EXTENSION OF THE BARRY M. GOLDWATER RANGE LAND WITHDRAWAL AND PROPOSED GILA BEND ADDITION LAND WITHDRAWAL

FINAL LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT APPENDICES

SEPTEMBER 2021

LEAD AGENCIES:

U.S. Department of the Air Force

U.S. Department of the Navy, U.S. Marine Corps

COOPERATING AGENCIES:

U.S. Department of the Interior

Bureau of Land Management

Fish and Wildlife Service

Arizona Game and Fish Department

Appendix A – List of References

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Appendix A
List of References

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Appendix B – BMGR Military Land and Airspace Use and Changes During the Current Land Withdrawal

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Appendix B
BMGR Military Land and Airspace Use and Changes During the Current Land Withdrawal

The BMGR is subdivided into BMGR East and BMGR West. BMGR East is supported by restricted airspace areas R-2301E, R-2304, and R2305. BMGR West is supported by restricted airspace area R-2301W. BMGR East and BMGR West are each subdivided into multiple land and airspace subranges to support diverse types of training and provide robust training capacities. The restricted areas overlying BMGR East and BMGR West are also subdivided as needed to support each active subrange by providing airspace for aircraft training maneuvers and the use of aircraft or ground-based weapons. Building facilities are located in both BMGR East and BMGR West that support training and the administration, operations, and maintenance of the range. Table B-1 describes the current and ongoing military land and airspace use areas for BMGR East along with a description of what has changed, if anything during the current land withdrawal period that began with the MLWA of 1999. Table B-2 provide similar descriptions for BMGR West. Figure B-1 shows land and airspace use at BMGR East and Figure B-2 shows land and airspace use at BMGR West.

Table B-1. Military Land and Airspace Use at BMGR East in 2020

Subrange, Area, or Facility	Ongoing Military Land and/or Airspace Use	Changes in Use During Current Land Withdrawal
BMGR East Land Area	BMGR East encompasses about 60 percent of the total area of the BMGR. The entire withdrawn and reserved land area of BMGR East continues to be used and needed to support the military purposes of the range.	No changes to the boundaries of BMGR East have occurred.
Gila Bend AFAF	Gila Bend AFAF is a developed installation that serves as the operational control, maintenance, and security center for BMGR East. It includes an 8,500-foot runway, six helipads, and other airfield facilities, as well as offices, workshops, storage, lodging, and other spaces. No active duty personnel or aircraft are permanently based at Gila Bend AFAF. Construction of a taxiway for the runway and a new air traffic control tower were assessed in an EIS and selected in a Record of Decision for implementation; however, funds to complete these projects have not yet become available.	Ongoing maintenance and upgrades of facilities at Gila Bend AFAF are routinely conducted, but the installation has not changed markedly during the current withdrawal.
Restricted Airspace	Air and ground operations at BMGR East are supported by restricted areas R-2301E, R-2304, and R-2305. The 56 FW at Luke AFB is the FAA-designated using and scheduling agency for these restricted areas. Airspace within R-2301E, R-2304, and R-2305 is reallocated to subranges or is aggregated into larger units as needed to support training, but the subrange lateral boundaries shown in Figure B-1 are typical. Aircraft not participating in training or test activities in an active subrange are prohibited from entering the subrange. Each subrange includes the corresponding BMGR East land area. Nonparticipating personnel are prohibited from entering a subrange surface area when hazardous training or test activities are active.	No changes to either the lateral boundaries or altitude dimensions of restricted areas R-2301E, R-2304, and R-2305 have occurred.

Subrange, Area, or Facility	Ongoing Military Land and/or Airspace Use	Changes in Use During Current Land Withdrawal
Numbered Ranges	Ranges 1, 2, 3, and 4 are relatively compact ranges, with similar standard layouts and located in open flat terrain, that are used for training aircrews in conventional visual delivery of air-to-ground gunnery, bombs, rockets, and missiles and radar delivery of bombs. Aircrews fly prescribed patterns to practice several types of weapons delivery tactics. A Range Control Officer is present on the ground for most training sessions to control aircraft traffic as aircrews make repeated practice attacks on bulls-eye types of targets or static simulated tactical targets. The accuracy of ordnance deliveries on targets is scored by automated electronic sensors. Only inert-practice ordnance is authorized for use at the numbered ranges. Although the targets of numbered ranges are clustered in relatively small areas, a larger airspace area is reserved for aircraft maneuvers. The airspace of active numbered ranges extends vertically from the surface to 24,000 feet AMSL and laterally to five nautical miles except where that radius is truncated by a restricted area or BMGR land boundary or boundary of another active subrange. Numbered range airspace is also extended from 8 to 12.5 nautical miles to the east or southeast to support patterns flown by aircraft for certain types of weapons deliveries.	No notable changes to Ranges 1, 2, or 4 have occurred during the current land withdrawal. Standard numbered range layouts have left- and right-side targets. The left (southwest) side of Range 3 was converted to a Helicopter Gunnery, Combat Search and Rescue Range during the current land withdrawal. (Refer to Combat Search and Rescue description in this table.)
Tactical Ranges	The land and lateral airspace boundaries of North, South, and East tactical ranges encompass areas ranging from 74,511 to 117,482 acres with diverse mountain and valley plain topography. Tactical ranges are designed to support advanced and realistic training in air-to-ground delivery of bombs, gunnery, rockets, and missiles on targets of military value. Targets simulate true-to-scale features such as airfields, aircraft or vehicles in revetments, air defense batteries, buildings, vehicle convoys, power stations, railroad yards, and armored vehicles. In aggregate, the tactical ranges provide several hundred fixed aim points for air-to-ground attack training. With the exception of only six tactical range targets approved for training with live high-explosives ordnance, aircraft deliveries of munitions are restricted to inert-practice variants of ordnance. More than 99 percent of the ordnance expended on tactical range targets are inert-practice rounds. In addition, mobile and fixed laser sensor systems provide aircrews with immediate feedback on their ability to illuminate targets with their aircraft's laser targeting system without the expenditure of ordnance. Enemy air defense threat simulation is provided at each tactical range to enhance the warfighting complexity, realism, and challenges presented to aircrews.	The infrastructure and configurations of the tactical ranges have been changed only modestly during the current land withdrawal. Some individual targets have been rebuilt and/or repositioned within existing core target impact areas. An existing inert weapons target in the North Tactical Range was converted to a live high-explosives target for training with air-to-ground rockets and missiles. Four automated threat emitters and six simulated surface-to-air missiles and the mobile and fixed laser sensor systems have been installed. A moving target has been built in the East Tactical Range. Targets on North Tactical Range and South Tactical Range have also been used for developmental testing of long-range artillery systems.

Subrange, Area, or Facility	Ongoing Military Land and/or Airspace Use	Changes in Use During Current Land Withdrawal
Air-to-Air ACTS Range	The airspace assigned to the Air-to-Air ACTS Range usually extends to the perimeter of R-2301E, but excludes airspace assigned to the Air-to-Air Firing Range; Numbered Ranges 1, 2, and 4; and North and South tactical ranges when these ranges are active. The ACTS Range supports training in air combat maneuvering, fighter intercepts, and other air combat activities (refer to Section 1.2.2.4). The ACTS Range can be expanded to include R-2304 and R-2305 and/or airspace within the Sells MOA to the east above the Tohono O'odham Nation. The surface footprint of the ACTS Range includes 16 electronic instrument sites of which 9 sites are located within BMGR East and 7 sites are in off-range locations. Fifteen of the instrument sites require an area of no more than 15 feet by 15 feet.	One electronic instrument site located in the Sierra Pinta Mountains of the CPNWR was removed during the current withdrawal period. The Air-to-Air ACTS Range is otherwise unchanged since the current withdrawal period began.
Air-to-Air Firing Range	The Air-to-Air Firing Range overlying BMGR East land supports training in air-to-air gunnery. The lateral boundaries of this range encompass almost 160 square miles and gunnery is restricted to altitudes of 10,000 feet AMSL and above. This range was once used daily, but the need for live-fire aerial gunnery training has been largely supplanted by the ACTS, which can simulate the use of all types of air-to-air weapons as aircrews engage in air combat maneuvers. By 1999, the use of the Air-to-Air Firing Range for aerial gunnery training had declined to fewer than 10 missions annually. During a training mission, an aerial target, which is deployed at the end of a long cable by a tow aircraft, is fired on by shooter aircraft. The ground surface below the firing range, which receives expended gunnery rounds and possibly target debris, is closed to personnel entry during gunnery missions.	No changes in the lateral boundaries or altitude limits of the Air-to-Air Firing Range have occurred during the current withdrawal period.
Helicopter Gunnery, Combat Search and Rescue (CSAR) Range	The Helicopter Gunnery/CSAR Range, referred to as the Rescue Range, occupies the left (southwest) side of Range 3, supports helicopter gunnery training and training of helicopter aircrews and CSAR personnel in combat infiltration and exfiltration. The range includes multiple fixed and pop-up targets that can be attacked with up to .50 caliber ammunition, six helicopter landing zones, and an area of about 400 acres where personnel may maneuver, engage targets, and perform simulated recues and extractions. When in use, airspace from the surface up to 8,000 feet AMSL is reserved for these activities.	The Rescue Range was developed in 2012. The new range is located within the original footprint of Range 3 target and explosive ordnance disposal (EOD) clearance areas.
Assault Landing Zones (ALZ/AUX)	AUX-6 and Stoval Auxiliary Airfield are World War II era triangular airfields used for certain limited training activities. AUX-6 is used for training C-130 and helicopter aircrews and ground support personnel in forward ALZ operations and as a personnel parachute drop zone. Stoval is used primarily during the semiannual Marine Corps WTI courses, ALZ operations for KC-130s and helicopters, and helicopter external load deliveries. AUX-11 is no longer used as an ALZ but serves as a site for exercise-specific communications operations.	Runways at AUX-6 and Stoval have been upgraded during the current withdrawal, but the dimensions of these airfields have not changed.

Subrange, Area, or Facility	Ongoing Military Land and/or Airspace Use	Changes in Use During Current Land Withdrawal
Helicopter Landing Zones and Parachute Drop Zones	Seventeen helicopter landing zones are located in the three tactical ranges combined for training aircrews and CSAR and special operations personnel in combat insertions and extractions. Parachute drop zones for training personnel are located southeast of AUX-6, in North Tactical Range, Gila Bend AFAF, and north of Range 3. Parachute drop zones for training personnel and dropping light (less than 1,500 pounds) tactical equipment are located at Stoval and AUX-6.	The helicopter landing zones and parachute drop zones were established during the current withdrawal.
Observation Points	Seven observation points, located in the three tactical ranges combined, support training for JTACs, tactical air control parties, forward air controllers, and fire control officers (hereafter all referred to as JTACs) and aircrews attacking ground targets. JTACs provide terminal control of weapons delivered by aircraft on ground targets by laser designating selected targets and controlling and sequencing aircraft by voice radio and data links. The observation points provide locations from which JTACs can operate during live ordnance delivery training.	The locations of six of the observation points have been slightly adjusted and a new point has been established during the current withdrawal period.
Small Arms Range	The Small Arms Range is used for training U.S. Border Patrol in the use of small arms.	U.S. Border Patrol has modified the Small Arms Range during the current withdrawal.
EOD Training and Disposal Range	The EOD Training and Disposal Range is used for training EOD technicians to conduct safe detonations of expended but unexploded ordnance. Detonation of high-explosive charges weighing up to 2,000 pounds net explosive weight is authorized at this range.	No notable changes to the EOD Range have occurred during the current withdrawal.
EOD Clearance Areas	EOD clearances occur annually, every 2 years, and every 10 years. Annual clearances entail removing expended ordnance and target debris on the ground surface within 50 feet of roads and target access ways and in the vicinity of targets to maintain safe work areas for maintenance, reconstruction, or replacement of targets. Every 2 years, ordnance and target debris on the surface is cleared inside a 300-foot radius around each inert-practice ordnance target and inside a 500-foot radius around each live high-explosives ordnance target. Every 10 years, ordnance and target debris on the surface is cleared inside a 1,000-foot radius around each inert-practice and live high-explosives ordnance target. No EOD clearances are conducted below the Air-to-Air Firing Range. Unexploded live high-explosives ordnance is detonated in place where it is found. No attempt is made to move or recover live high-explosives ordnance. No attempts are made to detect, excavate, move, or detonate ordnance that is fully buried.	Improvements in the accuracy of aircraft weapons systems for delivering ordnance on-target allowed DoD to reduce EOD clearance requirements in 2001 and 2007. As a result, the total area of BMGR East subject to EOD clearance is just 15 percent of the area that was subject to clearance in 1999.
Range Munitions Consolidation Point (RMCP) 1, 2, 3, and 4	RMCP 1, 2, 3, and 4 serve as range EOD and maintenance support areas. Expended munitions, munitions scrap, and target debris that is safe for handling is cleared from the three tactical and four manned ranges and transported to the RMCPs for demilitarization and decontamination processing before being released for off-range recycling or disposal. The RMCPs are also used as staging locations for target construction, maintenance, and replacement operations.	No notable changes to the RMCPs have occurred during the current withdrawal.

Subrange, Area, or Facility	Ongoing Military Land and/or Airspace Use	Changes in Use During Current Land Withdrawal
Sand and Gravel Excavation and Stockpile Areas	Excavation of sand and gravel from 10 wash locations in BMGR East and stockpiling of these materials at 5 sites for later on-range use is approved in accordance with the MLWA of 1999, but not yet implemented; a permit from Maricopa County is required (Luke AFB and MCAS Yuma 2018a). The sand and gravel may be used in target construction or road repairs as needed.	Excavation of sand and gravel for on-range use from the BMGR East was first approved during the current withdrawal. While approved, no material has been extracted.

Table B-2. Military Land and Airspace Use at BMGR West in 2020

Subrange, Area, or Facility	Ongoing Military Land and/or Airspace Use	Changes in Use During Current Land Withdrawal
BMGR West Land Area	BMGR West encompasses about 40 percent of the total area of the BMGR. The entire withdrawn and reserved land area of BMGR West continues to be used and needed to support the military purposes of the range.	No changes to the boundaries of BMGR West have occurred.
Restricted Airspace	Air and ground operations at BMGR West are supported by restricted area R-2301W. The FAA-designated using and scheduling agency for R-2301W is MCAS Yuma. Airspace within R-2301W is reallocated to subranges or is aggregated into larger units as needed to support training, but the subrange lateral boundaries shown on Figure B-2 are typical. Aircraft not participating in training or test activities in an active subrange are prohibited from entering the subrange. Each subrange includes the corresponding BMGR West land area. Nonparticipating personnel are prohibited from entering a subrange surface area when hazardous training or test activities are active.	No changes to either the lateral boundaries or altitude dimensions of restricted areas R-2301W have occurred.
Cactus West Target Complex and Hazard Area III	The Cactus West Target Complex includes a bull's-eye target, located in a 1,500-foot radius bladed circle, for conventional bombing practice and two berm and panel targets for strafing practice. Ordnance is restricted to inert-practice munitions. Airborne and ground laser use is supported with certain safety conditions. The complex also serves as a live-fire range area for two Convoy Security Operations courses. The target bull's-eye is also a jettison area for unarmed, live, high-explosives ordnance, and drop tanks. Hazard Area III encompasses the Weapons Danger Zones (WDZs), Surface Danger Zones (SDZs), and Laser Surface Danger Zones (LSDZs) associated with weapons use.	No changes to the Cactus West target have occurred, but the Convoy Security Operations courses were developed, and Hazard Area III was established during the current withdrawal.
Urban Target Complex	The Urban Target Complex provides a simulated urban setting with streets, 240 buildings, and vehicles for training in precision air-to-ground attack in densely developed and populated areas. The Complex is located inside the 1,500-foot radius circle of a former bladed bull's-eye target and is fenced. The complex also has a moving land target, which consists of a remotely controlled vehicle that pulls a target sled on an oval track. Another feature of the complex is a Convoy Security Operations Course, which is also described in this table. Airborne and ground laser use is supported with certain safety conditions. Hazard Area IV encompasses the WDZ, SDZs, and LSDZs associated with weapons use at the complex.	The complex has been upgraded, but its dimensions have not changed. The Convoy Security Operations Course was developed, and Hazard Area III was reshaped during the current withdrawal.

Subrange, Area, or Facility	Ongoing Military Land and/or Airspace Use	Changes in Use During Current Land Withdrawal
Tactical Aerial Combat Training System (TACTS) Range High and Low	The TACTS Range is an electronically instrumented range that supports air-to-air and air-to-ground combat training. The electronic architecture of the TACTS Range is composed of 27 fixed-position and 17 mobile-position electronic instrument sites that are used to track, record, and replay the simultaneous actions of up to 36 aircraft and generate electronic simulation and scoring of air-to-air, air-to-ground, and ground-to-air weapons use. The air-to-ground component of the TACTS Range includes 112 individual tactical targets situated in 11 complexes that simulate airfields, power stations, fuel storage facilities, buildings, railway facilities, anti-aircraft missile and gun positions, and military vehicles. No munitions are fired or otherwise released on this electronically scored range. Airborne laser use is supported on authorized targets within the TACTS Laser Range. Chapter 3, Figure 3.2-1 shows the dimensions of the TACTS Range High and Low airspace.	The TACTS Range has been upgraded, but its dimensions have not changed during the current withdrawal.
AUX-2	AUX-2 provides a hard-surfaced airstrip to train aircrews of KC-130 aircraft to operate in and out of a bare-bones ALZ in a forward area. AUX-2 is also used as a staging area or forward arming and refueling point for helicopter operations. A bivouac site is located adjacent to the KC-130 airstrip for ground units supporting air operations. The simulated flight deck of a Navy landing helicopter assault ship or Navy landing helicopter dock ship that was used for training AV-8B aircrews is no longer in use.	Retirement of the simulated landing helicopter assault/dock deck for training AV-8B aircrews at AUX-2 was replaced by the Auxiliary Landing Field completed in 2015 and described in the next row of this table.
F-35B Auxiliary Landing Field (airfield identifier is KNOZ)	Construction of KNOZ was completed in 2015 to support field carrier landing practice training of F-35B pilots. KNOZ is an approximately 320-acre facility that includes three simulated landing helicopter assault decks, a flight control tower, an aircraft maintenance shelter, a refueling apron, and a fire and rescue shelter.	KNOZ was developed during the current withdrawal to train F-35B pilots.
ALZ Hawkeye	ALZ Hawkeye is a 90-foot by 3,500-foot dirt airstrip that supports training for KC-130 operations out of a primitive forward airfield. This facility was developed by repurposing and upgrading an existing auxiliary airfield, which served as an electronically scored, air-to-ground target simulation that was part of the TACTS Range. The simulated auxiliary airfield is now an operational ALZ, but the TACTS instrumentation was left in place and the ALZ continues to function as an electronically scored target.	ALZ Hawkeye became operational in 2020 during the current withdrawal.
Parachute Drop Zones (DZ)	Twenty-four parachute DZs are currently designated. Four DZs–located east of AUX-2 and at ground support areas 53, 54, and 83–are approved for parachute cargo drops, which require retrieval by an off-road combat fork lift. The remaining DZs are approved for use by military personnel only and are located at or along roads or in ground support areas so that no off-road driving is required to retrieve these troops.	Personnel DZs were designated during the current withdrawal. Since 2007, parachute troops are restricted to designated DZs that have been surveyed and certified for safety.

Subrange, Area, or Facility	Ongoing Military Land and/or Airspace Use	Changes in Use During Current Land Withdrawal
Known-Distance Rifle and Pistol Ranges	The Known-Distance Rifle and Pistol ranges are qualification ranges used primarily to train and qualify MCAS Yuma personnel in the use of small arms. The rifle and pistol ranges are located in Hazard Area I.	No notable changes to the Rifle and Pistol ranges have occurred during the current withdrawal.
Small Arms Live-Fire Static and Maneuver Ranges	The Small Arms Live-Fire Static and Maneuver Ranges, known as Ranges 01 and 01A, are located in Hazard Area I in and adjacent to a retired sand and gravel borrow pit. These ranges support training for small infantry teams. Range 01 provides static simulated-fighting positions from which troops fire at fixed targets with infantry arms. Range 01A includes simulated small buildings and other features that provide an area where infantry teams can maneuver and engage targets in a realistic setting.	Ranges 01 and 01A were developed during the current withdrawal.
Multi-Purpose Machine Gun Range	The Multi-Purpose Machine Gun Range is located in Hazard Area II at the inactive Panel Stager air-to-ground bombing target. Ground-to-ground machine gun fire of .50 caliber and smaller and other small arms can be directed from vehicle-mounted or troop-carried weapons at target sets.	The Multi-Purpose Machine Gun Range was developed during the current withdrawal.
Convoy Security Operations Courses	Four Convoy Security Operations courses are designed to train troops to protect vehicle convoys in combat theaters being prepared to recognize, counter, and defeat threats from hostile forces. Static and pop-up targets that simulate threats are placed in ambush scenarios along the established roads used to access the Cactus West Target and Urban Target complexes. Convoy Security Operations courses 1 and 2 are located in Hazard Area III to the north of the Cactus West target. The Murrayville West and East Security Operations courses are located in Hazard Area IV on either side of the road that leads to the Urban Target Complex. Ground-to-ground machine gun fire of .50 caliber and smaller is directed from vehicle-mounted or troop-carried weapons at target sets designed to simulate ambush attacks by hostile forces.	The four Convoy Security Operations courses were developed during the current withdrawal.
Combat Village Infantry Training Area	Combat Village simulates a small building complex adjacent to a railroad. This facility is used as an electronically scored TACTS Range target and as a training area for instructing small infantry teams in reconnaissance, assault, and defense tactics. Only blank small arms munitions and a special effects small arms marking system are authorized for use at this infantry training site.	Combat Village is a long-established training site that has been upgraded, but not changed notably, during the withdrawal.
Ground Support Areas	Thirty-two undeveloped ground support areas provide deployment sites for ground units engaged in training exercises. Most ground troop deployments are coordinated with aviation training exercises to enhance the realism of air-ground training evolution for both elements. The 27 ground support areas that are west of 113° 53' west longitude are approved for landings by helicopters or tilt-rotor aircraft. In accordance with Sonoran pronghorn protection measures, aircraft landings are not permitted at the five ground support areas east of this longitude.	Ground support areas have been used since the early 1990s. Aircraft landings at the five easternmost support areas were prohibited during the current withdrawal. Some ground support areas have been used as temporary gun positions in support of long-range artillery testing.

Subrange, Area, or Facility	Ongoing Military Land and/or Airspace Use	Changes in Use During Current Land Withdrawal
Chemical, Biological, Radiological, and Nuclear Confidence Chamber	Located near the western boundary of the BMGR between the rifle and pistol ranges and AUX-2, the Chemical, Biological, Radiological and Nuclear Confidence Chamber is a block building that accommodates up to 16 occupants. Marines must be trained to recognize incidents involving chemical, biological, radiological, or nuclear materials and capable of taking appropriate protective measures and completing their mission in an environment contaminated by these materials. A component of this training involves controlled exposure of troops to an environment contaminated with tear gas to test and build confidence in their abilities to manage themselves, take protective action, and meet mission objectives. The Confidence Chamber provides a controlled and safe training facility.	The Confidence Chamber was developed during the current withdrawal.
Canon Air Defense Complex	The Canon Air Defense Complex, a permanent built-up facility of about 192 acres, provides administrative, maintenance, and training areas for a Marine Air Control Squadron. More recently, a dirt runway was developed at the complex to support training operations at BMGR West that involve UAS aircraft. Special operating procedures allow UAS aircraft to transition from and to the Canon Complex and R-2301W, which is less than 2 nautical miles to the east.	The Canon Complex is a long-standing facility. The UAS runway at the complex was developed during the current withdrawal.
AUX-II Field Ammunition Supply Point	The field ammunition supply point, located about 1,500 feet northwest of AUX-2, provides temporary secure storage for munitions used by ground units during field exercises, primarily during semi-annual WTI Course.	The field ammunition supply point was developed during the current withdrawal.
Munitions Treatment Range	The Munitions Treatment Range is used to train personnel in the use of demolition explosives including the demolition of expended, but unexploded, ordnance.	No changes to the Munitions Treatment Range have occurred during the current withdrawal.
Live Ordnance and Drop Tank Jettison Area	The Cactus West Target bull's-eye is used as the Live Ordnance and Drop Tank Jettison Area for aircraft experiencing difficulties that warrant a precautionary jettisoning of external stores prior to landing at MCAS Yuma. Live ordnance is jettisoned in an unarmed condition and is later recovered by EOD personnel.	Jettison Area was moved from inactive Panel Stager Target to Cactus West during the current withdrawal.

Figure B-1. BMGR East Subranges and Operating Areas

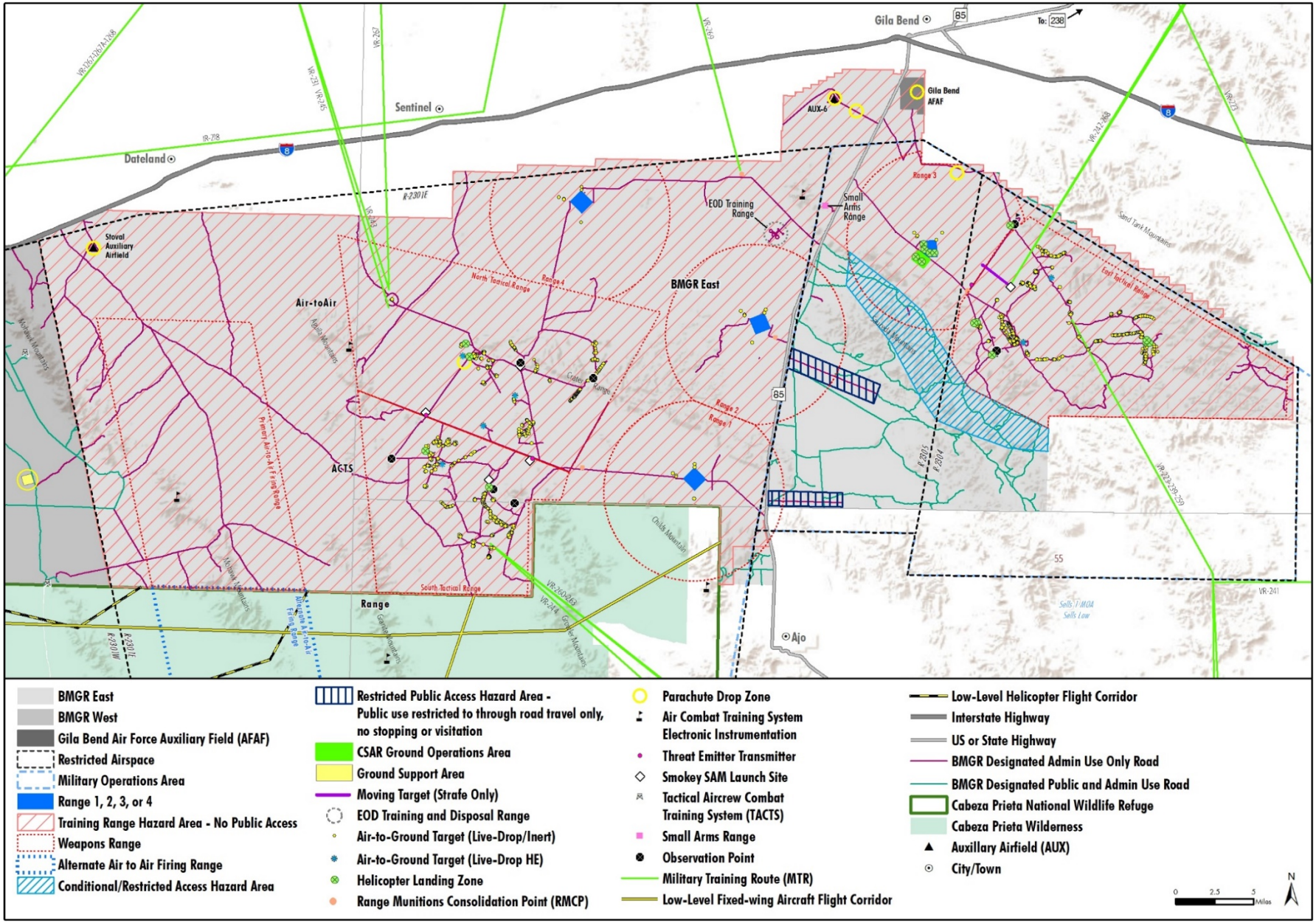
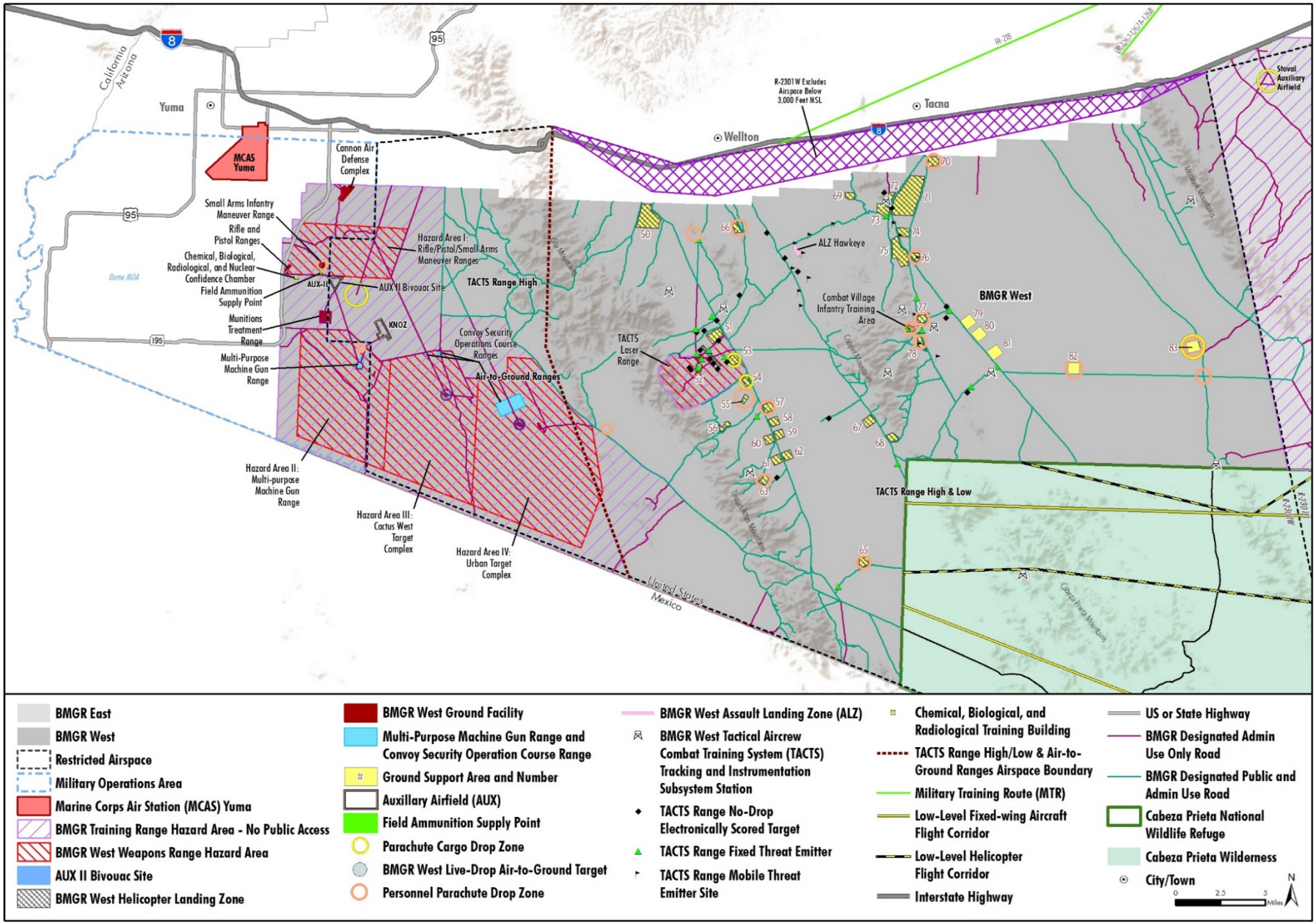


Figure B-2. BMGR West Subranges and Operating Areas



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Appendix C – 1994 Memorandum of Understanding between the DOI, Navy, and Air Force Relating to the Cabeza Prieta National Wildlife Refuge

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TO LISA

MEMORANDUM OF UNDERSTANDING

BETWEEN

DEPARTMENT OF DEFENSE

AND

DEPARTMENT OF INTERIOR

RELATING TO THE

CABEZA PRIETA NATIONAL WILDLIFE REFUGE

AUTHORITY

This Memorandum of Understanding (MOU) is made and entered into between the Department of the Air Force (Air Force) and the Department of the Navy (Navy), branches of the Department of Defense, hereafter referred to as Military, with the United States Fish and Wildlife Service (Service), an agency of the Department of Interior (Interior).

The Service enters into this MOU pursuant to the authority provided by the Wildlife Administration Act of 1966, the Military enters into this MOU pursuant to the authority provided by Public Law 99-606, the Military Land Withdrawal Act of 1986. This MOU is specific to military operations involving the Service managed Cabeza Prieta National Wildlife Refuge (Refuge) located within the Barry M. Goldwater Air Force Range (Range). Service management of the Refuge is the responsibility of the Refuge Manager. Military administration of the Range is managed by Air Force through the 56th Fighter Wing, Luke Air Force Base (AFB)on the east side (R-2301E), and by Navy through Marine Corps Air Station (MCAS) Yuma on the west side of the Range (R-2301W). Portions of both Range sections overlay the Refuge.

APPLICABLE LAW

PL 99-606, Military Lands Withdrawal Act of 1986; National Wildlife Refuge System Administration Act of 1966 (16 USC 668dd-668ee); Refuge Recreation Act of 1962 (16 USC 460 et seq); PL 91-190, National Environmental Policy Act (NEPA) of 1969 (42 USC 4321, 4331-4335 and 4341-4347); PL 93-205, The Endangered Species Act of 1973 (16 USC 1531); PL 95-579 Federal Lands Management Policy Act of 1976 (43 USC 1701

et seq); PL 101-628 301 (f), Arizona Desert Wilderness Act of 1990; The Federal Aviation Administration Act of 1958.

PURPOSE AND OBJECTIVES

The primary purpose of the Refuge is the conservation and development of natural wildlife resources. The primary mission of the Military with respect to airspace overlying the Refuge is to provide realistic, advanced aviation training in the interest of National Defense. This MOU is entered into for the purposes of enhancing the ability of the parties to achieve their primary missions, minimizing potential conflicts between the program objectives, and providing a framework for cooperation among the parties. This MOU replaces the existing MOU dated January 2, 1991, which expires January 2,1995, and the Local Agreement between the Commanding Officer, 56th Fighter Wing, Luke AFB and the Refuge Manager dated February 13,1991.

WHEREAS, both the Military and the Service have legitimate missions within the Range, recognized by statute, and

WHEREAS, both the Military and the Service acknowledge the importance of the Range to the National Defense mission, and

WHEREAS, by virtue of Public Law 99-606 and other Acts both the Military and the Service have responsibilities related to Refuge purposes and the protection of endangered and threatened species and other native flora and fauna, and for the maintenance and conservation of wilderness, and

WHEREAS, since the ability of the Service to reach definitive conclusions regarding impacts of Military overflight activities on wildlife in the Refuge is hindered by limitations on the availability of relevant scientific data, both the Military and the Service recognize that the acquisition of additional such information is desirable, and

WHEREAS, the Service, through the Refuge Manager, has the authority and responsibility to manage ground activities pursuant to Refuge compatibility standards prescribed by the National Wildlife Refuge System Administration Act, and this agreement, and

WHEREAS, the Federal Aviation Administration has the authority and responsibility to regulate and control the use of all airspace pursuant to the Federal Aviation Administration Act of 1958, and

WHEREAS, the airspace overlying the Refuge is part of the restricted airspace of R-2301E and R-2301W, which has been established for military use in accordance with Federal Aviation Administration regulations, and

WHEREAS, the Military, through Luke AFB and MCAS Yuma, schedules and controls the restricted airspace overlying the Refuge in accordance with Federal Aviation Administration regulations and this agreement , and

WHEREAS, designation of the Range has provided mutual physical security and encroachment limitation from non-mission secondary uses to both the Service and the Military, and has enhanced the overall value of the Refuge by the Military's contribution to search and rescue services, assistance in wildlife protection projects, and enhancing the capabilities of the Service through sharing of manpower and material, and

WHEREAS, the Military and the Service have cooperated in the management and protection of the Refuge and Range, to include visitor management and services, research and field study funding, watering hole development, and establishment of Areas of Critical Environmental Concern, and

WHEREAS, the successful management, development, administration, and protection of Refuge natural wildlife resources require: (1) the management of research areas and facilities, roads, trails, fences, wells, catchments, radio repeaters, visitor service sites and other ground facilities; (2) the regulation, management and monitoring of public and other non-military access and use; (3) the monitoring of potential impacts to Refuge resources, and (4) the occasional scheduling of airspace for natural resource monitoring, conduct of wildlife surveys and facility maintenance.

NOW THEREFORE, the Military and Service, in consideration of the mutual benefits to be derived, hereby agree as follows:

1. While this MOU focuses primarily on airspace coordination issues, the parties agree to the following provisions relating to ground activities and facilities:

a. The Military and the Service acknowledge that certain ground activities in the Refuge have been conducted by the Military under previous agreements, aspects of which have concerned the Service. This agreement neither accepts nor prohibits any aspects of those ground activities. On the contrary, both the Military and the Service agree to continue to address areas of mutual concern arising out of the use of ground facilities and acknowledge specifically the desirability of eventually reaching a comprehensive separate agreement addressing the use and operation of ground facilities at the Childs Mountain site.

b. The Service will administer all third party permits associated with land use on the Refuge such as research and rights-of-way.

c. No new roads, structures, facilities, permanent or temporary, shall be constructed or

placed upon the Refuge by the Military except as authorized and permitted by the Service in any separate agreement for ground facilities.

d. The Service shall have unlimited access to the Refuge for all necessary management activities, but agrees that it will not enter designated areas during live fire exercises conducted pursuant to Paragraph 5 in this section.

e. Military personnel are prohibited from entering upon and carrying or using firearms or ammunition on the Refuge unless permitted by the Refuge Manager. It is agreed that individuals specifically designated for guard duty may possess firearms within the Refuge to protect Government property. Military personnel shall not enter that part of the Refuge which has been designated by legislation as a Wilderness Area by motorized vehicle unless permitted by the Refuge Manager, except in emergencies involving the safety and welfare of human life, and in the protection of Government property. In such a case requiring emergency entry into the Refuge, the Military will notify the Refuge Manager as soon as possible to coordinate access needs.

2. Range airspace, including that area overlying the Refuge, is primarily utilized for military aviation training in support of National Defense. Occasional use of such airspace by the Service will be scheduled and coordinated with the Military for utilization of refuge management purposes. The Military agrees to furnish the Service, from time to time, if available, aircraft for purposes of game inventory, water hole location and maintenance, and patrol.

3. All military training flights over the Refuge shall maintain a minimum altitude of 1,500 feet above ground level (AGL), except along established routes depicted in Attachment 1 of this MOU and along military training routes (MTRs) described in Department of Defense Flight Information Publication AP/1B. Any proposed changes to the routes depicted in Attachment 1 or to published MTRs located within the Refuge boundary will require an amendment to this document. Exceptions to flights below the 1.500 feet AGL limit, and outside the MTRs and Low Altitude Training Routes identified in Attachment 1 are not authorized except as noted in Paragraph 6 of this section.

4. Attachment 1 of this agreement depicts existing low level flight corridors that are used during spring and fall training for the Weapons and Tactics Instructors Course (WTIC). The Military will provide the specific dates and planned flight activity along the low level routes of WTIC to the Refuge Manager thirty days prior to the commencement of each exercise. It is acknowledged by each party to this agreement that circumstances could arise that could require this notification period from the military to be reduced. The Military shall immediately notify the Refuge Manager of any changes in the WTIC schedule forcing such training to be conducted at times other than indicated. The Refuge Manager will provide to the Military, prior to the WTIC, any new natural resource information so that it may be included in WTIC troop and pilot briefings.

5. The Military agrees that the use of airspace overlying the Refuge for live fire exercises shall be confined to air-to-air weaponry and that all such firing practice shall be conducted at altitudes of 5,000 feet mean sea level (MSL) upward. The Military is presently using electronically scored aerial targets and will confine itself to that means unless mission requirements mandate the use of other methods. The Military further agrees there shall not at any time be any air-to-ground targets within the Refuge. The Military will provide 60 days written notice to the Refuge Manager prior to the commencement of any air-to-air live fire exercises that involve airspace overlying the Refuge. It is acknowledged by each party to this agreement that circumstances could arise that could require this notification period from the Military to be reduced. The Military shall immediately notify the Refuge Manager of any changes in the Air-to-Air schedule necessitated by weather phenomena or aircraft availability forcing such firing operations to be conducted at times other than indicated. Pursuant to this understanding,

a. The Refuge Manager shall be responsible for the issuance of access permits to individuals proposing travel within the Refuge.

b. The Military Liaison Officers will be responsible for providing live firing schedules to the Refuge Manager in the 60 day advance time frame.

c. The Refuge Manager agrees to require non-government individuals traveling in the Refuge to execute military Hold Harmless Agreements prior to issuance of access permits. The Military will provide Hold Harmless Agreement forms. The Refuge Manager will retain completed forms for a period of three years, unless otherwise requested by the Military Liaison Officer.

d. The Refuge Manager agrees to deny public access permits to accommodate Live Firing schedule changes. The Refuge Manager further agrees to attempt to revoke, or delay for up to 48 hours, permits already issued. Revocation/delay efforts will include a telephone search for the permit holder and, if necessary, conduct a ground search to locate visitors and move them outside the potential danger area.

6. The Military agrees to rigidly enforce flight restrictions over the Refuge. However, in accordance with Military and FAA regulations, fixed and rotary wing aircraft flying visual flight rules (VFR) may deviate from these restrictions in order to remain clear of clouds and maintain VFR flight or to maintain safety of flight. Aircraft that are unable to safely reach or maintain the appropriate altitude will fly at the highest altitude possible while continuing to maintain safety of flight. Course deviations deemed necessary for the safety of flight are permitted.

7. The Military agrees to notify the Refuge Manager immediately, or as soon as practicable, of course deviations outside the limits of this agreement which are deemed

necessary by the pilot for safety consideration. Alleged violations of the 1,500 AGL minimum altitude outside mutually approved corridors and MTRs due to pilot error or indiscretion will be reported by Refuge staff to the appropriate Liaison Officer for either R2301E or R2301W as soon as possible.

8. In the event of an aircraft mishap in the Refuge, the following procedures will be followed:

a. The Luke AFB Command Post Duty Officer, or the MCAS Yuma Operations Duty Officer, as appropriate, shall notify the Refuge Manager of any downed or missing aircraft suspected to be located in the Refuge as soon as initial air search/rescue aircraft have been dispatched.

b. The Refuge Manager will, within his/her capability, dispatch personnel to nearby field locations to serve as guides for ground search crews as necessary.

c. After the crews and security sensitive equipment have been recovered and Military guards have been posted at the crash site, the Military agrees to temporarily terminate further recovery operations until paragraph "d" below has been complied with. Flight Safety Investigators and guard relief will be inserted by helicopter in remote areas.

d. Within 24 hours, representatives of the Military and the Service will meet to plan removal of the wreckage. The foremost consideration in this planning process will be to provide the maximum protection to Refuge vegetation and terrain features. The Military will assume responsibility for restoration of vegetation and terrain damage as identified by the Refuge Manager.

9. To enhance communications between the Military and the Refuge, and to facilitate the implementation of this agreement, Military agrees to appoint designated Refuge Liaison Officers at Luke AFB and MCAS Yuma to work in cooperation with the Refuge Manager. These representatives shall all meet together at least annually. More frequent telephone contact and/or meetings between the Refuge Manager and individual Liaison Officers will be conducted as necessary to coordinate specific operations, issues or information sharing.

10. In the event problems are identified which can not be resolved among the Refuge Liaison Officers and the Refuge Manager, the following dispute procedures will be followed:

a. Should the dispute procedures be invoked, all provisions of this MOU shall remain in force and effect during resolution of the dispute.

b. The Refuge Manager and a Service Refuge Program support staff member, or other appropriate staff, will meet with the appropriate Base/Wing Commander and respective Liaison Officer to discuss the pertinent issue and seek resolution. If both branches of the Military have an interest in the dispute, lead Military representation will be agreed upon mutually by the two branches for this process. During this informal dispute resolution process, these individuals, or their designees, shall meet as many times as necessary to discuss and attempt in good faith to resolve the dispute.

c. In the event informal resolution is not successful, the originating party shall effect service on the other party of a written statement clearly invoking these dispute procedures, and containing a viable basis for the dispute. Such statement shall include the disputing, or originating, party's position on the dispute, and the technical, legal, scientific/factual information underlying the dispute. It shall also include the originating party's proposed solutions to the dispute. The originating party is the party which proposes actions that, if conducted, would have the effect of either adding to, deleting or otherwise modifying conditions of this agreement, or offering a new interpretation to past mutual interpretation of this agreement and its predecessors. Any such proposals or actions could represent a basis for the dispute resolution process described in this section. Mutually agreeable modifications can be negotiated in the form of an amendment to this MOU.

d. Upon receipt of the written statement, the other party will then have 15 days to consider the originating party's position and to continue efforts to informally resolve the dispute. If following those efforts a resolution is not reached, the other party will serve a written response to the disputing party's position.

e. If upon evaluation of the written positions the dispute has not been resolved, the appropriate Military Commander or designee will meet with the Service Regional Director, or Assistant Regional Director of Refuges and Wildlife as designee, in an attempt to seek local resolution. This meeting would be immediately proceeded by a joint briefing session involving appropriate staff from the two parties presenting agency positions.

f. Following this meeting and discussions the appropriate Military Commander and the Service Regional Director shall have 21 days to review the dispute, unanimously resolve it, and issue a written decision and management guidance. The focus of the review will be a determination of whether the disputed activity will materially interfere with the ability of either party to accomplish its primary mission, or whether the dispute involves conflict between each agency attempting to comply with legal mandates where no other alternatives are available. If local parties are unable to unanimously resolve the dispute, the written statement of dispute and the other party's response will be submitted to the Senior Executive Committee (SEC) for resolution within seven days after the close of the 21 day resolution period.

g. The SEC will serve as the forum for resolution of disputes for which agreement has not been reached locally. The SEC is composed of a representative designated by the Secretary of Interior and a representative designated by the Secretary of the Air Force or the Secretary of the Navy, as appropriate. The SEC members shall, as appropriate, confer, meet and exert their best efforts to resolve the dispute and issue a written decision. If unanimous resolution of the dispute is not reached within 21 days, the originating party's representative on the SEC shall have an additional 60 days to arrange for its agency to issue its final written position on the dispute. The other party shall have 60 days to consider and respond with its final agency position on the dispute. If following the exchange of final agency positions the dispute remains unresolved, either party may invoke the executive dispute resolution procedures of Presidential Executive Order 12146.

11. The Military and the Service agree to cooperate in formal research projects involving assessments of the potential impacts to Refuge resources from aircraft overflights, to the degree that funding permits. Methodology and protocols for such research projects shall be developed through coordination between the Military and the Service. It is further agreed that a monitoring project will be conducted to facilitate a comparison of on-the-ground conditions to flight activities in an attempt to determine if there are any detectable wildlife population impacts at conducted flight levels. To assist in this project the Military agrees to provide to the Refuge Manager quarterly summaries of all Refuge overflights below 1,500 feet AGL which will include date, time, a flight path map for each flight, aircraft type and altitude through the Refuge. The Refuge Manager will provide to the Military the results of any research or surveys related to natural resources of the Refuge, and will work with the Military to build a Geographic Information System/Database which will aid future coordination issues relating to the Refuge. Flight character and frequency data will be overlaid on Refuge wildlife resource maps to aid in the determination of possible long-term or cumulative impacts at different levels of Military flight activity, and to help evaluate the need to adjust Low Level Flight Corridor alignment to avoid areas found to be sensitive to this activity.

12. Mutually satisfactory written agreements between the Refuge Manager and the Commanding Officer, 56th Fighter Wing, Luke Air Force Base, and/or Commanding Officer, Marine Corps Air Station Yuma may be executed to satisfy immediate, local and short-term requirements of each party, provided that such agreements are consistent with and do not contravene the conditions of this MOU.

13. The duration of this MOU shall begin with the date of signing this MOU and end with the expiration date of PL 99-606, which is November 6, 2001. Terms of this MOU may be renegotiated, renewed and/or amended as necessary with the mutual consent of all parties.

IN WITNESS WHEREOF, the signatures have been affixed hereto on the respective dates herein indicated by authorized representatives of the Department of the Air Force, Department of the Navy, and the Department of the Interior.

FOR DEPARTMENT OF THE AIR FORCE DATE 21 NOV 94

, BG, USAF

Commander 56th Fighter Wing
United States Air Force

FOR DEPARTMENT OF THE NAVY DATE 21 NOV 94

Col USMC

Commanding Officer
Marine Corps Air Station
Yuma Arizona

FOR DEPARTMENT OF THE INTERIOR DATE 21 NOV 94

Regional Director, Region 2
United States Fish and Wildlife Service

Memorandum of Understanding
Between
Department of Defense
And
Department of Interior
Relating To The
Cabeza Prieta National Wildlife Refuge

Attachment 1

1. Low level flight corridors used during Spring and Fall Weapons and Tactics Instructor (WTI) Course. Route width is 2 nautical miles either side of centerline.

A. Fixed Wing

Route 1

a. 32 23 00 N 113 57 40 W
b. 32 22 45 N 113 18 00 W
c. 32 23 15 N 113 06 00 W
d. 32 28 30 N 112 55 30 W

Route 2

a. 32 18 00 N 113 57 40 W
b. 32 07 45 N 113 24 00 W
c. 32 17 00 N 113 15 00 W
d. 32 31 00 N 113 09 45 W

B. Rotary Wing

Route 1

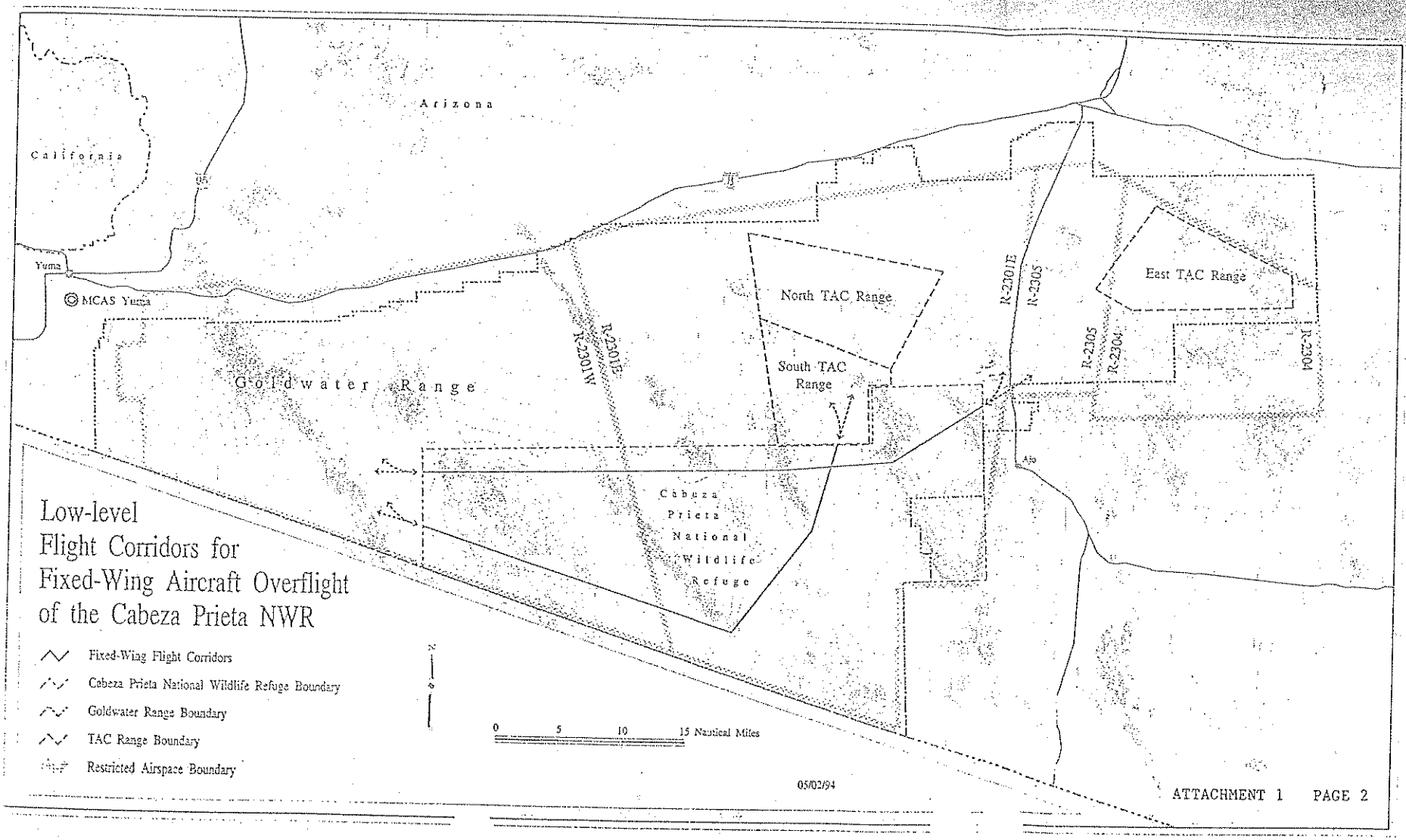
a. 32 17 00 N 113 57 30 W
b. 32 13 30 N 113 48 30 W
c. 32 09 00 N 113 26 30 W
d. 32 11 30 N 113 15 30 W
e. 32 23 00 N 113 06 00 W
f. 32 30 00 N 113 00 00 W

Route 2

a. 32 25 00 N 113 58 00 W
b. 32 24 36 N 113 39 00 W
c. 32 21 06 N 113 25 00 W
d. 32 17 48 N 113 15 00 W
e. 32 17 00 N 113 02 00 W
f. 32 15 30 N 112 56 00 W

Ajo Route

a. 32 25 00 N 113 49 00 W
b. 32 19 30 N 113 36 00 W
c. 32 09 00 N 113 26 30 W
d. 32 09 30 N 113 17 00 W
e. 32 16 00 N 113 14 30 W
f. 32 25 00 N 113 20 30 W


Arizona
California
Yuma
MCAS Yuma
Goldwater Range
R-2301W
R-2301E
North TAC Range
South TAC Range
R-2301E
R-2305
East TAC Range
R-2305
R-2304
R-2304
Cabeza Prieta National Wildlife Refuge
Low-level
Flight Corridors for
Fixed-Wing Aircraft Overflight
of the Cabeza Prieta NWR
Fixed-Wing Flight Corridors
Cabeza Prieta National Wildlife Refuge Boundary
Goldwater Range Boundary
TAC Range Boundary
Restricted Airspace Boundary
N
0 5 10 15 Nautical Miles
05/02/94

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Appendix D – Transportation Routes in the BMGR Perimeter

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Appendix D
Transportation Routes in the BMGR Perimeter

Beyond the boundary of the BMGR, major transportation routes in perimeter study area surrounding the range include Interstate 8, U.S. Highway 95, and State Routes 85 and 195 (refer to Chapter 3, Figure 3.6-1). Intercontinental freight and passenger rail service connects southern California ports with El Paso, Texas and beyond. The Union Pacific Railroad Sunset Route is the primary railroad line active in the area.

Major Roads and Ports of Entry

The western and northwestern perimeter study area of the BMGR in Yuma County serves as an economic and transportation nexus among Arizona, California, and Mexico. The major urban markets of San Diego, Los Angeles, Phoenix, Las Vegas and Tucson are all within a 5-hour drive. In this area, Interstate 8, U.S. Highway 95, State Route 195, and Business 8 (32nd Street and 4th Avenue) have been identified as Regionally Significant Routes. Interstate 8 and Avenue 3E between Interstate 8 and MCAS Yuma are designated as a part of the Strategic Highway Network, a roadway system designed to accommodate military needs including emergency mobilization (YMPO 2013).

In the western perimeter study area, efforts to improve access to the Mexican border have led to improvements to U.S. Highway 95 and the development of State Route 195 (YMPO 2013). U.S. Highway 95 connects the U.S.-Mexico border at the San Luis I Port of Entry, which served about 28,400 commercial vehicles, 3.28 million noncommercial vehicles, as well as 2.64 million pedestrians (including agricultural workers) and bicyclists in 2018 (ADOT 2013a, Eller College of Management 2020). U.S. Highway 95 traverses the center of the Yuma metropolitan area as a four-lane surface street that also serves as East/West 16th Street and South Avenue B and courses through Somerton and San Luis along other surface streets. State Route 195 was completed in 2010 to bypass the urban centers of Yuma, Somerton, and San Luis to the east and connect Interstate 8 with the San Luis II Port of Entry (YMPO 2013; ADOT 2013b). State Route 195 improves the movement of large commercial trucks to and from the international border and relieves these urban areas of heavy truck traffic, congestion, and noise. State Route 195, which traverses BMGR West just inside its western boundary, is a four-lane, limited-access highway from the point that it crosses the northern boundary of the range to its intersection with County Avenue B near San Luis. As a result of the lack of entrances to or exits from State Route 195 along its segment within the western fringe of BMGR West, the highway provides a beneficial barrier against trespass entry to the range and the development of incompatible land use adjacent to the range boundary.

Along the northern perimeter of the range, Interstate 8 traverses in an east-west direction through Yuma and Maricopa counties. In the northeastern perimeter study area at Gila Bend, Interstate 8 intersects State Route 85. State Route 85 travels in a north-south direction from Interstate 10 and is used by truckers as a bypass route for the Phoenix metropolitan area (ADOT 2017). State Route 85 passes through the BMGR, Ajo, and OPCNM before reaching the Lukeville Port of Entry at the international border. In 2018, the Lukeville Port of

Entry served 411,200 personal vehicles, about 830 commercial vehicles, and 46,500 pedestrians (including agricultural workers) and bicyclists (ADOT 2013a, Eller College of Management 2020).

Traffic on the major routes in Yuma County (Interstate 8, U.S. Highway 95) is predicted to double by 2030; however, most of the traffic growth will be associated with port activity in Mexico or east-west transport of goods among California, Arizona, Nevada, and Mexico and not due to BMGR administrative or public access.

Other State and Federally Managed Roads

In addition to the major public roadways in the BMGR perimeter study area, roads within the CPNWR, SDNM and other BLM and Reclamation public lands provide access for recreation in the region and access to the BMGR. Two roads within the CPNWR provide a through connection from public access roads in BMGR West to OPCNM and State Route 85 from the south. Roads on BLM-administered land near Ajo connect to public use roads in BMGR East. Vekol Road provides access to Bender Spring recreation area and the East Tactical Range (ETAC) Paradise Well. Roads extending from State Route 85 and State Route 238 on public land near Gila Bend provide access to the Gila Bend Addition. State Route 195 (also known as Araby Road) connects to administrative-use-only roads at the western end of BMGR West. While State Route 195 passes through the BMGR boundary, this highway offers no exits or other public access to BMGR West lands.

Railroads

Freight and passenger rail service operate along the north BMGR perimeter on the Union Pacific Railroad's Sunset Route, passing through Gila Bend, Sentinel, Tacna, Wellton, and Yuma. Capable of accommodating up to 100 trains per day, the double-track Sunset Route is one of the state's most active rail lines and transports freight between cities on the Pacific Ocean and major rail hubs (YMPO 2013). Diverging northeast from the Sunset Route, the McElhaney Cattle Company uses 6 miles of the Union Pacific Railroad Wellton Branch to transport grain, but about 80 miles of the branch between Roll and Arlington has been out of service since 1997 (YMPO 2013). Amtrak operates three passenger routes through Arizona, including two routes north of the BMGR (refer to Chapter 3, Figure 3.6-1).

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Appendix E – Climate, Air Quality Standards and Regulations, and Monitoring Data

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Appendix E
Climate, Air Quality Standards and Regulations, and Monitoring Data

This appendix provides a description of climate and meteorology, air quality standards and regulations, and ambient air quality monitoring data in the region of influence for the BMGR. The study area for the air quality analysis is a large arid region covering portions of Yuma, Maricopa, Pinal, and Pima counties in southwestern Arizona. Air quality in the study area is characterized using measurement data from ambient air monitoring sites in Yuma, Ajo, Casa Grande, and Tucson, with comparison of monitored concentrations to applicable federal and state ambient air quality standards.

Climatology/Meteorology

The local climate features hot summers, mild winters, low humidity, and large diurnal temperature variations. Temperatures in this region are typical of desert climates, ranging from the low 40s degrees Fahrenheit (°F) during the winter to more than 100 °F during the summer. Daily temperatures of 90 °F or greater occur for 4 to 5 months of the year. Elevations vary from near sea level to more than 2,000 feet above mean sea level, with some mountain regions reaching 4,000 to 5,000 feet. Additional information on climate and climate monitoring can be found in Section 2.2.1 of the Integrated Natural Resources Management Plan (INRMP; Luke AFB and MCAS Yuma 2018a) and is incorporated by reference.

Precipitation in the area is sparse and is limited primarily to rainfall, although traces of snow, sleet, or hail have been reported. Rainfall occurs primarily from July through early October. Thunderstorms can result when warm, moist air from the Gulf of Mexico moves through the area. Monthly and annual precipitation amounts are lower in the western portion of the study area near Yuma.

During the summer, periods of storms and atmospheric instability allow greater air mixing and pollutant dispersion. Atmospheric conditions tend to be more stable in fall and winter months, which may result in higher concentrations of air pollutants near emission sources in the winter than during the summer (Air Force 1999). Consistent with assumptions regarding average atmospheric mixing height in the Federal Environmental Impact Statement for West Coast Basing of the MV-22 aircraft, the average depth of the mixing layer where emissions could affect ground-level pollutant concentrations is assumed to be from the surface to 3,000 feet AGL. Emissions released above the mixing layer are not expected to appreciably affect ground-level air quality (Department of the Navy 2009).

Available data on surface winds in the broader study area are limited. Surface winds in the Yuma area tend to be seasonal, with northerly winds in the winter, westerly winds in the spring, and southeast winds during the summer. Average daily wind speeds range from 7 knots in the fall to near 10 knots in the summer (Department of the Navy 2009).

Air Quality Standards and Regulations

Criteria Pollutants: As required by the federal Clean Air Act (CAA), U.S. Environmental Protection Agency (EPA) establishes National Ambient Air Quality Standards (NAAQS) for "criteria" pollutants. EPA has adopted these standards to protect public health (primary standards) and public welfare (secondary standards). The NAAQS pollutants are: carbon monoxide, oxides of nitrogen as nitrogen dioxide, ozone, particulate matter less than 10 microns in aerodynamic diameter (PM_{10}), particulate matter less than 2.5 microns in aerodynamic diameter ($PM_{2.5}$), sulfur dioxide, and lead. States are required to adopt standards that are at least as stringent as the NAAQS. The Arizona ambient air quality standards adopted and enforced by the Arizona Department of Environmental Quality (ADEQ) are identical to the NAAQS and are presented Table E-1.

Table E-1. National and Arizona Ambient Air Quality Standards

Pollutant	Averaging Time	Primary Standards: µg/m³ (ppm)[a]	Secondary Standards: µg/m³ (ppm)
Carbon monoxide	1-hour	40 (35)[b]	No standard
Carbon monoxide	8-hour	10 (9)	No standard
Nitrogen dioxide	1-hour	189 (0.100)	No standard
Nitrogen dioxide	annual	100 (0.053)	100 (0.053)
Ozone	8-hour	137 (0.070)	137 (0.070)
$PM_{2.5}$	24-hour	35	35
$PM_{2.5}$	annual	12[c]	15[c]
PM_{10}	24-hour	150	150
Sulfur dioxide	3-hour	No standard	1300 (0.50)
Sulfur dioxide	1-hour	195 (0.075)[d]	No standard
Lead	Rolling 3-month average	0.15	0.15

Notes:

[a] Federal and Arizona: standards other than ozone, particulate matter, and those based on annual averages or annual arithmetic means are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM10, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m3 is equal to or less than 1. For PM2.5, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, is equal to or less than the standard.

[b] Carbon monoxide is measured in milligrams per cubic meter (mg/m3).

[c] Annual arithmetic mean.

[d] To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 parts per billion.

Sources: EPA 2016c; Arizona Administrative Code, Title 18, Article 2.

µ/m3 = micrograms per cubic meter

ppm = parts per million

In addition to establishing the NAAQS, EPA promulgates air quality regulations, permitting programs, and air quality planning processes to protect and maintain air quality. In Arizona, EPA has delegated responsibility for overseeing compliance with the NAAQS and applicable regulations to ADEQ. EPA works with the states to classify or designate air basins (or portions thereof) as either "attainment" or "nonattainment" with respect to the NAAQS.

To preserve those areas that have air quality better than the NAAQS, designated as attainment areas, the CAA established the Prevention of Significant Deterioration Program. The Prevention of Significant Deterioration regulations divide the attainment areas within the U.S. into three classes of air quality. Class I areas, such as national parks and national wilderness areas, have pristine air and almost no increase in air pollution is allowed. Class II areas allow moderate development and Class III areas allow extensive development. EPA's map of Class I areas in the region shows none exist within the study area (EPA 2020a); this area is considered a Class II category.

Those areas of the country where air quality does not meet the NAAQS for one or more pollutants are identified as nonattainment areas. For these areas, the states are required to formulate and submit a State Implementation Plan (SIP) to EPA to detail how the state will attain and maintain the NAAQS within the required time frame. Once a nonattainment area has improved air quality and demonstrated compliance with the applicable NAAQS, EPA revises the area's classification to "attainment/maintenance," and the area must submit a maintenance plan sufficient to show that the standard will be maintained for the next 10 to 20 years.

The existing nonattainment areas in or near the BMGR region are listed in Table E-2. Only the Yuma PM_{10} nonattainment area, which extends roughly 10 to 15 miles east of the greater Yuma metropolitan area, overlaps with a small portion of the westernmost part of the BMGR region. The general outlines of the existing federal and state nonattainment areas in and near the study area are illustrated on Figure 3.10-1 in Section 3.10 of the LEIS.

Table E-2. Federal and State Nonattainment Areas in or Near the BMGR Region

Area	Pollutant	Classification	Nonattainment Area Location Relative to the BMGR Region
Yuma, Arizona	PM_{10}	Moderate	Nonattainment area partially overlaps with westernmost part of the BMGR region
Yuma, Arizona	Ozone	Marginal	Nonattainment area is in the City of Yuma outside the BMGR region to the north and west
Ajo, Arizona	PM_{10}	Moderate	Small nonattainment maintenance area nearly adjacent to the BMGR region
West Central Pinal County, Arizona	$PM_{2.5}$	Moderate	Nonattainment area is outside the BMGR region to the north and east
West Pinal County, Arizona	PM_{10}	Serious	Nonattainment area is outside the BMGR region to the north and east

Sources: EPA 2019; ADEQ 2020a.

To protect and support the states in achieving and maintaining the NAAQS, the CAA stipulates that the federal government may not engage, support, or provide financial assistance or approve licensing or permitting for any activity not conforming to the applicable SIP. EPA has issued two types of conformity regulations—transportation conformity rules that apply to transportation plans and projects, and general conformity rules that apply to all other federal actions. As a result of the general conformity rule (40 Code of Federal Regulations [CFR] Part 51 Subpart W, and Part 93), federal actions must be evaluated to assess whether emissions associated with the project would interfere with an area's approved SIP or air quality improvement plan. The general conformity rule applies only to federal actions that would result in an emission of a criteria pollutant (or a precursor pollutant) for which an area has been designated as nonattainment or maintenance. The rule requires that the net air emissions associated with a federal action be quantified and compared to established pollutant-specific de minimis threshold values using a methodology referred to as a conformity applicability analysis. For the purpose of this document, the de minimis level is emissions of 100 tons per year for any nonattainment criteria pollutant or precursor. If implementation of the project would generate net emissions increases exceeding the pollutant-specific de minimis value, a more detailed assessment, referred to as a conformity determination, would be required prior to approval by the federal agency. If the net emissions increases from a proposed action would be below the de minimis level, the project would be assumed to conform with the applicable SIP, and no further study is required.

Air Quality Management Plans and SIPs in the BMGR Region

Over time, the ADEQ has prepared, submitted, and revised SIPs for the nonattainment areas listed in Table E-2.

EPA designated the Yuma area as a moderate PM_{10} nonattainment area, and ADEQ completed a SIP for the Yuma Moderate PM_{10} Nonattainment Area in 1991 and updated the plan in 1994 with additional control measures. EPA has never approved the SIP for the Yuma area. Since 1991, the Yuma area had not violated either the 24-hour or annual PM_{10} NAAQS up until 2002. As a result of several years of "clean data," ADEQ began developing a maintenance plan and redesignation request for the Yuma area, and continued to do so until an exceedance of the 24-hour NAAQS occurred on 18 August 2002, as a result of a massive thunderstorm that generated strong winds and windblown dust.

High wind events are a type of natural event covered by EPA's Natural Events Policy. As a result of the 2002 exceedances, the maintenance plan was temporarily postponed until ADEQ completed a Natural Events Action Plan for the Yuma area and submitted it to EPA on 17 February 2004. Subsequently, ADEQ submitted a Natural Events Action Plan implementation report to EPA on 17 February 2005. The Natural Events Action Plan contains strategies and best available control measures being implemented in the Yuma area to reduce particulates in the event of future high wind conditions. ADEQ submitted the Yuma PM_{10} Maintenance Plan in August 2006 (ADEQ 2006), but it has not yet been approved by EPA.

EPA designated a portion of Yuma County as marginal nonattainment for the 2015 Ozone NAAQS on 4 June 2018. ADEQ is working on an ozone SIP with plans to submit it to the EPA in 2020. Sources of

ozone precursors in the area include vehicle travel, industrial solvent and coating use, fuel combustion, and pollutant transport (ADEQ 2019b).

In November 1990, EPA designated the Ajo area in northwest Pima County as a nonattainment area for the 1987 PM_{10} NAAQS. ADEQ submitted nonattainment area plans for the Ajo PM_{10} planning area in 1988 and 1991. In May 2019, the ADEQ Air Quality Division submitted a SIP revision to the EPA (ADEQ 2019a). ADEQ stated that the SIP revision demonstrated satisfaction of all the CAA requirements for redesignation to attainment and requested EPA's concurrence. New Pima County fugitive dust rules ensure that the emission reductions from local sources needed to maintain air quality will continue into the future. Recent data show the area has been in compliance with the PM_{10} standards in 2014, 2015, 2016, and 2017 (ADEQ 2019a). EPA approved ADEQ's request to redesignate the Ajo area as an attainment area and approved the Ajo PM_{10} Maintenance Plan on August 4, 2020 (EPA 2020d).

On 31 May 2012, EPA redesignated an area in western Pinal County, Arizona, from "unclassifiable" to "nonattainment" for the 1987 PM_{10} NAAQS. The "West Pinal County PM10Nonattainment Area" was classified as a "moderate area" under CAA. The CAA imposes certain planning requirements for moderate nonattainment areas to reduce PM_{10} emissions and attain the NAAQS. On 30 December 2013, ADEQ submitted a revision to the Arizona SIP to meet CAA obligations for PM_{10} nonattainment areas (emissions inventory, ambient monitoring data, and base year modeling) and commitments to comply with additional requirements. Because the 2013 revision did not contain all required elements for nonattainment area SIP, ADEQ withdrew the plan from consideration for EPA action in February 2014. ADEQ submitted the Final 2015 West Pinal Moderate PM_{10} Nonattainment Area SIP revision in December 2015. Final rules submitted for approval with the SIP document included the applicable Arizona rules for agricultural best management practices and Pinal County regulations for construction and general fugitive dust (ADEQ 2015). The applicable PM_{10} attainment date for West Pinal County was December 31, 2018 (EPA 2020c). The EPA determined on June 24, 2020 that the West Pinal County nonattainment area did not attain the requisite PM_{10} attainment standard by the December 31, 2018 attainment date (EPA 2020c). Accordingly, the EPA concluded the West Pinal County area is a serious PM_{10} nonattainment area. ADEQ is also in the process of preparing SIP supporting documentation for $PM_{2.5}$ moderate nonattainment area in West Central Pinal County (EPA 2020b).

Ambient Air Quality

To characterize the air quality in the study area, ambient air quality data collected during the 4-year period from 2016 to 2019 at four locations adjacent to or within the study area are presented in Table E-3. The locations of the monitoring sites are illustrated on Figure 3.10-1 in Section 3.10 of the LEIS. The availability of monitoring sites and data for criteria pollutants in the area is somewhat limited, but available data have been summarized.

For comparison of observed area concentrations to the NAAQS, the relevant NAAQS from Table E-1 are listed in Table E-3. Results indicate that the air quality over most of the study area may be considered good to excellent. Of the six criteria pollutants addressed by the NAAQS, only ozone and PM_{10} either approach or exceed the NAAQS in the vicinity of the study area.

Table E-3. Ambient Air Concentrations Measured from 2016 to 2019 in the BMGR Region

Pollutant	NAAQS	Year	Yuma - 2323 S Arizona Ave	Ajo - AZ Hwy Dept Yard-Well Rd	Casa Grande - N Marshall St/ 660 W Aero Dr	Tucson - 400 W River Road/2498 N Geronimo
carbon monoxide (1-Hour Max)	35 ppm	2016 2017 2018 2019	- - -	- - -	- - -	1.0 ppm 1.3 ppm 0.9 ppm 0.8 ppm
carbon monoxide (8-Hour Max)	9 ppm	2016 2017 2018 2019	- - -	- - -	- - -	0.7 ppm 1.0 ppm 0.7 ppm 0.5 ppm
nitrogen dioxide (1-Hour Max)	0.100 ppm	2016 2017 2018 2019	- - -	- - -	- - -	0.046 ppm 0.043 ppm 0.044 ppm 0.034 ppm
nitrogen dioxide (Annual Average)	0.053 ppm	2016 2017 2018 2019	- - -	- - -	- - -	0.00762 ppm 0.00832 ppm 0.00814 ppm 0.00726 ppm
Ozone (4th Highest Daily Max 8-Hour Average)	0.70 ppm	2016 2017 2018 2019	0.067 ppm 0.074 ppm 0.074 ppm 0.065 ppm	- - -	0.066 ppm 0.067 ppm 0.066 ppm 0.069 ppm	0.063 ppm 0.068 ppm 0.070 ppm 0.065 ppm
$PM_{2.5}$ (98th Percentile of the Daily Average)	35 µg/m^3	2016 2017 2018 2019	23 µg/m^3 20 µg/m^3 26 µg/m^3 16 µg/m^3	- - -	19 µg/m^3 26 µg/m^3 25 µg/m^3 14 µg/m^3	18 µg/m^3 17 µg/m^3 11 µg/m^3 9.0 µg/m^3
$PM_{2.5}$ (Annual Average)	12 µg/m^3	2016 2017 2018 2019	8.3 µg/m^3 8.5 µg/m^3 8.7 µg/m^3 7.9 µg/m^3	- - -	8.9 µg/m^3 9.0 µg/m^3 8.7 µg/m^3 6.9 µg/m^3	5.9 µg/m^3 6.7 µg/m^3 5.9 µg/m^3 5.0 µg/m^3
PM_{10} (24-Hour Max)	150 µg/m^3	2016 2017 2018 2019	523 µg/m^3 379 µg/m^3 292 µg/m^3 211 µg/m^3	141 µg/m^3 109 µg/m^3 164 µg/m^3 65 µg/m^3	156 µg/m^3 226 µg/m^3 451 µg/m^3 133 µg/m^3	99 µg/m^3 95 µg/m^3 107 µg/m^3 89 µg/m^3
sulfur dioxide (1-Hour Max)	0.075 ppm	2016 2017 2018 2019	- - -	- - -	- - -	0.00008 ppm 0.00010 ppm 0.00013 ppm 0.00011 ppm

Source: EPA 2020c.

"-" = no available data

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Appendix F – Air Quality Emissions Calculations and Air Conformity Applicability Model Reports

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Appendix F: Air Quality Emissions Calculations and Air Conformity Applicability Model (ACAM) Reports

Methodology and Emissions Calculations for BMGR Aircraft and Ground Operations

Code	Source Category	Data overview		Methodology and References
		East	West	
AOPS	Aircraft Operations	Hours of Operation: Surface to 3000 ft AGL	Hours of Operation: Mixed Values	The Air Force's Air Conformity Applicability Model (ACAM) and emission factors (EFs) from the AFCEC Air Emissions Guide for Air Force Mobile Sources were used to calculate emissions for aircraft operations at the BMGR (AFCEC 2017a, 2020a). Total activity data in hours for each aircraft type used at BMGR East and BMGR West for the reporting year 2019 were provided by the Air Force and Marine Corps. If available, engine power settings and flight profiles for use in ACAM were taken from noise studies conducted to support two prior environmental studies relevant to the BMGR: the 2020 Draft F-35A Operational Beddown – Air Force Reserve Command Environmental Impact Statement (Air Force et al. 2020) and the F-35B West Coast Basing EIS (Department of the Navy 2010). Power settings and flight profiles were available in noise studies for the following aircraft: F-18, F-16, F-15, F-5, A-10, AV-8, C-130J, EA-6, AH-1, AH/CH-64, and UH-60. For aircraft not addressed in the cited noise studies, power settings were estimated using touch-and-go sortie profiles found in the AFCEC Mobile Guide (AFCEC,2020a). Emissions were calculated in ACAM for most aircraft operations. A few aircraft could not be modeled in ACAM, including helicopters, the AV-8 Harrier, and small UAS. For the AV-8 and helicopters, emissions were estimated based on AFCEC Mobile Guide (AFCEC, 2020a) emission factors. For small UAS, such as the RQ-21A, emissions were estimated using surrogate emission factors for a small, non-road gasoline engine found in the AFCEC Mobile Guide (AFCEC, 2020a). Each aircraft type was modeled separately, assuming no use of Auxiliary Power Units (APUs). Emission results in ACAM Detail Report and in worksheet titled "Aircraft not in ACAM".
VEHE	Vehicle Operations (including Road dust)	Miles	Miles	Emission factors from the AFCEC Air Emissions Guide for Air Force Mobile Sources were used to calculate vehicle exhaust emissions and dust from travel on paved and unpaved roads and open ground (AFCEC 2018a). Engine exhaust PM and road dust PM estimates are presented separately in the vehicle emissions estimation spreadsheet.
ECOM	Boilers (External Combustion)	Unavailable, PTE used	Not applicable	Emissions were calculated in ACAM. Calculations based on AFCEC guidance assumption of 111 heating days for BMGR. Emission results in ACAM Detail Report.
OBOD	Munitions			Emission factors from EPA's AP-42 Compilation of Emission Factors and from the USAF Civil Engineer Center (AFCEC) Air Emissions Guide were used for estimation of emissions from munitions/ordnance detonations (EPA 2009; AFCEC 2020b). Warhead and Motor Materials primarily unknown, estimates made as documented on the OBOD emissions page. Weight of rocket motors unknown for most Air to Ground Missiles, conservatively assumed to be the weight of the munition less the weight of the warhead.
ICOM	Generators	Fuel delivery inconsistent (time between fuel deliveries is greater than a year), hours of operation used.	Not applicable	Emissions were calculated in ACAM. Engine load factor conservatively assumed at 100 percent. Emission results in ACAM Detail Report.

Summary of Total Estimated Emissions (tons per year)

Based on 2019 Aircraft and Ground Operations at the BMGR

Pollutant	Carbon Monoxide	Oxides of Nitrogen	Volatile Organic Compounds	PM_{10}	$PM_{2.5}$	Sulfur Dioxide	GHGs as CO_2e	Total HAPs
Aircraft Operations	219.71	1382.72	24.77	92.80	69.56	93.11	280,041	2.57
Boilers	0.24	0.48	0.03	0.03	0.02	0.25	479	0.01
Internal Combustion Engine Generators	0.20	0.29	0.07	0.06	0.06	0.06	34	0.00
Munitions/Ordnance Detonations	1.86	0.77	0.02	24.20	0.73	0.01	68	0.02
Ground Operations - Vehicles	0.97	1.04	0.12	38.84	3.91	0.00	323	0.01
Total Emissions	222.97	1385.30	25.01	155.93	74.30	93.44	280,946	2.61

Note: To support the BMGR Legislative Environmental Impact Statement (LEIS), the Air Force's Air Conformity Applicability Model (ACAM) and emission factors from the AFCEC Air Emissions Guide for Air Force Mobile Sources and the AFCEC Air Emissions Guide for Air Force Stationary Sources were used to calculate emissions for 2019 aircraft and ground operations at the BMGR (U.S. Air Force 2017; AFCEC 2018a; AFCEC 2020a; AFCEC 2020b). The ACAM Summary Report in this Appendix (F) only reports emission results for the sources that have been modeled using ACAM. As a result, the total emission rates presented in this summary table differ from the emission results presented in the ACAM Summary Report, because the totals in this table include both the source emissions modeled in ACAM and the source emissions estimated using AFCEC emission factors. The table below lists and totals the emissions estimated "in ACAM" and those estimated using AFCEC guidance and emission factors ("not in ACAM".)

Breakout

	CO (tons)	NOX (tons)	VOC (tons)	PM10 (tons)	PM2.5 (tons)	SOX (tons)	CO2e (ton)
Aircraft Not in ACAM	42.9	53.1	1.8	4.5	3.0	6.5	19413
Aircraft in ACAM	176.802	1329.661	23.003	88.269	66.531	86.652	260628.6

Aircraft (total)	219.706	1382.716	24.768	92.796	69.564	93.113	280041.46
Boilers (in ACAM)	0.241	0.483	0.030	0.026	0.025	0.247	478.70
Engines (in ACAM)	0.196	0.290	0.071	0.064	0.064	0.060	34.30
Munitions (not in ACAM)	1.861	0.771	0.018	24.205	0.732	0.014	68.07
Vehicles (not in ACAM)	0.971	1.036	0.118	38.836	3.914	0.003	322.98
Total:	222.975	1385.297	25.006	155.927	74.299	93.437	280945.51

ACAM Summary Report Values	177.24	1330.43	23.10	88.36	66.62	86.96	261141.60

		Aircraft Not in ACAM									Carbon Dioxide	Methane	Nitrous Oxide	
Aircraft	No of Eng	Engine	CO	NOX	PM	PM10	PM2.5	SOX	VOC	Fuel Used (gal)	124389	74828	10024972	
AH1	1	T53-L-13 (HELICOPTER)	1876.5	4040.4	188.2	188.2	167.3	559.3	156.8	77898	1674407	69.6	13.9	
AH64	2	T700-GE-700 (HELICOPTER)	509.3	2071.7	473.1	473.1	219.3	193.9	1.8	27012	580617	24.1	4.8	
AV8	1	F402-RR-408	4372.7	4270.8	107.0	107.0	96.8	545.3	101.9	75952	1632584	67.8	13.6	
AV8	1	F402-RR-408	23561.6	21099.9	367.9	367.9	334.7	2794.9	522.4	389276	8367431	347.6	69.5	
CH46	2	T58-GE-8F (HELICOPTER)	10085.0	3813.0	614.7	614.7	552.5	832.6	653.7	115970	2492762	103.5	20.7	
CV22	2	T406-AD-400 (HELICOPTER)	1373.7	8954.2	1252.8	1252.8	1125.9	848.4	12.7	118166	2539955	105.5	21.1	
SUAV	1	SUAV Surrogate	323.4	3.3	11.1	11.1	10.2	0.0	87.7		1528	0.0	0.0	
UH60	2	T700-GE-700 (HELICOPTER)	2220.6	9032.6	2062.6	2062.6	956.2	845.6	7.9	117772	2531491	105.2	21.0	
UH60 Surrogate	2	T700-GE-700 (HELICOPTER)	1536.3	4344.0	726.2	726.2	241.2	408.0	5.4	56823	1221396	50.7	10.1	
AH1	1	T53-L-13 (HELICOPTER)	1694.1	811.4	137.4	137.4	123.8	151.1	554.5	21051	452496	18.8	3.8	
AV8	1	F402-RR-408	34191.0	33394.0	836.8	836.8	757.1	4263.9	797.0	593884	12765443	530.3	106.1	
CH47	2	T56-A-7	88.3	317.5	71.5	71.5	33.6	35.6	1.0	4962	106659	4.4	0.9	
CH53	2	T64-GE-413 (HELICOPTER)	627.8	4121.2	777.6	777.6	300.8	469.3	171.5	65370	1405115	58.4	11.7	
CV22	2	T406-AD-400 (HELICOPTER)	1239.9	8082.4	1130.8	1130.8	1016.3	765.8	11.5	106660	2292651	95.2	19.0	
SUAV	1	SUAV Surrogate	954.6	9.8	32.7	32.7	30.1	0.0	258.9		4511	0.0	0.0	
UH1	2	T400-CP-400 (HELICOPTER)	642.6	299.7	23.0	23.0	20.5	71.7	183.3	9989	214706	8.9	1.8	
UH60	2	T700-GE-700 (HELICOPTER)	510.7	1444.0	241.4	241.4	80.2	135.6	1.8	18889	406024	16.9	3.4	
		lbs	85,808	106,110	9,055	9,055	6,066	12,921	3,530	1,799,675	38,689,776	1,607	321	
		tons	42.9	53.1	4.5	4.5	3.0	6.5	1.8		19344.9	0.8	0.2	
										GWP	1	25	298	
													19,413	CO2e (tons)

Boiler Use Supporting Information and Assumptions

Location of Boiler	Fuel	Rating (MMBTU/HR)	Heating Days (ACAM Guidance)	PTE Hours	HHV (Table 3-2 AFCEC Stat)	HHV UOM	Calculated Usage (gals)
Facility 16	Diesel #2	0.3	111	2664	0.138	MMBTU/gal	5791.3
Facility 326	Diesel #2	0.3	111	2664	0.138	MMBTU/gal	5791.3
Facility 314	Propane	0.49	111	2664	0.092	MMBTU/gal	14188.7
Facility 4300	Propane	1.46	111	2664	0.092	MMBTU/gal	42276.5

Diesel Generator Use Supporting Information and Assumptions				
1999 Facility	1999 Facility Still Operating in 2020	Efficiency	Hours of Operation 2019	hp
POL 2824	Changed/POL 24	0.3	6	20.1
S/LIFT 2015	S/LIFT E3/2015	0.3	13.3	20.1
STORAGE 22	Storage 22	0.3	16.5	134.1
S/LIFT 3307	Changed to 3304	0.3	87	20.1
DISASTER 2079	E1/2079	0.3	6.4	5.4
MSA 1016	E8/1016	0.3	640.8	40.2
TOWER 315	Tower 315	0.3	16.3	80.5
FIRE 314	Fire Dept. 314	0.3	6.7	40.2
STORAGE 326	Storage 326	0.3	6.7	207.9
SECURITY 300	Security 300	0.3	19.2	80.5
BEACON 1001	Beacon 1001	0.3	15.2	16.1
RANGE OPS 324	Range OPS 324	0.3	16.3	80.5
TELEX 3196	Telex 3196	0.3	20.1	107.3
WATER PLANT 45	Water Plant 45	0.3	23	167.6
CE CNTRL 2008	CE CNTRL 2008	0.3	16.3	23.5
WELL #4 313	Well #4 313	0.3	16.3	167.6
RANGE 1 1000	Range 1 1000	0.3	15.7	80.5
RANGE 2 2000	Range 2 2000	0.3	16.3	80.5
RANGE 3 3020	Range 3 3020	0.3	0	80.5
RANGE 4 4020	Range 4 4020	0.3	37.6	80.5

Munitions Emissions: Open Detonation

Operational Data:

Emission Factors:

Material	UOM	630080	NOX	PM	PM10	PM2.5	SOX	VOC	7439921	124389	74828		100414	100425
		Carbon Monoxide	Oxides Of Nitrogen	Particulate Matter	Particulate Matter <10um (PM10)	Particulate Matter <2.5um (PM2.5)	Oxides Of Sulfur	Volatile Organic Compound	Lead	Carbon Dioxide	Methane	CO2e	Ethylbenzene	Styrene
Composition B Surrogate	LBS/LB	0.0042	0.00949	0.012	0.012		0.00013	0.00011		1.1		1.1	0.000002	0
Tritonal Surrogate	LBS/LB	0.0047	0.00835	0.37	0.37		0.00016	0.00028	0.0011	0.64		0.64	0.0000025	0
M023 (M112 Demolition Block Charge)	LBS/RND	0.026	0.0079	0.026	0.026	0.019	0.00015		0.00017	0.79	0.0016	0.83		
H974 (2.75-Inch Practice Warhead, Mk66 Mod 3 Motor (M267))	LBS/EACH	0.53		0.16	0.16	0.17			0.07	4.8	0.0062	4.96		0.000017
AFCEC Stationary Source Guidance, 2020, Table 16-1, 16-2 and 16-3														
MK66 MOD 2 Propelling Rocket	lb/lb NEW	0.074			0.023	0.024			0.0097	0.067	0.00087	0.08875		2.40E-06
AP-42, Table 15.6.7-1 and Table 15.6.7-2													10	

Emissions		Carbon Monoxide	Oxides Of Nitrogen	Particulate Matter	Particulate Matter <10um (PM10)	Particulate Matter <2.5um (PM2.5)	Oxides Of Sulfur	Volatile Organic Compound	Lead	Carbon Dioxide	Methane	CO2e	Ethylbenzene	Styrene
Mark 82	92544	435.0	772.7	34241.3	34241.3	0.0	14.8	25.9	101.8	59228.2	0.0	59228.2	0.2	0.0
Mark 84	33075	155.5	276.2	12237.8	12237.8	0.0	5.3	9.3	36.4	21168.0	0.0	21168.0	0.1	0.0
Maverick	8946	37.6	84.9	107.4	107.4	0.0	1.2	1.0	0.0	9840.6	0.0	9840.6	0.0	0.0
Hellfire	540	2.3	5.1	6.5	6.5	0.0	0.1	0.1	0.0	594.0	0.0	594.0	0.0	0.0
Hydra 70	5607.4	23.6	53.2	67.3	67.3	0.0	0.7	0.6	0.0	6168.1	0.0	6168.1	0.0	0.0
M112 (1.25 lb block)	44392	1154.2	350.7	1154.2	1154.2	843.4	6.7	0.0	7.5	35069.7	71.0	36845.4	0.0	0.0
Maverick Motor	5964	441.3	0.0	0.0	137.2	143.1	0.0	0.0	57.9	399.6	5.2	529.3	0.0	0.0
Hellfire Motor	2430	179.8	0.0	0.0	55.9	58.3	0.0	0.0	23.6	162.8	2.1	215.7	0.0	0.0
Hydra 70 Motor	17480	1293.6	0.0	0.0	402.1	419.5	0.0	0.0	169.6	1171.2	15.2	1551.4	0.0	0.0
Total (lbs):		**3,723**	**1,543**	**47,814**	**48,409**	**1,464**	**29**	**37**	**397**	**133,802**	**94**	**136,141**	**0**	**0**
Total (tons):		**1.86**	**0.77**	**23.91**	**24.20**	**0.73**	**0.01**	**0.02**	**0.20**	**66.90**	**0.05**	**68.07**	**0.00**	**0.00**

Munitions Emissions: Open Detonation, cont.

Emission Factors:

Material	106990	107062	107131	108883	110543	117817	127184	50000	56235	67663	71432	71556	74873	75058	75070	75092	7647010	84742	91203
	1,3-Butadiene	Ethylene Dichloride	Acrylonitrile	Toluene	n-Hexane	Di(2-ethylhexyl) Phthalate	Tetrachloroethylene	Formaldehyde	Carbon Tetrachloride	Chloroform	Benzene	1,1,1-Trichloroethane	Methyl Chloride	Acetonitrile	Acetaldehyde	Methylene Chloride	Hydrochloric Acid	Dibutyl Phthalate	Naphthalene
Composition B Surrogate	0			0.000006	0.00000055		0.000018		0.00000036	0	0.0000026	0	0			0.00014			
Tritonal Surrogate	0.00000091			0.0000018	0		0.0000027		0.00000037	0.00000036	0.0000057	0	0.00000056			0.000018			
M023 (M112 Demolition Block Charge)		0.00000029	0.0000094	0.0000037	0.000046	0.000015		0.00014			0.000014	7.6E-09		0.00012		0.0000019		0.0000043	0.0000022
H974 (2.75-Inch Practice Warhead, Mk66 Mod 3 Motor (M267))			0.000026	0.000047				0.00025			0.00038			0.000087	0.0002	0.00013	0.0017		0.0000086
AFCEC Stationary Source Guidance, 2020, Table 16-1, 16-2 and 16-3																			
MK66 MOD 2 Propelling Rocket			3.60E-06	6.60E-06				3.50E-05			5.20E-05			1.20E-05	2.80E-05	1.80E-05	2.30E-04		1.20E-06
AP-42, Table 15.6.7-1 and Table 15.6.7-2																			

Emissions	1,3-Butadiene	Ethylene Dichloride	Acrylonitrile	Toluene	n-Hexane	Di(2-ethylhexyl) Phthalate	Tetrachloroethylene	Formaldehyde	Carbon Tetrachloride	Chloroform	Benzene	1,1,1-Trichloroethane	Methyl Chloride	Acetonitrile	Acetaldehyde	Methylene Chloride	Hydrochloric Acid	Dibutyl Phthalate	Naphthalene
Mark 82	0.1	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.5	0.0	0.1	0.0	0.0	1.7	0.0	0.0	0.0
Mark 84	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0
Maverick	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0
Hellfire	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Hydra 70	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0
M112 (1.25 lb block)	0.0	0.0	0.4	0.2	2.0	0.7	0.0	6.2	0.0	0.0	0.6	0.0	0.0	5.3	0.0	0.1	0.0	0.2	0.1
Maverick Motor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.3	0.0	0.0	0.1	0.2	0.1	1.4	0.0	0.0
Hellfire Motor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.6	0.0	0.0
Hydra 70 Motor	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.6	0.0	0.0	0.9	0.0	0.0	0.2	0.5	0.3	4.0	0.0	0.0
Total (lbs):	**0**	**0**	**1**	**1**	**2**	**1**	**1**	**7**	**0**	**0**	**3**	**0**	**0**	**6**	**1**	**5**	**6**	**0**	**0**
Total (tons):	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Munitions/Ordnance Supporting Information and Assumptions

Number of 2019 HE Ordnance										
Ordnance (count)	**North TAC**	**South TAC**	**East TAC**	**EOD Range**	**Range 1**	**Range 2**	**Range 3**	**Range 4**		**Total:**
Mk-82/BSU-49/GBU-12/GBU-38/GBU-49/GBU-54	215	137	130							482
Mk-117	0	0	0							0
Mk-83/ GBU-16/GBU-32	0	0	0							0
Mk-84/GBU-10/GBU-15/GBU-24/GBU-31	17	12	6							35
AGM-65 (125 lbs. warhead)	40	0	31							71
AGM-65 (300 lbs. warhead)		0								0
AGM-114	25	0	2							27
Mk-66/CRV-7 HE & WP	859	911	668							2438
Mk-71										0
C-4 (lbs)		2247	988	50253	642	608	407	345		55490

Vehicle Emissions (lbs)			VOC	NOX	SO2	PM10 (engine)	PM2.5 (engine)	CO2e	NH3	PM10 (dust)	PM2.5 (dust)	71432	106990	100414	110543	98828	100425	108883	540841	1330207
Paved Roads	VMT	**Carbon Monoxide**	**Volatile Organic Compound**	**Oxides Of Nitrogen**	**Oxides Of Sulfur**	**Particulate Matter <10um (PM10)**	**Particulate Matter <2.5um (PM2.5)**	**Carbon Dioxide Equivalent**	**Ammonia**	**Particulate Matter <10um (PM10)**	**Particulate Matter <2.5um (PM2.5)**	**Benzene**	**1,3-Butadiene**	**Ethylbenzene**	**Hexane**	**Cumene**	**Styrene**	**Toluene**	**2,2,4-Trimethylpentane**	**Xylene (Mix Isomers)**
LDDT	85919	971.5	49.2	87.1	0.8	1.3	1.3	90908.8	1.5	12.9	3.2	1.4	0.7	0.2	0.1	0.3	0.0	1.0	0.4	1.0
HDDV	106155	458.5	119.8	1364.4	3.0	46.3	42.6	366446.1	6.8	15.9	3.9	0.0	0.0	1.5	2.9	2.9	2.4	0.0	0.3	0.0
LDDV	400	2.4	0.1	0.1	0.0	0.0	0.0	294.8	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Totals:	192,474	1432.4	169.2	1451.7	3.8	47.7	43.9	457649.8	8.3	28.9	7.1	1.4	0.7	1.8	3.0	3.2	2.4	1.0	0.7	1.0
		630080	VOC	NOX	SO2	PM10 (engine)	PM2.5 (engine)	CO2e	NH3	PM10 (dust)	PM2.5 (dust)	71432	106990	100414	110543	98828	100425	108883	540841	1330207
Unpaved Roads	VMT	**Carbon Monoxide**	**Volatile Organic Compound**	**Oxides Of Nitrogen**	**Oxides Of Sulfur**	**Particulate Matter <10um (PM10)**	**Particulate Matter <2.5um (PM2.5)**	**Carbon Dioxide Equivalent**	**Ammonia**	**Particulate Matter <10um (PM10)**	**Particulate Matter <2.5um (PM2.5)**	**Benzene**	**1,3-Butadiene**	**Ethylbenzene**	**Hexane**	**Cumene**	**Styrene**	**Toluene**	**2,2,4-Trimethylpentane**	**Xylene (Mix Isomers)**
LDDT	27427	310.1	15.7	27.8	0.2	0.4	0.4	29019.8	0.5	28918.3	2891.8	0.5	0.2	0.1	0.0	0.1	0.0	0.3	0.1	0.3
HDDV	46147	199.3	52.1	593.1	1.3	20.1	18.5	159299.0	3.0	48656.2	4865.6	0.0	0.0	0.7	1.3	1.2	1.1	0.0	0.1	0.0
Totals:	73,574	509.4	67.8	620.9	1.6	20.6	18.9	188318.9	3.4	77574.5	7757.4	0.5	0.2	0.7	1.3	1.4	1.1	0.3	0.2	0.3
	Total lbs:	1941.9	237.0	2072.6	5.4	68.2	62.9	645968.6	11.7	77603.4	7764.6	1.9	0.9	2.5	4.2	4.6	3.5	1.3	0.9	1.4
	Total tons:	**0.97**	**0.12**	**1.04**	**0.00**	**0.03**	**0.03**	**322.98**	**0.01**	**38.80**	**3.88**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

	Engine Emission Factors (g/mi)								
		CO	VOC	NOX	SO2	PM10	PM2.5	CO2e	NH3
	LDDT	5.129	0.26	0.46	0.004	0.007	0.007	479.935	0.008
	HDDV	1.959	0.512	5.83	0.013	0.198	0.182	1565.797	0.029
	LDDV	2.777	0.092	0.148	0.003	0.004	0.004	334.348	0.008
	AFCEC Mobile Guidance, 2018a, Table 5-22, Arizona 2019 On-Road Vehicle Emission Factors								
	Fugitive Dust Emission Factors (g/mi) for GOVs								
		Uncorrected		Corrected for Precipitation					
		PM10	PM2.5	PM10	PM2.5				
	Paved	0.069	0.017	0.068	0.017				
	Unpaved	505.981	50.598	478.256	47.8255				
	AFCEC Mobile Guidance, 2018a, Table 5-10, Arizona 2019 On-Road Vehicle Emission Factors								
	Mean Days of Precipitation of 0.01 Inches or More								
	20								
	AFCEC Mobile Guidance, 2018a, Figure 5-1								
	VOC Weight Percentage HAP Speciation								
	CAS	71432	106990	100414	110543	98828	100425	108883	540841	1330207
	Name	Benzene	1,3-Butadiene	Ethylbenzene	Hexane	Cumene	Styrene	Toluene	2,2,4-Trimethylpentane	Xylene (Mix Isomers)
	LDDT	2.91	1.44	0.48	0.19	0.68		2.06	0.77	2.08
	HDDV			1.29	2.4	2.39	2.044		0.24	
	LDDV	2.23	1.08	0.38		0.53	0.84	1.62	0.94	1.9
	AFCEC Mobile Guidance, 2018a, Table 5-43									

Vehicle Use Supporting Information and Assumptions (BMGR East)

Vehicle Type	Weight (tons)	Wheels	Paved Miles	Unpaved Miles	Weight (lbs)	Classification	LDDT	HDDV	LDDV	LDDT	HDDV	LDDV
Short-Bed Truck	5	6	18,000	5,000	10000	HDDV	0	18000	0	0	5000	0
1-Ton Passenger Van	1	4	400	0	2000	LDDV	0	0	400	0	0	0
HMMWV	3	4	3,120	2,700	6000	LDDT	3120	0	0	2700	0	0
1-Ton Pickup	1	4	36,000	11,000	2000	LDDT	36000	0	0	11000	0	0
Stake Bed Pickup	1		1,200	500	2000	LDDT	1200	0	0	500	0	0
0.5-Ton Pickup	0.5	4	18,000	5,000	1000	LDDT	18000	0	0	5000	0	0
20-Ton Truck Tractor	7.5	10	18,000	7,000	15000	HDDV	0	18000	0	0	7000	0
30-Ton Truck Tractor	10	10	28,000	10,500	20000	HDDV	0	28000	0	0	10500	0
5-Ton Wrecker	5	10	500	120	10000	HDDV	0	500	0	0	120	0
0.75-Ton Maintenance Truck	0.75	6	1,800	1,000	1500	LDDT	1800	0	0	1000	0	0
5-Ton Dump Truck	5	6	3,120	2,700	10000	HDDV	0	3120	0	0	2700	0
15-Ton Crane	15	4	75	250	30000	HDDV	0	75	0	0	250	0
Farm Tractor	1	4	0	50	2000	LDDT	0	0	0	50	0	0
Front-End Loader (Maintenance + EOD)	10	4	100	438	20000	HDDV	0	100	0	0	438	0
Grader	10	4	50	800	20000	HDDV	0	50	0	0	800	0
10K Forklift	5	4	50	150	10000	HDDV	0	50	0	0	150	0
15K Forklift	7.5	4	50	150	15000	HDDV	0	50	0	0	150	0
2.5-Ton Refueling Truck	2.5	10	50	100	5000	LDDT	50	0	0	100	0	0
GSA Work Truck 4WD	2.5	4	7085	3543	5000	LDDT	7085	0	0	3543	0	0
M1157 10-Ton dump truck, M929 5-ton dump truck, M1090 5-ton Dump Truck, and HMMWV	Air Force EOD Green Fleet Combined		6,200	6,979	10000	HDDV	0	6200	0	0	6979	0
D25 Dump truck (EOD)				116	0	LDDT	0	0	0	116	0	0
			141,800	58,096			67255	74145	400	24009	34087	0
									141800			58096

Vehicle Use Supporting Information and Assumptions (BMGR West)

Vehicle Type	Weight (tons)	Wheels	Paved Miles	Unpaved Miles	Weight (lbs)	Classification	LDDT	HDDV	LDDV	LDDT	HDDV	LDDV
1-Ton 4x4 pickups	1	4	9,992	2,618	2000	LDDT	9992	0	0	2618	0	0
7-Ton Truck	7	6	11,956	4,744	14000	HDDV	0	11956	0	0	4744	0
Mk-970 Refueler		6	8,672	800		HDDV	0	8672	0	0	800	0
HMMWV	3	4	8,672	800	6000	LDDT	8672	0	0	800	0	0
TRAM (Deere 624R wheel loader)		4	3,794	2,172		HDDV	0	3794	0	0	2172	0
Bull Dozer T-5 Caterpillar)	104	Tracked	3,794	2,172	208000	HDDV	0	3794	0	0	2172	0
Grader (M-120)	17.75	6	3,794	2,172	35500	HDDV	0	3794	0	0	2172	0
			50674	15478			18664	32010	0	3418	12060	0
									50674			15478

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1. General Information: The Air Force's Air Conformity Applicability Model (ACAM) was used to perform an analysis to assess the potential air quality impact/s associated with the action in accordance with the Air Force Manual 32-7002, Environmental Compliance and Pollution Prevention; the Environmental Impact Analysis Process (EIAP, 32 CFR 989); and the General Conformity Rule (GCR, 40 CFR 93 Subpart B). This report provides a summary of the ACAM analysis.

a. Action Location:

Base: BARRY GOLDWATER AIR FORCE RANGE
State: Arizona
County(s): Yuma
Regulatory Area(s): Yuma, AZ

b. Action Title: Barry M. Goldwater Range Baseline

c. Project Number/s (if applicable):

d. Projected Action Start Date: 1 / 2019

e. Action Description: Extension of Land Withdrawal

f. Point of Contact:

Name: Michelle York
Title: Air Quality Consultant
Organization: Jacobs Engineering Group
Email: michelle.york@jacobs.com
Phone Number: 360-694-6756

2. Analysis: Total combined direct and indirect net emissions increase associated with the action were estimated through ACAM on a calendar-year basis for the "worst-case" and "steady state" (net gain/loss upon action fully implemented) emissions[1]. General Conformity under the Clean Air Act, Section 1.76 has been evaluated for the action described above according to the requirements of 40 CFR 93, Subpart B.

Based on the analysis, the requirements of this rule are: _____ applicable
__X__ not applicable

Conformity Analysis Summary:

2019

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Yuma, AZ			

[1] To support the BMGR Legislative Environmental Impact Statement (LEIS), the Air Force's Air Conformity Applicability Model (ACAM) and emission factors from the AFCEC Air Emissions Guide for Air Force Mobile Sources and the AFCEC Air Emissions Guide for Air Force Stationary Sources were used to calculate emissions for aircraft and ground operations at the BMGR (U.S. Air Force 2017; AFCEC 2018a; AFCEC 2020a; AFCEC 2020b). This ACAM Summary Report only reports emission results for the sources that have been modeled using ACAM. As a result, the total emission rates presented in the LEIS differ from the emission results presented in this ACAM Summary Report, because the totals in the LEIS include both the source emissions modeled in ACAM and the source emissions estimated using AFCEC emission factors.

VOC	23.104		
NOx	1330.430		
CO	177.235		
SOx	86.959		
PM 10	88.360		
PM 2.5	66.617		
Pb	0.000		
NH3	0.000		
CO2e	261141.6		

2020 to Future - (Steady State)

Pollutant	Action Emissions (ton/yr)	GENERAL CONFORMITY	
		Threshold (ton/yr)	Exceedance (Yes or No)
Yuma, AZ			
VOC	0.000		
NOx	0.000		
CO	0.000		
SOx	0.000		
PM 10	0.000	100	No
PM 2.5	0.000		
Pb	0.000		
NH3	0.000		
CO2e	0.0		

The proposed action, extension of the land withdrawal, would result in continuation of current aircraft and ground operations at the BMGR. No net increases in emissions would occur, therefore, the estimated net emissions increases associated with this action are less than the applicable conformity threshold values established at 40 CFR 93.153 (b). The requirements of the General Conformity Rule are not applicable.

_____ ___11/30/2020__

Michelle York, Air Quality Consultant DATE

1. General Information

- Action Location

Base: BARRY GOLDWATER AIR FORCE RANGE
State: Arizona
County(s): Yuma
Regulatory Area(s): Yuma, AZ

- Action Title: Barry M. Goldwater Range Baseline

- Project Number/s (if applicable):

- Projected Action Start Date: 1 / 2019

- Action Purpose and Need:

Extension of Land Withdrawal

- Action Description:

Extension of Land Withdrawal

- Point of Contact

Name: Michelle York
Title: Air Quality Consultant
Organization: Jacobs Engineering Group
Email: michelle.york@jacobs.com
Phone Number: 360-694-6756

- Activity List:

Activity Type		Activity Title
2.	Aircraft	East - A-10 Aircraft Sorties
3.	Aircraft	East - A-4 Aircraft Sorties
4.	Aircraft	East - C-130J Aircraft Sorties
5.	Aircraft	West - C-27J Aircraft Sorties
6.	Aircraft	West - C-28 Aircraft Sorties
7.	Aircraft	East - EA-6B Aircraft Sorties
8.	Aircraft	East - F-15 Aircraft Sorties
9.	Aircraft	East and West - F-16D Aircraft Sorties
10.	Aircraft	East and West - F-18 Aircraft Sorties
11.	Aircraft	East and West - F-22 Aircraft Sorties
12.	Aircraft	East and West - F-35 Aircraft Sorties
13.	Aircraft	East and West - F-4 Aircraft Sorties
14.	Aircraft	East and West - F-5 Aircraft Sorties
15.	Aircraft	West - KC-10 Aircraft Sorties
16.	Aircraft	West - KC-135R Aircraft Sorties
17.	Aircraft	East and West - MQ-9 Aircraft Sorties
18.	Aircraft	East - T-1 Aircraft Sorties
19.	Aircraft	West - T-45 Aircraft Sorties
20.	Aircraft	West - T-6 Aircraft Sorties
21.	Aircraft	East - U-2 Aircraft Sorties
22.	Heating	Boiler - Facility 16
23.	Heating	Boiler - Facility 326
24.	Heating	Boiler - Facility 314
25.	Heating	Boiler - Facility 4300
26.	Emergency Generator	POL 24 - 20.1 hp - Diesel Generator

27.	Emergency Generator	S/Lift E3 2015 - 20.1 hp - Diesel Generator
28.	Emergency Generator	Storage 22 - 134.1 hp - Diesel Generator
29.	Emergency Generator	S/Lift 3304 - 20.1 hp - Diesel Generator
30.	Emergency Generator	E1/2079 - 5.4 hp - Diesel Generator
31.	Emergency Generator	E8/1016 - 40.2 hp - Diesel Generator
32.	Emergency Generator	Tower 315 - 80.5 hp - Diesel Generator
33.	Emergency Generator	Fire Dept - 40.2 hp - Diesel Generator
34.	Emergency Generator	Storage 326 - 207.9 hp - Diesel Generator
35.	Emergency Generator	Security 300 - 80.5 hp - Diesel Generator
36.	Emergency Generator	Beacon 1001 - 16.1 hp - Diesel Generator
37.	Emergency Generator	Range Ops - 80.5 hp - Diesel Generator
38.	Emergency Generator	Telex 3196 - 107.3 hp - Diesel Generator
39.	Emergency Generator	Water Plant 45 - 167.6 hp - Diesel Generator
40.	Emergency Generator	CE Cntrl - 23.5 hp - Diesel Generator
41.	Emergency Generator	Well #4 313 - 167.6 hp - Diesel Generator
42.	Emergency Generator	Range 1 1000 - 80.5 hp - Diesel Generator
43.	Emergency Generator	Range 2 2000 - 80.5 hp - Diesel Generator
44.	Emergency Generator	Range 4 4020 - 80.5 hp - Diesel Generator
45.	Aircraft	West - EA18 Aircraft Sorties
46.	Aircraft	East and West - LJ60 Aircraft Sorties
47.	Aircraft	East and West - T34C Aircraft Sorties
48.	Aircraft	East - C17 Aircraft Sorties
49.	Aircraft	West - C130T Aircraft Sorties

Emission factors and air emission estimating methods come from the United States Air Force's Air Emissions Guide for Air Force Stationary Sources, Air Emissions Guide for Air Force Mobile Sources, and Air Emissions Guide for Air Force Transitory Sources.

2. Aircraft

2.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: East - A-10 Aircraft Sorties

- Activity Description:
A-10 Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	1.008811
SO_x	9.386329
NO_x	93.863289
CO	19.298994
PM 10	23.334238

Pollutant	Total Emissions (TONs)
PM 2.5	14.737414
Pb	0.000000
NH_3	0.000000
CO_2e	28369.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	1.008811
SO_x	9.386329
NO_x	93.863289
CO	19.298994
PM 10	23.334238

Pollutant	Total Emissions (TONs)
PM 2.5	14.737414
Pb	0.000000
NH_3	0.000000
CO_2e	28369.5

2.2 Aircraft & Engines

2.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: A-10C
Engine Model: TF34-GE-100
Primary Function: Combat
Aircraft has After burn: No
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

2.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	390.00	39.45	1.07	2.10	106.70	8.13	3.60	3234
Approach	920.00	2.19	1.07	5.70	16.30	6.21	2.12	3234
Intermediate	460.00	23.35	1.07	2.60	78.00	8.93	6.95	3234
Military	2710.00	0.12	1.07	10.70	2.20	2.66	1.68	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

2.3 Flight Operations

2.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 194220
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 0
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 12
AfterBurn (mins): 0

2.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year
$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year
$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year
$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

2.4 Auxiliary Power Unit (APU)

2.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

2.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

2.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units

OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

3. Aircraft

3.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: East - A-4 Aircraft Sorties

- Activity Description:
A-4 Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.472027
SO_x	0.520822
NO_x	2.893586
CO	8.623182
PM 10	0.082928

Pollutant	Total Emissions (TONs)
PM 2.5	0.074130
Pb	0.000000
NH_3	0.000000
CO_2e	1574.1

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.472027
SO_x	0.520822
NO_x	2.893586
CO	8.623182
PM 10	0.082928

Pollutant	Total Emissions (TONs)
PM 2.5	0.074130
Pb	0.000000
NH_3	0.000000
CO_2e	1574.1

3.2 Aircraft & Engines

3.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: A-4C
Engine Model: J65-W-20
Primary Function: Combat

Aircraft has After burn: No
Number of Engines: 1

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

3.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	1333.00	4.31	1.07	2.78	50.19	0.18	0.16	3234
Approach	2346.00	1.57	1.07	4.82	21.82	0.18	0.16	3234
Intermediate	3260.00	0.32	1.07	7.27	16.14	0.18	0.16	3234
Military	6421.00	0.04	1.07	7.55	7.72	0.13	0.12	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

3.3 Flight Operations

3.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 1752
Takeoff [After Burn] (mins): 1752
Climb Out [Intermediate] (mins): 4380
Approach [Approach] (mins): 14016
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 12
AfterBurn (mins): 0

3.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year
$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

3.4 Auxiliary Power Unit (APU)

3.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

3.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

3.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

4. Aircraft

4.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: East - C-130J Aircraft Sorties

- Activity Description:
C-130J Aircraft Sorties

- Activity Start Date
Start Month: 1

Start Year: 2019

- Activity End Date

Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	1.236819
SO_x	2.876948
NO_x	25.005245
CO	5.646346
PM 10	1.344368

Pollutant	Total Emissions (TONs)
PM 2.5	1.209931
Pb	0.000000
NH_3	0.000000
CO_2e	8695.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	1.236819
SO_x	2.876948
NO_x	25.005245
CO	5.646346
PM 10	1.344368

Pollutant	Total Emissions (TONs)
PM 2.5	1.209931
Pb	0.000000
NH_3	0.000000
CO_2e	8695.4

4.2 Aircraft & Engines

4.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: C-130J
Engine Model: T56-A-15
Primary Function: Transport - Bomber
Aircraft has After burn: No
Number of Engines: 4

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

4.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	794.00	24.15	1.07	3.90	32.00	0.83	0.75	3234
Approach	1185.00	14.26	1.07	4.40	22.20	0.97	0.87	3234
Intermediate	1825.00	0.58	1.07	9.20	2.40	0.51	0.46	3234
Military	2302.00	0.46	1.07	9.30	2.10	0.50	0.45	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

4.3 Flight Operations

4.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	35040
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	0
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	0
Approach (mins):	0
Intermediate (mins):	0
Military (mins):	0
AfterBurn (mins):	0

4.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year
$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year
$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year
$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)

TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

4.4 Auxiliary Power Unit (APU)

4.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

4.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

4.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
APU_{POL} = APU * OH * LTO * EF_{POL} / 2000

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

5. Aircraft

5.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: West - C-27J Aircraft Sorties

- Activity Description:
C-27J Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000066
SO_x	0.001900
NO_x	0.015755
CO	0.004974
PM 10	0.004316

Pollutant	Total Emissions (TONs)
PM 2.5	0.002147
Pb	0.000000
NH_3	0.000000
CO_2e	5.7

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.000066
SO_x	0.001900
NO_x	0.015755
CO	0.004974
PM 10	0.004316

Pollutant	Total Emissions (TONs)
PM 2.5	0.002147
Pb	0.000000
NH_3	0.000000
CO_2e	5.7

5.2 Aircraft & Engines

5.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: C-27J
Engine Model: AE2100D2
Primary Function: Transport - Bomber
Aircraft has After burn: No
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

5.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	723.60	0.08	1.07	7.58	5.06	3.64	1.88	3234
Approach	880.20	0.06	1.07	7.54	3.89	3.85	2.18	3234
Intermediate	1741.90	0.02	1.07	9.15	1.94	1.46	0.56	3234
Military	2261.70	0.01	1.07	12.46	2.30	1.22	0.33	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

5.3 Flight Operations

5.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 5.64
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 28.2
Approach [Approach] (mins): 50.76
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 12

AfterBurn (mins): 0

5.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year
$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year
$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year
$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)

1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

5.4 Auxiliary Power Unit (APU)

5.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

5.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

5.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

6. Aircraft

6.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: West - C-28 Aircraft Sorties

- Activity Description:
C-28 Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.002204
SO_x	0.000315
NO_x	0.002468
CO	0.215328
PM 10	0.012453

Pollutant	Total Emissions (TONs)
PM 2.5	0.011209
Pb	0.000000
NH_3	0.000000
CO_2e	1.0

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.002204
SO_x	0.000315
NO_x	0.002468
CO	0.215328
PM 10	0.012453

Pollutant	Total Emissions (TONs)
PM 2.5	0.011209
Pb	0.000000
NH_3	0.000000
CO_2e	1.0

6.2 Aircraft & Engines

6.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: C-28A
Engine Model: GTSIO-520-M
Primary Function: General - Piston
Aircraft has After burn: No
Number of Engines: 2

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

6.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	22.36	47.31	1.07	0.88	720.50	60.00	54.00	3234
Approach	102.00	7.52	1.07	7.70	697.40	47.95	43.16	3234
Intermediate	145.00	7.04	1.07	9.76	728.75	40.00	36.00	3234

Military	256.00	11.66	1.07	1.03	1045.66	20.00	18.00	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

6.3 Flight Operations

6.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	3.74
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	62.39
Approach [Approach] (mins):	74.87
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	12
AfterBurn (mins):	0

6.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year
$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

6.4 Auxiliary Power Unit (APU)

6.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

6.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

6.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

7. Aircraft

7.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: East - EA-6B Aircraft Sorties

- Activity Description:
EA-6B Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.040064
SO_x	1.428950
NO_x	10.056067
CO	10.283097
PM 10	0.173611

Pollutant	Total Emissions (TONs)
PM 2.5	0.160256
Pb	0.000000
NH_3	0.000000
CO_2e	4318.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.040064
SO_x	1.428950
NO_x	10.056067
CO	10.283097
PM 10	0.173611

Pollutant	Total Emissions (TONs)
PM 2.5	0.160256
Pb	0.000000
NH_3	0.000000
CO_2e	4318.9

7.2 Aircraft & Engines

7.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: EA-6B
Engine Model: J52-P-408
Primary Function: Combat
Aircraft has After burn: No
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

7.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	1466.21	3.62	1.07	2.79	50.10	0.18	0.16	3234
Approach	3324.50	0.29	1.07	7.25	16.07	0.18	0.16	3234
Intermediate	6502.10	0.03	1.07	7.53	7.70	0.13	0.12	3234
Military	6482.85	0.03	1.07	7.53	7.70	0.13	0.12	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

7.3 Flight Operations

7.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 12360
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 0
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	12
AfterBurn (mins):	0

7.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

7.4 Auxiliary Power Unit (APU)

7.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

7.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

7.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
APU_{POL} = APU * OH * LTO * EF_{POL} / 2000

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

8. Aircraft

8.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: East - F-15 Aircraft Sorties

- Activity Description:
F-15 Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.082188
SO_x	0.282769
NO_x	7.740468
CO	0.087209
PM 10	0.351479

Pollutant	Total Emissions (TONs)
PM 2.5	0.317124
Pb	0.000000
NH_3	0.000000
CO_2e	854.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.082188
SO_x	0.282769
NO_x	7.740468
CO	0.087209
PM 10	0.351479

Pollutant	Total Emissions (TONs)
PM 2.5	0.317124
Pb	0.000000
NH_3	0.000000
CO_2e	854.6

8.2 Aircraft & Engines

8.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: F-15D
Engine Model: F100-PW-229
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:

Original Engine Name:

8.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	1087.00	0.45	1.07	3.80	10.17	2.06	1.85	3234
Approach	3098.00	0.24	1.07	15.08	1.17	2.63	2.37	3234
Intermediate	5838.00	0.35	1.07	17.54	0.15	2.06	1.85	3234
Military	11490.00	0.31	1.07	29.29	0.33	1.33	1.20	3234
After Burn	20793.00	5.26	1.07	14.30	21.51	1.15	1.04	3234

8.3 Flight Operations

8.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 1380
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 0
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

8.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

8.4 Auxiliary Power Unit (APU)

8.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

8.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

8.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

9. Aircraft

9.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: East and West - F-16D Aircraft Sorties

- Activity Description:
F-16D Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	17.928625
SO_x	20.627558
NO_x	392.116382
CO	22.555367
PM 10	2.698933

Pollutant	Total Emissions (TONs)
PM 2.5	0.000000
Pb	0.000000
NH_3	0.000000
CO_2e	62345.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	17.928625
SO_x	20.627558
NO_x	392.116382
CO	22.555367
PM 10	2.698933

Pollutant	Total Emissions (TONs)
PM 2.5	0.000000
Pb	0.000000
NH_3	0.000000
CO_2e	62345.3

9.2 Aircraft & Engines

9.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: NF-16D
Engine Model: F110-GE-129
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

9.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	961.00	4.90	1.07	2.62	45.04	2.60	1.12	3234
Approach	4832.00	0.03	1.07	13.42	1.93	1.37	0.91	3234
Intermediate	6939.00	0.05	1.07	17.82	1.53	0.58	0.41	3234
Military	8611.00	0.93	1.07	20.34	1.17	0.14	0.00	3234
After Burn	15564.00	53.46	1.07	7.09	63.28	3.35	2.98	3234

9.3 Flight Operations

9.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	268653
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	0
Approach [Approach] (mins):	0
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

9.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

9.4 Auxiliary Power Unit (APU)

9.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

9.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

9.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

10. Aircraft

10.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: East and West - F-18 Aircraft Sorties

- Activity Description:
F-18 Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.144288
SO_x	7.719435
NO_x	186.348592
CO	10.677349
PM 10	11.636867

Pollutant	Total Emissions (TONs)
PM 2.5	6.420838
Pb	0.000000
NH_3	0.000000
CO_2e	23331.4

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.144288
SO_x	7.719435
NO_x	186.348592
CO	10.677349
PM 10	11.636867

Pollutant	Total Emissions (TONs)
PM 2.5	6.420838
Pb	0.000000
NH_3	0.000000
CO_2e	23331.4

10.2 Aircraft & Engines

10.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: F/A-18C

Engine Model: F404-GE-402
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

10.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	685.00	3.39	1.07	1.70	110.18	4.47	3.10	3234
Approach	3111.00	0.04	1.07	7.86	2.02	1.46	0.87	3234
Intermediate	6464.00	0.07	1.07	17.03	1.54	1.57	0.90	3234
Military	7739.00	0.02	1.07	25.83	1.48	1.61	0.89	3234
After Burn	15851.00	1.85	1.07	5.43	50.31	3.57	3.21	3234

10.3 Flight Operations

10.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 55933
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 0
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

10.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

10.4 Auxiliary Power Unit (APU)

10.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

10.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

10.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

11. Aircraft

11.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: East and West - F-22 Aircraft Sorties

- Activity Description:
F-22 Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.012847
SO_x	0.568505
NO_x	5.259666
CO	4.354055
PM 10	0.722676

Pollutant	Total Emissions (TONs)
PM 2.5	0.617520
Pb	0.000000
NH_3	0.000000
CO_2e	1373.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.012847
SO_x	0.568505
NO_x	5.259666
CO	4.354055
PM 10	0.722676

Pollutant	Total Emissions (TONs)
PM 2.5	0.617520
Pb	0.000000
NH_3	0.000000
CO_2e	1373.3

11.2 Aircraft & Engines

11.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: F-22B
Engine Model: F119-PW-100
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

11.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	1377.00	1.67	1.07	3.01	48.15	2.42	1.76	3234
Approach	2740.00	0.05	1.07	6.59	7.92	1.96	1.73	3234
Intermediate	10110.00	0.03	1.07	12.40	2.14	1.40	1.09	3234
Military	18612.00	0.01	1.07	19.81	0.75	1.12	0.97	3234
After Burn	50170.00	0.00	1.07	7.37	16.10	0.85	0.75	3234

11.3 Flight Operations

11.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	202.83
Takeoff [After Burn] (mins):	202.83
Climb Out [Intermediate] (mins):	811.3
Approach [Approach] (mins):	3549.45
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

11.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

11.4 Auxiliary Power Unit (APU)

11.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

11.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

11.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

12. Aircraft

12.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: East and West - F-35 Aircraft Sorties

- Activity Description:
F-35 Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.159660
SO_x	37.230055
NO_x	559.765885
CO	30.666714
PM 10	46.137903

Pollutant	Total Emissions (TONs)
PM 2.5	41.499994
Pb	0.000000
NH_3	0.000000
CO_2e	111791.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.159660
SO_x	37.230055
NO_x	559.765885
CO	30.666714

Pollutant	Total Emissions (TONs)
PM 2.5	41.499994
Pb	0.000000
NH_3	0.000000
CO_2e	111791.6

PM 10	46.137903		

12.2 Aircraft & Engines

12.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: F-35A
Engine Model: F135-PW-100
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

12.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

Proprietary Information. Contact Air Quality Subject Matter Expert for More Information regarding this engine's Emission Factors.

12.3 Flight Operations

12.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 117775.65
Takeoff [After Burn] (mins): 1437.64
Climb Out [Intermediate] (mins): 1327.05
Approach [Approach] (mins): 276579.26
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

12.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year
$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year
$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year
$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)

NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

12.4 Auxiliary Power Unit (APU)

12.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

12.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

12.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

13. Aircraft

13.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: East and West - F-4 Aircraft Sorties

- Activity Description:
F-4 Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.091010
SO_x	0.326558
NO_x	1.879863
CO	3.078801
PM 10	0.149559

Pollutant	Total Emissions (TONs)
PM 2.5	0.134603
Pb	0.000000
NH_3	0.000000
CO_2e	802.0

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.091010
SO_x	0.326558
NO_x	1.879863
CO	3.078801
PM 10	0.149559

Pollutant	Total Emissions (TONs)
PM 2.5	0.134603
Pb	0.000000
NH_3	0.000000
CO_2e	802.0

13.2 Aircraft & Engines

13.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: QF-4E
Engine Model: J79-GE-17
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

13.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	1032.00	26.57	1.07	2.70	66.00	0.18	0.16	3234
Approach	3492.00	0.58	1.07	4.50	15.40	0.51	0.46	3234
Intermediate	6984.00	0.12	1.07	5.80	7.80	0.72	0.65	3234
Military	9841.00	0.12	1.07	10.60	5.20	0.92	0.83	3234
After Burn	34921.00	0.01	1.07	8.10	4.00	0.15	0.14	3234

13.3 Flight Operations

13.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	136.85
Takeoff [After Burn] (mins):	136.85
Climb Out [Intermediate] (mins):	547.4
Approach [Approach] (mins):	2394.89
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

13.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

13.4 Auxiliary Power Unit (APU)

13.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU	Operation Hours	Exempt	Designation	Manufacturer

per Aircraft	for Each LTO	Source?		

13.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

13.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

14. Aircraft

14.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: East and West - F-5 Aircraft Sorties

- Activity Description:
F-5 Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.759150
SO_x	2.820452
NO_x	13.179680
CO	56.830780
PM 10	0.052719

Pollutant	Total Emissions (TONs)
PM 2.5	0.052719
Pb	0.000000
NH_3	0.000000
CO_2e	8524.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)

Pollutant	Total Emissions (TONs)

VOC	0.759150
SO_x	2.820452
NO_x	13.179680
CO	56.830780
PM 10	0.052719

PM 2.5	0.052719
Pb	0.000000
NH_3	0.000000
CO_2e	8524.6

14.2 Aircraft & Engines

14.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: F-5E
Engine Model: J85-GE-21
Primary Function: Combat
Aircraft has After burn: Yes
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

14.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	400.00	27.89	1.07	1.25	159.00	0.00	0.00	3234
Approach	700.00	14.30	1.07	2.00	92.14	0.01	0.01	3234
Intermediate	1200.00	2.97	1.07	2.92	46.17	0.01	0.01	3234
Military	3200.00	0.29	1.07	5.00	21.56	0.02	0.02	3234
After Burn	10650.00	0.12	1.07	5.60	36.40	0.01	0.01	3234

14.3 Flight Operations

14.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 49423.8
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 0
Approach [Approach] (mins): 0
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	9
AfterBurn (mins):	3

14.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

14.4 Auxiliary Power Unit (APU)

14.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

14.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

14.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
APU_{POL} = APU * OH * LTO * EF_{POL} / 2000

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

15. Aircraft

15.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: West - KC-10 Aircraft Sorties

- Activity Description:
KC-10 Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.056638
SO_x	0.072556
NO_x	1.399650
CO	0.162766
PM 10	0.073769

Pollutant	Total Emissions (TONs)
PM 2.5	0.031472
Pb	0.000000
NH_3	0.000000
CO_2e	219.3

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.056638
SO_x	0.072556
NO_x	1.399650
CO	0.162766
PM 10	0.073769

Pollutant	Total Emissions (TONs)
PM 2.5	0.031472
Pb	0.000000
NH_3	0.000000
CO_2e	219.3

15.2 Aircraft & Engines

15.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: KC-10A
Engine Model: F103-GE-100
Primary Function: Transport - Bomber
Aircraft has After burn: No
Number of Engines: 3

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:

Original Engine Name:

15.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	1706.00	21.80	1.07	3.60	61.79	2.80	2.49	3234
Approach	5238.00	1.00	1.07	9.50	4.30	1.20	0.44	3234
Intermediate	15675.00	0.70	1.07	29.79	0.50	0.89	0.37	3234
Military	19738.00	0.60	1.07	36.54	0.50	1.18	0.77	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

15.3 Flight Operations

15.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 20.31
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 60.93
Approach [Approach] (mins): 258.96
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 12
AfterBurn (mins): 0

15.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

15.4 Auxiliary Power Unit (APU)

15.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

15.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

15.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

16. Aircraft

16.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: West - KC-135R Aircraft Sorties

- Activity Description:
KC-135R Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.005982
SO_x	0.090267
NO_x	1.095787
CO	0.200394
PM 10	0.004815

Pollutant	Total Emissions (TONs)
PM 2.5	0.004377
Pb	0.000000
NH_3	0.000000
CO_2e	272.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.005982
SO_x	0.090267
NO_x	1.095787
CO	0.200394
PM 10	0.004815

Pollutant	Total Emissions (TONs)
PM 2.5	0.004377
Pb	0.000000
NH_3	0.000000
CO_2e	272.8

16.2 Aircraft & Engines

16.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: KC-135R
Engine Model: CFM56-2B-1
Primary Function: Transport - Bomber
Aircraft has After burn: No
Number of Engines: 4

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

16.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	1015.88	2.11	1.07	4.00	30.70	0.07	0.06	3234
Approach	2468.27	0.09	1.07	8.20	4.20	0.06	0.05	3234
Intermediate	6500.04	0.06	1.07	16.00	0.90	0.05	0.05	3234
Military	7817.51	0.05	1.07	18.50	0.90	0.07	0.06	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

16.3 Flight Operations

16.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	61.71
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	141.06
Approach [Approach] (mins):	458.43
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	12
AfterBurn (mins):	0

16.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

16.4 Auxiliary Power Unit (APU)

16.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

16.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

16.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

17. Aircraft

17.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: East and West - MQ-9 Aircraft Sorties

- Activity Description:
MQ-9 Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.016448
SO_x	0.043922
NO_x	0.455168
CO	0.139883
PM 10	0.076321

Pollutant	Total Emissions (TONs)
PM 2.5	0.068613
Pb	0.000000
NH_3	0.000000
CO_2e	132.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.016448
SO_x	0.043922
NO_x	0.455168
CO	0.139883
PM 10	0.076321

Pollutant	Total Emissions (TONs)
PM 2.5	0.068613
Pb	0.000000
NH_3	0.000000
CO_2e	132.8

17.2 Aircraft & Engines

17.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: MQ-9

Engine Model: TPE-331
Primary Function: Unmanned Aerial Vehicle
Aircraft has After burn: No
Number of Engines: 1

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

17.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	112.00	90.97	1.07	2.86	61.52	2.68	2.41	3234
Approach	250.00	0.74	1.07	9.92	6.96	2.40	2.16	3234
Intermediate	409.00	0.17	1.07	11.86	0.98	1.47	1.32	3234
Military	458.00	0.13	1.07	12.36	0.76	1.75	1.57	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

17.3 Flight Operations

17.3.1 Flight Operations Assumptions

- Flight Operations
Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)
Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 401.3
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 6688.41
Approach [Approach] (mins): 8026.09
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test
Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 12
AfterBurn (mins): 0

17.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

17.4 Auxiliary Power Unit (APU)

17.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

17.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

17.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

18. Aircraft

18.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: East - T-1 Aircraft Sorties

- Activity Description:
T-1 Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.289647
SO_x	0.048181
NO_x	0.361245
CO	0.774782
PM 10	0.019383

Pollutant	Total Emissions (TONs)
PM 2.5	0.017445
Pb	0.000000
NH_3	0.000000
CO_2e	145.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.289647
SO_x	0.048181
NO_x	0.361245
CO	0.774782
PM 10	0.019383

Pollutant	Total Emissions (TONs)
PM 2.5	0.017445
Pb	0.000000
NH_3	0.000000
CO_2e	145.6

18.2 Aircraft & Engines

18.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: T-1A
Engine Model: JT15D-5B
Primary Function: Trainer
Aircraft has After burn: No
Number of Engines: 2

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

18.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	235.50	136.97	1.07	1.66	119.20	0.82	0.74	3234
Approach	524.00	13.46	1.07	4.93	38.60	0.73	0.66	3234
Intermediate	1371.00	1.50	1.07	10.08	1.15	0.23	0.21	3234
Military	1630.00	0.00	1.07	11.13	0.00	0.13	0.12	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

18.3 Flight Operations

18.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft:	1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft:	1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft:	0
Number of Annual Trim Test(s) per Aircraft:	0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	279.66
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	783.05
Approach [Approach] (mins):	2237.29
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	12
AfterBurn (mins):	0

18.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

18.4 Auxiliary Power Unit (APU)

18.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

18.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

18.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

19. Aircraft

19.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: West - T-45 Aircraft Sorties

- Activity Description:
T-45 Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.011123
SO_x	0.015069
NO_x	0.093675
CO	0.137465
PM 10	0.081504

Pollutant	Total Emissions (TONs)
PM 2.5	0.081504
Pb	0.000000
NH_3	0.000000
CO_2e	45.5

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.011123
SO_x	0.015069
NO_x	0.093675
CO	0.137465

Pollutant	Total Emissions (TONs)
PM 2.5	0.081504
Pb	0.000000
NH_3	0.000000
CO_2e	45.5

PM 10	0.081504		

19.2 Aircraft & Engines

19.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-45
Engine Model: F405-RR-401
Primary Function: Trainer
Aircraft has After burn: No
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

19.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	498.00	39.12	1.07	0.27	151.21	8.94	8.94	3234
Approach	1495.00	1.71	1.07	2.68	19.54	8.11	8.11	3234
Intermediate	3826.00	0.23	1.07	8.33	3.72	4.92	4.92	3234
Military	4559.00	0.17	1.07	10.10	3.27	3.65	3.65	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

19.3 Flight Operations

19.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 110.3
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 137.88
Approach [Approach] (mins): 441.22
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12

Approach (mins): 27
Intermediate (mins): 9
Military (mins): 12
AfterBurn (mins): 0

19.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year
$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year
$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year
$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)

TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

19.4 Auxiliary Power Unit (APU)

19.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

19.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

19.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

20. Aircraft

20.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: West - T-6 Aircraft Sorties

- Activity Description:
T-6 Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.001101
SO_x	0.000599
NO_x	0.002936
CO	0.012169
PM 10	0.002156

Pollutant	Total Emissions (TONs)
PM 2.5	0.000537
Pb	0.000000
NH_3	0.000000
CO_2e	1.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.001101
SO_x	0.000599
NO_x	0.002936
CO	0.012169
PM 10	0.002156

Pollutant	Total Emissions (TONs)
PM 2.5	0.000537
Pb	0.000000
NH_3	0.000000
CO_2e	1.8

20.2 Aircraft & Engines

20.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: T-6A
Engine Model: PT6A-68
Primary Function: Trainer
Aircraft has After burn: No
Number of Engines: 1

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

20.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	156.00	7.89	1.07	1.77	117.85	3.95	2.16	3234

Approach	328.00	3.29	1.07	5.03	33.69	4.15	1.23	3234
Intermediate	449.00	0.71	1.07	4.73	10.91	3.34	0.70	3234
Military	612.00	0.20	1.07	8.18	3.88	4.30	0.61	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

20.3 Flight Operations

20.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 11.56
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 57.8
Approach [Approach] (mins): 104.04
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 12
AfterBurn (mins): 0

20.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)

AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

20.4 Auxiliary Power Unit (APU)

20.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

20.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

20.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

21. Aircraft

21.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: East - U-2 Aircraft Sorties

- Activity Description:
U-2 Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.002762
SO_x	0.069879
NO_x	0.989550
CO	0.103432

Pollutant	Total Emissions (TONs)
PM 2.5	0.152090
Pb	0.000000
NH_3	0.000000
CO_2e	211.2

PM 10	0.258908		

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.002762
SO_x	0.069879
NO_x	0.989550
CO	0.103432
PM 10	0.258908

Pollutant	Total Emissions (TONs)
PM 2.5	0.152090
Pb	0.000000
NH_3	0.000000
CO_2e	211.2

21.2 Aircraft & Engines

21.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: U-2S
Engine Model: F118-GE-101
Primary Function: Combat
Aircraft has After burn: No
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

21.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	1097.00	0.29	1.07	4.30	20.98	1.25	1.03	3234
Approach	3773.00	0.05	1.07	11.09	2.02	4.70	2.32	3234
Intermediate	6350.00	0.03	1.07	18.01	0.85	3.05	2.72	3234
Military	10887.00	0.03	1.07	33.12	0.65	1.64	1.48	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

21.3 Flight Operations

21.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 1
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 0
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 76.6
Takeoff [After Burn] (mins): 76.6
Climb Out [Intermediate] (mins): 306.38
Approach [Approach] (mins): 1340.43

Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	12
AfterBurn (mins):	0

21.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)

$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

21.4 Auxiliary Power Unit (APU)

21.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

21.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

21.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

22. Heating

22.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: Boiler - Facility 16

- Activity Description:
Boiler - Facility 16 - Diesel - 0.3 MMBTU/hr

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000970
SO_x	0.123305
NO_x	0.057086
CO	0.014271
PM 10	0.003539

Pollutant	Total Emissions (TONs)
PM 2.5	0.001313
Pb	0.000000
NH_3	0.000000
CO_2e	64.4

22.2 Heating Assumptions

- Heating
Heating Calculation Type: Rated Capacity Method

- Rated Capacity Method
Rated Capacity of boiler/furnance (MM Btu): 0.3
Type of fuel: Fuel Oil No. 2
Type of boiler/furnace: Commercial/Institutional (0.3 - 9.9 MMBtu/hr)
Heat Value (MMBtu/gal): 0.14

- Default Settings Used: No

- Boiler/Furnace Usage
Operating Time Per Year (hours): 2664

22.3 Heating Emission Factor(s)

- Heating Emission Factors (lb/1000 gal)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.34	43.2	20	5	1.24	0.46			22579

22.4 Heating Formula(s)

- Heating Fuel Consumption gallons per Year

FC_{RC}= OT * RC / HV / 1000

FC_{RC}: Fuel Consumption for Rated Capacity Method
OT: Operating Time Per Year (hours)
RC: Rated Capacity of boiler/furnance (MM Btu)
HV: Heat Value (MMBtu/gal)
1000: Conversion Factor

- Heating Emissions per Year

HE_{POL}= FC * EF_{POL} / 2000

HE_{POL}: Heating Emission Emissions (TONs)
FC: Fuel Consumption
EF_{POL}: Emission Factor for Pollutant
2000: Conversion Factor pounds to tons

23. Heating

23.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: Boiler - Facility 326

- Activity Description:

Boiler - Facility 326 - Diesel - 0.3 MMBTU/hr

- Activity Start Date

Start Month: 1
Start Year: 2019

- Activity End Date

Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000970
SO_x	0.123305
NO_x	0.057086
CO	0.014271
PM 10	0.003539

Pollutant	Total Emissions (TONs)
PM 2.5	0.001313
Pb	0.000000
NH_3	0.000000
CO_2e	64.4

23.2 Heating Assumptions

- Heating
Heating Calculation Type: Rated Capacity Method

- Rated Capacity Method
Rated Capacity of boiler/furnance (MM Btu): 0.3
Type of fuel: Fuel Oil No. 2
Type of boiler/furnace: Commercial/Institutional (0.3 - 9.9 MMBtu/hr)
Heat Value (MMBtu/gal): 0.14

- Default Settings Used: No

- Boiler/Furnace Usage
Operating Time Per Year (hours): 2664

23.3 Heating Emission Factor(s)

- Heating Emission Factors (lb/1000 gal)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.34	43.2	20	5	1.24	0.46			22579

23.4 Heating Formula(s)

- Heating Fuel Consumption gallons per Year
FC_{RC}= OT * RC / HV / 1000

FC_{RC}: Fuel Consumption for Rated Capacity Method
OT: Operating Time Per Year (hours)
RC: Rated Capacity of boiler/furnance (MM Btu)
HV: Heat Value (MMBtu/gal)
1000: Conversion Factor

- Heating Emissions per Year
HE_{POL}= FC * EF_{POL} / 2000

HE_{POL}: Heating Emission Emissions (TONs)
FC: Fuel Consumption
EF_{POL}: Emission Factor for Pollutant
2000: Conversion Factor pounds to tons

24. Heating

24.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: Boiler - Facility 314

- Activity Description:

Boiler - Facility 326 - Propane - 0.49 MMBTU/hr

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.006943
SO_x	0.000125
NO_x	0.090264
CO	0.052076
PM 10	0.004860

Pollutant	Total Emissions (TONs)
PM 2.5	0.004860
Pb	0.000000
NH_3	0.000000
CO_2e	87.9

24.2 Heating Assumptions

- Heating
Heating Calculation Type: Rated Capacity Method

- Rated Capacity Method
Rated Capacity of boiler/furnance (MM Btu): 0.49
Type of fuel: LPG (Propane)
Type of boiler/furnace: Commercial/Institutional (0.3 - 9.9 MMBtu/hr)
Heat Value (MMBtu/gal): 0.094

- Default Settings Used: No

- Boiler/Furnace Usage
Operating Time Per Year (hours): 2664

24.3 Heating Emission Factor(s)

- Heating Emission Factors (lb/1000 gal)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
1	0.018	13	7.5	0.7	0.7			12664

24.4 Heating Formula(s)

- Heating Fuel Consumption gallons per Year
FC_{RC}= OT * RC / HV / 1000

FC_{RC}: Fuel Consumption for Rated Capacity Method
OT: Operating Time Per Year (hours)
RC: Rated Capacity of boiler/furnance (MM Btu)
HV: Heat Value (MMBtu/gal)
1000: Conversion Factor

- Heating Emissions per Year
HE_{POL}= FC * EF_{POL} / 2000

HE_{POL}: Heating Emission Emissions (TONs)
FC: Fuel Consumption
EF_{POL}: Emission Factor for Pollutant
2000: Conversion Factor pounds to tons

25. Heating

25.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: Boiler - Facility 4300

- Activity Description:
Boiler - Facility 4300 - Propane- 1.46 MMBTU/hr

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.020689
SO_x	0.000372
NO_x	0.268951
CO	0.155164
PM 10	0.014482

Pollutant	Total Emissions (TONs)
PM 2.5	0.014482
Pb	0.000000
NH_3	0.000000
CO_2e	262.0

25.2 Heating Assumptions

- Heating
Heating Calculation Type: Rated Capacity Method

- Rated Capacity Method
Rated Capacity of boiler/furnance (MM Btu): 1.46
Type of fuel: LPG (Propane)
Type of boiler/furnace: Commercial/Institutional (0.3 - 9.9 MMBtu/hr)
Heat Value (MMBtu/gal): 0.094

- Default Settings Used: No

- Boiler/Furnace Usage
Operating Time Per Year (hours): 2664

25.3 Heating Emission Factor(s)

- Heating Emission Factors (lb/1000 gal)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
1	0.018	13	7.5	0.7	0.7			12664

25.4 Heating Formula(s)

- Heating Fuel Consumption gallons per Year

FC_{RC}= OT * RC / HV / 1000

FC_{RC}: Fuel Consumption for Rated Capacity Method
OT: Operating Time Per Year (hours)
RC: Rated Capacity of boiler/furnance (MM Btu)
HV: Heat Value (MMBtu/gal)
1000: Conversion Factor

- Heating Emissions per Year

HE_{POL}= FC * EF_{POL} / 2000

HE_{POL}: Heating Emission Emissions (TONs)
FC: Fuel Consumption
EF_{POL}: Emission Factor for Pollutant
2000: Conversion Factor pounds to tons

26. Emergency Generator

26.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location

County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: POL 24 - 20.1 hp - Diesel Generator

- Activity Description:

POL 24 - 20.1 hp - Diesel Generator

- Activity Start Date

Start Month: 1
Start Year: 2019

- Activity End Date

Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000168
SO_x	0.000142

Pollutant	Total Emissions (TONs)
PM 2.5	0.000151
Pb	0.000000

NO_x	0.000693
CO	0.000463
PM 10	0.000151

NH_3	0.000000
CO_2e	0.1

26.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 20.1
Average Operating Hours Per Year (hours): 6

26.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

26.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year
$AE_{POL} = (NGEN * HP * OT * EF_{POL}) / 2000$

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

27. Emergency Generator

27.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: S/Lift E3 2015 - 20.1 hp - Diesel Generator

- Activity Description:
S/Lift E3 2015 - 20.1 hp - Diesel Generator

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date

Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000373
SO_x	0.000314
NO_x	0.001537
CO	0.001027
PM 10	0.000335

Pollutant	Total Emissions (TONs)
PM 2.5	0.000335
Pb	0.000000
NH_3	0.000000
CO_2e	0.2

27.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 20.1
Average Operating Hours Per Year (hours): 13.3

27.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

27.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year

$AE_{POL} = (NGEN * HP * OT * EF_{POL}) / 2000$

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

28. Emergency Generator

28.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: Storage 22 - 134.1 hp - Diesel Generator

- Activity Description:
Storage 22 - 134.1 hp - Diesel Generator

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.003087
SO_x	0.002600
NO_x	0.012723
CO	0.008497
PM 10	0.002777

Pollutant	Total Emissions (TONs)
PM 2.5	0.002777
Pb	0.000000
NH_3	0.000000
CO_2e	1.5

28.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 134.1
Average Operating Hours Per Year (hours): 16.5

28.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

28.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year
AE_{POL}= (NGEN * HP * OT * EF_{POL}) / 2000

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

29. Emergency Generator

29.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: S/Lift 3304 - 20.1 hp - Diesel Generator

- Activity Description:
S/Lift 3304 - 20.1 hp - Diesel Generator

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.002439
SO_x	0.002055
NO_x	0.010055
CO	0.006715
PM 10	0.002195

Pollutant	Total Emissions (TONs)
PM 2.5	0.002195
Pb	0.000000
NH_3	0.000000
CO_2e	1.2

29.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 20.1
Average Operating Hours Per Year (hours): 87

29.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

29.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year
AE_{POL}= (NGEN * HP * OT * EF_{POL}) / 2000

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)

EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

30. Emergency Generator

30.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: E1/2079 - 5.4 hp - Diesel Generator

- Activity Description:
E1/2079 - 5.4 hp - Diesel Generator

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000655
SO_x	0.000552
NO_x	0.002701
CO	0.001804
PM 10	0.000590

Pollutant	Total Emissions (TONs)
PM 2.5	0.000590
Pb	0.000000
NH_3	0.000000
CO_2e	0.3

30.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 5.4
Average Operating Hours Per Year (hours): 87

30.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

30.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year

AE_{POL}= (NGEN * HP * OT * EF_{POL}) / 2000

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

31. Emergency Generator

31.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: E8/1016 - 40.2 hp - Diesel Generator

- Activity Description:
E8/1016 - 40.2 hp - Diesel Generator

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.035935
SO_x	0.030268
NO_x	0.148121
CO	0.098919
PM 10	0.032329

Pollutant	Total Emissions (TONs)
PM 2.5	0.032329
Pb	0.000000
NH_3	0.000000
CO_2e	17.1

31.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 40.2
Average Operating Hours Per Year (hours): 640.8

31.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

31.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year

AE_{POL}= (NGEN * HP * OT * EF_{POL}) / 2000

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

32. Emergency Generator

32.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: Tower 315 - 80.5 hp - Diesel Generator

- Activity Description:
Tower 315 - 80.5 hp - Diesel Generator

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.001830
SO_x	0.001542
NO_x	0.007545
CO	0.005039
PM 10	0.001647

Pollutant	Total Emissions (TONs)
PM 2.5	0.001647
Pb	0.000000
NH_3	0.000000
CO_2e	0.9

32.2 Emergency Generator Assumptions

- Emergency Generator

Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 80.5
Average Operating Hours Per Year (hours): 16.3

32.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

32.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year
$AE_{POL} = (NGEN * HP * OT * EF_{POL}) / 2000$

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

33. Emergency Generator

33.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: Fire Dept - 40.2 hp - Diesel Generator

- Activity Description:
Fire Dept - 40.2 hp - Diesel Generator

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000376

Pollutant	Total Emissions (TONs)
PM 2.5	0.000338

SO_x	0.000316
NO_x	0.001549
CO	0.001034
PM 10	0.000338

Pb	0.000000
NH_3	0.000000
CO_2e	0.2

33.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 40.2
Average Operating Hours Per Year (hours): 6.7

33.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

33.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year
$AE_{POL} = (NGEN * HP * OT * EF_{POL}) / 2000$

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

34. Emergency Generator

34.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: Storage 326 - 207.9 hp - Diesel Generator

- Activity Description:
Storage 326 - 207.9 hp - Diesel Generator

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.001943
SO_x	0.001637
NO_x	0.008009
CO	0.005349
PM 10	0.001748

Pollutant	Total Emissions (TONs)
PM 2.5	0.001748
Pb	0.000000
NH_3	0.000000
CO_2e	0.9

34.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 207.9
Average Operating Hours Per Year (hours): 6.7

34.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

34.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year
$AE_{POL} = (NGEN * HP * OT * EF_{POL}) / 2000$

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

35. Emergency Generator

35.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: Security 300 - 80.5 hp - Diesel Generator

- Activity Description:
Security 300 - 80.5 hp - Diesel Generator

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.002156
SO_x	0.001816
NO_x	0.008887
CO	0.005935
PM 10	0.001940

Pollutant	Total Emissions (TONs)
PM 2.5	0.001940
Pb	0.000000
NH_3	0.000000
CO_2e	1.0

35.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 80.5
Average Operating Hours Per Year (hours): 19.2

35.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

35.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year
$AE_{POL} = (NGEN * HP * OT * EF_{POL}) / 2000$

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

36. Emergency Generator

36.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: Beacon 1001 - 16.1 hp - Diesel Generator

- Activity Description:
Beacon 1001 - 16.1 hp - Diesel Generator

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.000341
SO_x	0.000288
NO_x	0.001407
CO	0.000940
PM 10	0.000307

Pollutant	Total Emissions (TONs)
PM 2.5	0.000307
Pb	0.000000
NH_3	0.000000
CO_2e	0.2

36.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 16.1
Average Operating Hours Per Year (hours): 15.2

36.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

36.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year
AE_{POL}= (NGEN * HP * OT * EF_{POL}) / 2000

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)

OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

37. Emergency Generator

37.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: Range Ops - 80.5 hp - Diesel Generator

- Activity Description:
Range Ops - 80.5 hp - Diesel Generator

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.001830
SO_x	0.001542
NO_x	0.007545
CO	0.005039
PM 10	0.001647

Pollutant	Total Emissions (TONs)
PM 2.5	0.001647
Pb	0.000000
NH_3	0.000000
CO_2e	0.9

37.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 80.5
Average Operating Hours Per Year (hours): 16.3

37.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

37.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year

AE_{POL}= (NGEN * HP * OT * EF_{POL}) / 2000

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

38. Emergency Generator

38.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: Telex 3196 - 107.3 hp - Diesel Generator

- Activity Description:
Telex 3196 - 107.3 hp - Diesel Generator

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.003009
SO_x	0.002534
NO_x	0.012401
CO	0.008282
PM 10	0.002707

Pollutant	Total Emissions (TONs)
PM 2.5	0.002707
Pb	0.000000
NH_3	0.000000
CO_2e	1.4

38.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 107.3

Average Operating Hours Per Year (hours): 20.1

38.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

38.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year

AE_{POL}= (NGEN * HP * OT * EF_{POL}) / 2000

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

39. Emergency Generator

39.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: Water Plant 45 - 167.6 hp - Diesel Generator

- Activity Description:
Water Plant 45 - 167.6 hp - Diesel Generator

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.005377
SO_x	0.004529
NO_x	0.022165
CO	0.014802
PM 10	0.004838

Pollutant	Total Emissions (TONs)
PM 2.5	0.004838
Pb	0.000000
NH_3	0.000000
CO_2e	2.6

39.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 167.6
Average Operating Hours Per Year (hours): 23

39.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

39.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year
$AE_{POL} = (NGEN * HP * OT * EF_{POL}) / 2000$

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

40. Emergency Generator

40.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: CE Cntrl - 23.5 hp - Diesel Generator

- Activity Description:
CE Cntrl - 23.5 hp - Diesel Generator

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)

Pollutant	Total Emissions (TONs)

VOC	0.000534
SO_x	0.000450
NO_x	0.002203
CO	0.001471
PM 10	0.000481

PM 2.5	0.000481
Pb	0.000000
NH_3	0.000000
CO_2e	0.3

40.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 23.5
Average Operating Hours Per Year (hours): 16.3

40.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

40.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year
AE_{POL}= (NGEN * HP * OT * EF_{POL}) / 2000

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

41. Emergency Generator

41.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: Well #4 313 - 167.6 hp - Diesel Generator

- Activity Description:
Well #4 313 - 167.6 hp - Diesel Generator

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.003811
SO_x	0.003210
NO_x	0.015708
CO	0.010490
PM 10	0.003429

Pollutant	Total Emissions (TONs)
PM 2.5	0.003429
Pb	0.000000
NH_3	0.000000
CO_2e	1.8

41.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 167.6
Average Operating Hours Per Year (hours): 16.3

41.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

41.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year
$AE_{POL} = (NGEN * HP * OT * EF_{POL}) / 2000$

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

42. Emergency Generator

42.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: Range 1 1000 - 80.5 hp - Diesel Generator

- Activity Description:
Range 1 1000 - 80.5 hp - Diesel Generator

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.001763
SO_x	0.001485
NO_x	0.007267
CO	0.004853
PM 10	0.001586

Pollutant	Total Emissions (TONs)
PM 2.5	0.001586
Pb	0.000000
NH_3	0.000000
CO_2e	0.8

42.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 80.5
Average Operating Hours Per Year (hours): 15.7

42.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

42.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year
AE_{POL}= (NGEN * HP * OT * EF_{POL}) / 2000

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

43. Emergency Generator

43.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: Range 2 2000 - 80.5 hp - Diesel Generator

- Activity Description:
Range 2 2000 - 80.5 hp - Diesel Generator

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.001830
SO_x	0.001542
NO_x	0.007545
CO	0.005039
PM 10	0.001647

Pollutant	Total Emissions (TONs)
PM 2.5	0.001647
Pb	0.000000
NH_3	0.000000
CO_2e	0.9

43.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 80.5
Average Operating Hours Per Year (hours): 16.3

43.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

43.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year
$AE_{POL} = (NGEN * HP * OT * EF_{POL}) / 2000$

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators

HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

44. Emergency Generator

44.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: Range 4 4020 - 80.5 hp - Diesel Generator

- Activity Description:
Range 4 4020 - 80.5 hp - Diesel Generator

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.004222
SO_x	0.003556
NO_x	0.017404
CO	0.011623
PM 10	0.003799

Pollutant	Total Emissions (TONs)
PM 2.5	0.003799
Pb	0.000000
NH_3	0.000000
CO_2e	2.0

44.2 Emergency Generator Assumptions

- Emergency Generator
Type of Fuel used in Emergency Generator: Diesel
Number of Emergency Generators: 1

- Default Settings Used: No

- Emergency Generators Consumption
Emergency Generator's Horsepower: 80.5
Average Operating Hours Per Year (hours): 37.6

44.3 Emergency Generator Emission Factor(s)

- Emergency Generators Emission Factor (lb/hp-hr)

VOC	SO_x	NO_x	CO	PM 10	PM 2.5	Pb	NH_3	CO_2e
0.00279	0.00235	0.0115	0.00768	0.00251	0.00251			1.33

44.4 Emergency Generator Formula(s)

- Emergency Generator Emissions per Year

AE_{POL}= (NGEN * HP * OT * EF_{POL}) / 2000

AE_{POL}: Activity Emissions (TONs per Year)
NGEN: Number of Emergency Generators
HP: Emergency Generator's Horsepower (hp)
OT: Average Operating Hours Per Year (hours)
EF_{POL}: Emission Factor for Pollutant (lb/hp-hr)

45. Aircraft

45.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: West - EA18 Aircraft Sorties

- Activity Description:
EA18 Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.008060
SO_x	0.026772
NO_x	0.277980
CO	0.230891
PM 10	0.045555

Pollutant	Total Emissions (TONs)
PM 2.5	0.030932
Pb	0.000000
NH_3	0.000000
CO_2e	74.6

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.008060
SO_x	0.026772
NO_x	0.277980
CO	0.230891
PM 10	0.045555

Pollutant	Total Emissions (TONs)
PM 2.5	0.030932
Pb	0.000000
NH_3	0.000000
CO_2e	74.6

45.2 Aircraft & Engines

45.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: F/A-18E
Engine Model: F414-GE-400
Primary Function: Combat
Aircraft has After burn: No
Number of Engines: 2

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

45.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	685.00	3.39	1.07	1.70	110.18	4.47	3.10	3234
Approach	3111.00	0.04	1.07	7.86	2.02	1.46	0.87	3234
Intermediate	6464.00	0.07	1.07	17.03	1.54	1.57	0.90	3234
Military	7739.00	0.02	1.07	25.83	1.48	1.61	0.89	3234
After Burn	15851.00	1.85	1.07	5.43	50.31	3.57	3.21	3234

45.3 Flight Operations

45.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 0
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 1
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 14.45
Takeoff [After Burn] (mins): 14.45
Climb Out [Intermediate] (mins): 57.8
Approach [Approach] (mins): 252.89
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 9
AfterBurn (mins): 3

45.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year
$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year
AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL}$ = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds

EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

45.4 Auxiliary Power Unit (APU)

45.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

45.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

45.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

46. Aircraft

46.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: East and West - LJ60 Aircraft Sorties

- Activity Description:
LJ60 Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.293434
SO_x	0.157737
NO_x	1.611669
CO	1.438181
PM 10	0.012829

Pollutant	Total Emissions (TONs)
PM 2.5	0.011793
Pb	0.000000
NH_3	0.000000
CO_2e	476.7

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.293434
SO_x	0.157737
NO_x	1.611669
CO	1.438181
PM 10	0.012829

Pollutant	Total Emissions (TONs)
PM 2.5	0.011793
Pb	0.000000
NH_3	0.000000
CO_2e	476.7

46.2 Aircraft & Engines

46.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: NC-21A
Engine Model: TFE731-2-2B
Primary Function: General - Business Jet
Aircraft has After burn: No
Number of Engines: 2

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

46.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	190.00	23.05	1.07	2.82	58.60	0.13	0.12	3234
Approach	532.00	4.90	1.07	5.90	22.38	0.09	0.08	3234
Intermediate	1373.00	0.15	1.07	13.08	2.03	0.09	0.08	3234
Military	1627.00	0.13	1.07	15.25	1.39	0.08	0.08	3234

After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

46.3 Flight Operations

46.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 0
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 1
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 1616.64
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 2020.8
Approach [Approach] (mins): 6466.56
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 12
AfterBurn (mins): 0

46.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)

$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year
$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

46.4 Auxiliary Power Unit (APU)

46.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

46.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

46.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year

$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

47. Aircraft

47.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: East and West - T34C Aircraft Sorties

- Activity Description:
T34C Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.003650
SO_x	0.002953
NO_x	0.021603
CO	0.035319
PM 10	0.000468

Pollutant	Total Emissions (TONs)
PM 2.5	0.000428
Pb	0.000000
NH_3	0.000000
CO_2e	8.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.003650
SO_x	0.002953
NO_x	0.021603
CO	0.035319
PM 10	0.000468

Pollutant	Total Emissions (TONs)
PM 2.5	0.000428
Pb	0.000000
NH_3	0.000000
CO_2e	8.9

47.2 Aircraft & Engines

47.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: T-34C
Engine Model: PT6A-27
Primary Function: General - Piston
Aircraft has After burn: No
Number of Engines: 1

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

47.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	115.00	57.70	1.07	2.43	64.00	0.50	0.45	3234
Approach	215.00	2.51	1.07	8.37	23.26	0.10	0.09	3234
Intermediate	400.00	0.00	1.07	7.00	1.20	0.25	0.23	3234
Military	425.00	0.00	1.07	7.81	1.01	0.24	0.22	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

47.3 Flight Operations

47.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 0
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 1
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 101.44
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 284.03
Approach [Approach] (mins): 811.53
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	12
AfterBurn (mins):	0

47.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)

$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

47.4 Auxiliary Power Unit (APU)

47.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

47.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

47.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

48. Aircraft

48.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: East - C17 Aircraft Sorties

- Activity Description:
C17 Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.025371
SO_x	0.280837
NO_x	5.983895
CO	0.316050
PM 10	0.017838

Pollutant	Total Emissions (TONs)
PM 2.5	0.016020
Pb	0.000000
NH_3	0.000000
CO_2e	848.8

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.025371
SO_x	0.280837
NO_x	5.983895
CO	0.316050
PM 10	0.017838

Pollutant	Total Emissions (TONs)
PM 2.5	0.016020
Pb	0.000000
NH_3	0.000000
CO_2e	848.8

48.2 Aircraft & Engines

48.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine
Aircraft Designation: C-17A
Engine Model: PW2040
Primary Function: Transport - Bomber
Aircraft has After burn: No
Number of Engines: 4

- Aircraft & Engine Surrogate
Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:

Original Engine Name:

48.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	1262.00	1.90	1.07	4.37	19.95	0.05	0.05	3234
Approach	3937.00	0.12	1.07	10.49	1.42	0.07	0.06	3234
Intermediate	11468.00	0.02	1.07	26.62	0.41	0.09	0.08	3234
Military	13905.00	0.01	1.07	35.04	0.32	0.06	0.05	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

48.3 Flight Operations

48.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 0
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 1
Number of Annual Trim Test(s) per Aircraft: 12

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins): 0
Takeoff [Military] (mins): 32.24
Takeoff [After Burn] (mins): 0
Climb Out [Intermediate] (mins): 96.72
Approach [Approach] (mins): 411.04
Taxi/Idle In [Idle] (mins): 0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins): 12
Approach (mins): 27
Intermediate (mins): 9
Military (mins): 12
AfterBurn (mins): 0

48.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines

LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year

$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year

$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year

$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)

$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

48.4 Auxiliary Power Unit (APU)

48.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

48.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

48.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

49. Aircraft

49.1 General Information & Timeline Assumptions

- Add or Remove Activity from Baseline? Add

- Activity Location
County: Yuma
Regulatory Area(s): Yuma, AZ

- Activity Title: West - C130T Aircraft Sorties

- Activity Description:
C130T Aircraft Sorties

- Activity Start Date
Start Month: 1
Start Year: 2019

- Activity End Date
Indefinite: No
End Month: 12
End Year: 2019

- Activity Emissions:

Pollutant	Total Emissions (TONs)
VOC	0.350641
SO_x	2.052283
NO_x	19.240744
CO	0.928074
PM 10	0.973335

Pollutant	Total Emissions (TONs)
PM 2.5	0.877434
Pb	0.000000
NH_3	0.000000
CO_2e	6202.9

- Activity Emissions [Flight Operations (includes Trim Test & APU) part]:

Pollutant	Total Emissions (TONs)
VOC	0.350641
SO_x	2.052283
NO_x	19.240744
CO	0.928074
PM 10	0.973335

Pollutant	Total Emissions (TONs)
PM 2.5	0.877434
Pb	0.000000
NH_3	0.000000
CO_2e	6202.9

49.2 Aircraft & Engines

49.2.1 Aircraft & Engines Assumptions

- Aircraft & Engine

Aircraft Designation: KC-130T
Engine Model: T56-A-16
Primary Function: Transport - Bomber
Aircraft has After burn: No
Number of Engines: 4

- Aircraft & Engine Surrogate

Is Aircraft & Engine a Surrogate? No
Original Aircraft Name:
Original Engine Name:

49.2.2 Aircraft & Engines Emission Factor(s)

- Aircraft & Engine Emissions Factors (lb/1000lb fuel)

	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e
Idle	756.00	1.40	1.07	6.35	5.65	0.83	0.75	3234
Approach	1996.00	0.20	1.07	9.93	0.42	0.51	0.46	3234
Intermediate	2136.00	0.14	1.07	10.29	0.68	0.50	0.45	3234
Military	2219.00	0.16	1.07	10.45	0.65	0.50	0.45	3234
After Burn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3234

49.3 Flight Operations

49.3.1 Flight Operations Assumptions

- Flight Operations

Number of Aircraft: 1
Number of Annual LTOs (Landing and Take-off) cycles for all Aircraft: 0
Number of Annual TGOs (Touch-and-Go) cycles for all Aircraft: 1
Number of Annual Trim Test(s) per Aircraft: 0

- Default Settings Used: No

- Flight Operations TIMs (Time In Mode)

Taxi/Idle Out [Idle] (mins):	0
Takeoff [Military] (mins):	1688.6
Takeoff [After Burn] (mins):	0
Climb Out [Intermediate] (mins):	5065.79
Approach [Approach] (mins):	21529.61
Taxi/Idle In [Idle] (mins):	0

Per the Air Emissions Guide for Air Force Mobile Sources, the defaults values for military aircraft equipped with after burner for takeoff is 50% military power and 50% afterburner. (Exception made for F-35 where KARNES 3.2 flight profile was used)

- Trim Test

Idle (mins):	12
Approach (mins):	27
Intermediate (mins):	9
Military (mins):	12
AfterBurn (mins):	0

49.3.2 Flight Operations Formula(s)

- Aircraft Emissions per Mode for LTOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * LTO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
LTO: Number of Landing and Take-off Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for LTOs per Year

$AE_{LTO} = AEM_{IDLE_IN} + AEM_{IDLE_OUT} + AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{LTO}: Aircraft Emissions (TONs)
AEM_{IDLE_IN}: Aircraft Emissions for Idle-In Mode (TONs)
AEM_{IDLE_OUT}: Aircraft Emissions for Idle-Out Mode (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for TGOs per Year

$AEM_{POL} = (TIM / 60) * (FC / 1000) * EF * NE * TGO / 2000$

AEM_{POL}: Aircraft Emissions per Pollutant & Mode (TONs)
TIM: Time in Mode (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines

TGO: Number of Touch-and-Go Cycles (for all aircraft)
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for TGOs per Year
$AE_{TGO} = AEM_{APPROACH} + AEM_{CLIMBOUT} + AEM_{TAKEOFF}$

AE_{TGO}: Aircraft Emissions (TONs)
$AEM_{APPROACH}$: Aircraft Emissions for Approach Mode (TONs)
$AEM_{CLIMBOUT}$: Aircraft Emissions for Climb-Out Mode (TONs)
$AEM_{TAKEOFF}$: Aircraft Emissions for Take-Off Mode (TONs)

- Aircraft Emissions per Mode for Trim per Year
$AEPS_{POL} = (TD / 60) * (FC / 1000) * EF * NE * NA * NTT / 2000$

$AEPS_{POL}$: Aircraft Emissions per Pollutant & Power Setting (TONs)
TD: Test Duration (min)
60: Conversion Factor minutes to hours
FC: Fuel Flow Rate (lb/hr)
1000: Conversion Factor pounds to 1000pounds
EF: Emission Factor (lb/1000lb fuel)
NE: Number of Engines
NA: Number of Aircraft
NTT: Number of Trim Test
2000: Conversion Factor pounds to TONs

- Aircraft Emissions for Trim per Year
$AE_{TRIM} = AEPS_{IDLE} + AEPS_{APPROACH} + AEPS_{INTERMEDIATE} + AEPS_{MILITARY} + AEPS_{AFTERBURN}$

AE_{TRIM}: Aircraft Emissions (TONs)
$AEPS_{IDLE}$: Aircraft Emissions for Idle Power Setting (TONs)
$AEPS_{APPROACH}$: Aircraft Emissions for Approach Power Setting (TONs)
$AEPS_{INTERMEDIATE}$: Aircraft Emissions for Intermediate Power Setting (TONs)
$AEPS_{MILITARY}$: Aircraft Emissions for Military Power Setting (TONs)
$AEPS_{AFTERBURN}$: Aircraft Emissions for After Burner Power Setting (TONs)

49.4 Auxiliary Power Unit (APU)

49.4.1 Auxiliary Power Unit (APU) Assumptions

- Default Settings Used: No

- Auxiliary Power Unit (APU)

Number of APU per Aircraft	Operation Hours for Each LTO	Exempt Source?	Designation	Manufacturer

49.4.2 Auxiliary Power Unit (APU) Emission Factor(s)

- Auxiliary Power Unit (APU) Emission Factor (lb/hr)

Designation	Fuel Flow	VOC	SO_x	NO_x	CO	PM 10	PM 2.5	CO_2e

49.4.3 Auxiliary Power Unit (APU) Formula(s)

- Auxiliary Power Unit (APU) Emissions per Year
$APU_{POL} = APU * OH * LTO * EF_{POL} / 2000$

APU_{POL}: Auxiliary Power Unit (APU) Emissions per Pollutant (TONs)
APU: Number of Auxiliary Power Units
OH: Operation Hours for Each LTO (hour)
LTO: Number of LTOs
EF_{POL}: Emission Factor for Pollutant (lb/hr)
2000: Conversion Factor pounds to tons

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Appendix G – Conservation Measures from USFWS Biological Opinions

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Appendix G
Conservation Measures from USFWS Biological Opinions

This appendix identifies the Biological Opinions resulting from the consultation history for Air Force and Marine Corps actions proposed within the BMGR. Some species that have been addressed in ESA Section 7 consultations have been delisted or are not known to occur on the BMGR. Therefore, conservation measures are not listed for the lesser long-nosed bat (currently a Species of Concern), cactus ferruginous pygmy owl (currently a Species of Concern), and Peirson's milk-vetch (ESA threatened species, but not known to occur on the BMGR). Flat-tailed horned lizard was included in early Biological Opinions for activities on the BMGR as the species was under consideration for ESA listing; however, a 2011 Candidate Conservation Agreement providing a collaborative stewardship approach to conserving the declining species included the Air Force and Marine Corps, and provides a means of designing and implementing conservation measures to protect the species without requiring formal consultation with USFWS for changes to current activities or new actions.

As actions on the BMGR change over time, reinitiation of Section 7 consultations with USFWS occur and can at times modify the original conservation measures that were prescribed based on updated species information and effectiveness of measures already in place. Text has been struck through conservation measures that have been eliminated due to these changes. Inconsistencies in formatting, numbering, and out-of-sequence numbers are intentional to reflect the presentation in the Biological Opinions.

1. **2015. Reinitiation of Formal Section 7 Consultation on Ongoing Activities at Barry M. Goldwater Range by the Marine Corps Air Station - Yuma, Yuma and Maricopa Counties, Arizona. (No. 22410-1995-F-0114-R007)**

   The following terms and conditions implement reasonable and prudent measure number one for Sonoran pronghorn:

   1. If mortality or injury of Sonoran pronghorn is detected, the Sonoran Pronghorn Incident Response Protocol dated 2015 (or updated version) and the instructions provided below under "Disposition of Dead or Injured Listed Species" will be followed.

   2. We continue to recommend implementing the conservation measures in our August 6, 2003 biological opinion (#02-21-95-F-Ol 14R4, now 22410-1995-F-0114-R004) with modifications described in our October 21, 2009 biological opinion (22410-1995-F-0114-R005).

2. **2010. West Coast Basing of the F-35B Joint Strike Fighter and Reinitiation of Formal Section 7 Consultation on Ongoing Activities at the Barry M. Goldwater Range by Marine Corps Air Station-Yuma, Yuma and Maricopa Counties, Arizona (No. 22410-1995-F-0114-R006)**

   Reasonable and Prudent Measures for the Sonoran pronghorn remain the same as in the 1996 conference opinion. **(No. 2-21-95-F-114)**

3. 2010. Reinitiation of Formal Section 7 Consultation on Military Training on the Barry M. Goldwater Range East, Maricopa, Pima, and Yuma Counties, Arizona (No. 22410-1996-F-0094-R003)

- Sonoran pronghorn (SOPH) Monitoring (USAF [U.S. Air Force] Luke Air Force Base Protocol OI 13-01)

The USAF proposes to implement or continue implementation of the following conservation measures:

1. The annual range maintenance schedule will continue to be implemented to reduce potential effects to Sonoran pronghorn as follows: East TAC – 15 April to 15 June; NTAC- 1 January to 28 February; STAC – 1 October to 15 December. These dates are subject to scheduling changes which may move the starting and ending dates by two weeks.

2. All BMGR-East ground personnel are briefed on the Sonoran pronghorn. The briefings cover the status of the species, the importance in reducing impacts to the species, and any mitigation measures the users must comply with while on the range, specifically OI 13-01.

3. All vehicles are restricted to designated roads except as required by EOD, maintenance, emergency response, and environmental sciences personnel including authorized contractors while conducting required mission support activities.

4. When actions require new surface disturbance in current Sonoran pronghorn habitat, every effort will be made to minimize the extent of surface disturbance and to restore the area to the previous grade when such work is practicable. Most actions will be conducted on the existing road system but there will be a few cases where that cannot be done, such as during annual EOD clearances. The USAF will make every effort to minimize the impacts of operations to vegetation and friable soils, and for operations to be consistent with the conservation measures and terms and conditions of this biological opinion.

5. Low speed limits on roadways will continue to be enforced to ensure that no Sonoran pronghorn are injured due to vehicles. The 56th RMO OI 13-01 specifies that vehicle speed limits for all ground personnel will be reduced when approaching known Sonoran pronghorn locations. OI 13- 01 speed limits on BMGR-East within SPH habitat are 45 mph on paved roads, 35 mph on major graded roads, and 25 mph on all other roads. The speed limit on the 7-mile road segment proposed for paving will remain at 35 mph and additional speed limit signs will be posted to encourage compliance.

6. The USAF will continue to revise OI 13-01, *Sonoran Pronghorn Monitoring*, from monitoring data collected by the Sonoran pronghorn monitors and input provided by the Sonoran Pronghorn Recovery Team. Luke AFB will use the biennial internal reviews of 56th RMO OI 13-01 to assess and adjust the guidelines to support military training operations and further the recovery of the Sonoran Pronghorn.

7. The USAF funded and installed two forage enhancement plots on BMGR-East. One forage enhancement plot is operational and the other has been completed but is not yet in use. Continued funding will be required to maintain and operate those forage enhancement plots in the future for as long as they are needed. The USAF proposes working with the Sonoran Pronghorn Recovery Team to estimate operational costs for all forage enhancement plots and determine how to best cost-share that undertaking among the interested agencies. The USAF will contribute to the operation of these forage enhancement plots if the Sonoran Pronghorn Recovery Team determines this to be a priority use of USAF Sonoran pronghorn recovery action funding (see conservation measure 14).

8. The USAF supported new feed and water stations placed on BMGR-East's STAC (see the "Environmental Baseline" for Sonoran pronghorn for a description of this action). The USAF, along with others, spent numerous hours monitoring these three sites for use patterns, moving them to new locations when use was low, as well as moving them further away from the targets when use was high, and restocking water and alfalfa feed. The USAF will continue to support the development and implementation of food and water stations as determined necessary by the Sonoran Pronghorn Recovery Team.

9. In accordance with its responsibilities under the MLWA of 1999 and the Sikes Act, Luke AFB will continue to work with its agency partners - the USMC [U.S. Marine Corps], the USFWS, BLM, and AGFD [Arizona Game and Fish Department] - to implement the Integrated Natural Resources Management Plan (INRMP) for the BMGR. The INRMP, which incorporates ecosystem management principles, is designed to establish a long- term resource stewardship program for the BMGR that provides for protection, conservation, and rehabilitation of natural resources, including Sonoran pronghorn and their habitat. The INRMP also provides for sustained public use of the range consistent with its military purposes and will undergo a review every five years. The INRMP fully supports the requirements of the Sonoran Pronghorn Recovery Plan and the actions of the Sonoran Pronghorn Recovery Team. The Record of Decision for the INRMP EIS was signed in March 2007.

10. The USAF produces and will continue to produce an annual report, which is provided to the USFWS-AESO, that summarizes the results of all monitoring efforts (including the Sonoran pronghorn monitors annual report), the Range Use annual report, all range incidents, and a brief summary of all contract and construction work in Sonoran pronghorn habitat. The report includes the date and location of any Sonoran pronghorn observed by USAF personnel and contractors, including observations of injured or dead Sonoran pronghorn. This report describes in detail how each of the conservation measures was implemented. 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 in the spring of each year. Incidents of dead or injured Sonoran pronghorn will be reported within 24 hours to the Recovery Lead at CPNWR and to this office.

11. The San Cristobal Valley is closed to public use with access limited to authorized federal and state personnel and individuals holding a special use permit issued by 56th RMO. Special use permits for San Cristobal Valley are generally not issued for the time period beginning 15 March through 15 July to protect Sonoran pronghorn during the fawning period. Special use permits will only be issued during this period on an extremely limited basis and only if the proposed activity is not in conflict with pronghorn. These dates may be adjusted as recommended by the Recovery Lead at CPNWR.

12. The USAF removed several kilometers of barbed wire fencing from Sonoran pronghorn habitat. Fencing is a known deterrent to Sonoran pronghorn foraging and movement and poses a potential tangle hazard. The USAF will continue to remove unnecessary fencing as it is identified.

13. The USAF will continue to coordinate and share data with the CPNWR and the Arizona Ecological Services Office on all Sonoran pronghorn studies and monitoring efforts.

14. The USAF will continue to support priority recovery actions for Sonoran pronghorn as established by the Sonoran Pronghorn Recovery Team. This support has been in the form of providing 1) funding to AGFD and CPNWR to plan and implement recovery actions and 2) USAF staff time to assist in the planning and implementation of recovery actions identified by the Sonoran Pronghorn Recovery Team. Among other actions, last year USAF contributed funding to develop the Environmental Assessment (EA) for establishing a second pronghorn population in Arizona and more recently, they have committed to providing funding to develop the EA for a Sonoran Pronghorn Habitat Management Plan which is needed to coordinate pronghorn recovery actions range wide in Arizona (i.e., forage enhancements, water redevelopments, habitat manipulation, etc.). Luke AFB staff has contributed funding and dedicated numerous hours to the successful development and operation of the semi-captive breeding pen. USAF support of Sonoran pronghorn recovery actions will be continued at levels comparable to that provided since the issuance of the 2003 biological opinion (annual funding since 2003 has been approximately $210,000).

15. The USAF will continue to maintain the Sonoran pronghorn GIS database of all historical sightings in USAF files and support an annual program of documenting Sonoran pronghorn sightings by employees and other agencies throughout range. These files will be made available to the CPNWR, AGFD, and USFWS Tucson office upon request.

16. The USAF will continue efforts to implement the use of electronic scoring systems to reduce the number of air-to-ground weapons deliveries in pronghorn habitat. Development of the proposed STA [Sensor Training Area] was specifically designed to meet this goal, allowing pilots to practice delivery of precision- guided munitions on no-drop, electronically scored, targets.

Conservation measures 6, 7, 15, and 16 in the 2003 biological opinion were removed for reasons explained below:

Conservation Measure 6. USAF funding for on-going study with AGFD to determine the effect of military night operations on Sonoran pronghorn: In approximately 1998 the Air Force funded AGFD to perform this study using radio collar signal changes to indicate the movement of animals, but this method was determined to be non-feasible. Since then no new methods of performing this study have emerged, and the multi-year noise study concluded that pronghorn were acclimated to the noise resulting from military training operations. Hence there has been no compelling reason to fund further study, and instead, USAF funds were used for higher priority recovery actions such as the semi-captive breeding pen. The USAF does not propose any further study of this topic unless the Recovery Team identifies it as a high priority.

Conservation Measure 7. USAF study to determine the effects of military activities during the fawning season: In approximately 1998 the USAF funded the multi-year noise effects study. The field crew's observations over three seasons included some fawns, and this information was included in the noise effects study. The USAF does not propose any further study of this topic unless the Recovery Team identifies it as a high priority.

Conservation Measure 15. USAF roadside watering: No roadside watering was accomplished since the 2003 Biological Opinion was issued. Due to limited personnel and availability of equipment, further watering is not currently proposed unless the Recovery Team identifies it as a high priority.

Conservation Measure 16. Study of the effects of undocumented migrants on Sonoran pronghorn, vegetation transects, and soil analysis: The USAF has not funded a study of effects of undocumented aliens and law enforcement response, nor is one proposed given that this topic is being addressed as part of the Ajo 1 Tower biological opinion. Vegetation mapping of NTAC [North Tactical Range] and STAC [South Tactical Range] was completed in February 2007, and mapping of the San Cristobal Valley is in progress. An analysis of soil and vegetation characteristics at the NTAC HE [High Explosive] Hill target was completed in November of 1999 and another in June of 2005.

4. 2009. Consultation on the West Coast Basing of the MV-22 and Reinitiation of Formal Section 7 Consultation on Ongoing Activities at the Barry M. Goldwater Range by the Marine Corps Air Station-Yuma, Yuma and Maricopa Counties, Arizona. (No. 22410-1995-F-0114-R005)

We continue to recommend implementing the conservation measures for the Sonoran pronghorn in our **2003 BO** (#02-21- 95-F-0114R4, now 22410-1995-F-0114-R004) with the following modifications:

2. Replace with: Continue to fund or assist in the implementation of priority recovery projects as determined by the Sonoran Pronghorn Recovery Team.

4. Delete. With the support of MCAS-Yuma, a forage enhancement plot is under development at Devils Hills in lieu of the Mohawk Valley, per the recommendation of the Sonoran Pronghorn Recovery Team.

5. 2005. Biological Opinion for the Integrated Natural Resource Management Plan for the Barry M. Goldwater Range, Arizona (No. 02-21-05-F-0492)

1. MCAS and LAFB should continue to pursue funding for all pronghorn research, monitoring, and recovery needs identified by the SOPH Recovery Team.

6. 2003. Consultation on Military Training on the Barry M. Goldwater Range, Maricopa, Pima, and Yuma Counties, Arizona (No. 22410-1996-F-0094-R002)

1 A revised EOD - TAC range maintenance schedule has been implemented to reduce potential effects to SOPH [Sonoran pronghorn] as follows: East TAC - 15 March to 15 May; North TAC - 1 January to 28 February; South TAC - 1 October to 15 December. These dates are subject to scheduling changes which may move the starting and ending dates by two weeks.

2 All BMGR-E users are briefed on the SOPH. The briefings cover the status of the species, the importance in reducing impacts to the species, and any mitigation measures the users must comply with while on the range.

3 All vehicles are restricted to designated roads except as required by EOD [Explosive Ordnance Disposal], Maintenance, emergency response, and Environmental Sciences personnel including authorized contractors while conducting required mission support activities.

4 When actions require new surface disturbance in current SOPH habitat, every effort will be made to minimize the extent of surface disturbance and to restore the area to the previous grade when such work is practicable. Most actions will be conducted on the existing road system but there will be a few cases where that cannot be done, such as during annual EOD clearances. The USAF will make every effort to minimize the impacts of operations to vegetation and friable soils and for operations to be consistent with the conservation measures and terms and conditions of the November 16, 2001 opinion.

5 Low speed limits on roadways will continue to be enforced to ensure that no SOPH are injured due to vehicles. 56 RMO Operating Instruction (O.I.) 1.1 specifies that vehicle speed limits for all ground personnel will be reduced when approaching known SOPH locations. O.I.1.1 speed limits on BMGR-E within SOPH habitat are 35 mph on major graded roads and 25 mph on all other roads.

6 ~~Continue Air Force funding for an on-going study with Arizona Game and Fish Department (AGFD) to determine the effects of military night operations on SOPH. Because of the current low SOPH population a mule deer surrogate will be used for this study.~~

7 ~~The USAF has started, but still has to complete, a study to determine the effects of military activities on SOPH during the fawning season. Because of the current low population numbers for SOPH in the U.S., this project will be limited to observations made by the Air Force biological monitors on the TACs.~~

8 The USAF will continue to coordinate and share data with the Service offices at Cabeza Prieta NWR and the Arizona ESFO [Ecological Services Field Office] on all SOPH studies and monitoring efforts.

9 The USAF will continue to revise "Operating Instruction 1.1, SOPH" from monitoring data collected by the SOPH monitors and input provided by the SOPH Recovery Team. Luke AFB will use the annual internal reviews of 56 RMO OI 1.1 to assess and adjust the guidelines to further the recovery of the SOPH.

10 In accordance with its responsibilities under the MLWA of 1999 and the Sikes Act, Luke AFB will continue to work with its agency partners- the Marine Corps, the Service, BLM,

a. 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 SOPH and their habitat. The proposed INRMP will also provide for sustained public use of the range consistent with its military purposes and will undergo a review every five years. The proposed INRMP will fully support the requirements of the SOPH Recovery Plan and the actions of the SOPH Recovery Team. The Record of Decision for the INRMP is projected to be signed in the fall of 2003.

11 The AF produces an annual report, supplied to this office, that summarizes the results of all monitoring efforts (including the biological monitors annual report), the Range Use annual report, all range incidents, and a brief summary of all contract and construction work in SOPH current habitat will be provided to this office. The report includes the date and location of any SOPH observed by Air Force personnel and contractors, including observations of injured or dead SOPH. This report describes in detail how each of the conservation measures were implemented. 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 March of each year. Incidents of dead or injured SOPH will be reported within 24 hours to the Recovery Lead at Cabeza Prieta NWR and to this office.

12 Luke AFB has closed San Cristobal Valley to all recreation use; access is only allowed by permittees with a special use permit issued by 56 RMO. Special use permits for San Cristobal Valley are not issued during 15 March - 15 July to protect SOPH fawning period.

13 The AF has removed several kilometers of barbed wire fencing from SOPH habitat. Fencing is a known deterrent to SOPH foraging and movement and poses a potential tangle hazard. The

AF has identified additional fencing for removal upon completion of documentation required by the National Environmental Policy Act. The AF will continue to remove unnecessary fencing as it is identified.

14 The AF has agreed to install two forage enhancement plots on BMGR-E. Funding will be required to maintain and operate those forage enhancement plots in the future for as long as they are needed. The AF proposes working with the SOPH Recovery Team to estimate operation costs for all forage enhancement plots and determine how to best cost-share that undertaking among the interested agencies.

15 ~~The AF agreed to water selected roadsides in the summer of 2002 during the height of the SOPH decline. The AF will continue this effort under guidance from the SOPH Recovery Team as funding permits.~~

16 ~~Luke AFB additionally proposes projects to be submitted to the SOPH Recovery Team to study the effects of undocumented migrants on SOPH, vegetation transects to be done in the TACs and BMGR as recommended in an earlier study, and a soil analysis to be done at HE Hill to try to determine the causes of enhanced annual plant growth in these areas.~~

17 As identified in the 56 RMO letter of August 8, 2001, the USAF will continue to assist in supporting research and active management to determine the limiting factors of this SOPH population through the prioritized recovery projects identified in the letter.

18 Luke AFB additionally proposes projects to be submitted to the SOPH Recovery Team to study the effects of undocumented migrants on SOPH, vegetation transects to be done in the TACs and BMGR as recommended in an earlier study, and a soil analysis to be done at HE Hill to try to determine the causes of annual plant growth rates in these areas.

7. 2003. Revised Biological Opinion for 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. Gold Water Range (BMGR), Yuma and Maricopa Counties (No. 02-21-95-F-0114R4)

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.

8. 2002. Biological Opinion for Reinitiation of Consultation and Conference for Existing and Proposed Activities by the Marine Corps Air Station - Yuma (MCAS) in the Arizona Portion of the Yuma Training Range Complex (2-21-95-F-114R3)

No change to Reasonable and Prudent Measures and Terms and Conditions for flat-tailed horned lizard.

9. 2001. Biological Opinion for 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 (No. 2-21-95-F-114R2)

1. 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.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Marine Corps must comply with the following terms and conditions, which implement the reasonable and prudent measure described above and outline any required reporting/monitoring requirements. This term and condition is non-discretionary.

1.1 Revise low-level helicopter use in R2301W, R2301E, and Cabeza Prieta NWR as shown in Figure 6.

1.2 Between March 15 and July 15 of each year, all helicopters using R-2301W, except those participating in WT1will remain west of 113 degrees, 53 minutes, or on designated transit routes, or above 1,000 feet AGL

If a dead, injured, or sick individual of a listed species is found on the BMGR, 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 animals should be transported to a qualified veterinarian by an authorized biologist. Should any treated animals survive, the Service shall be contacted regarding before any final disposition of the animals.

10. 1996. Biological Opinion and Conference Opinion for Existing and Proposed Activities by the Marine Corps Air Station - Yuma in the Arizona Portion of the Yuma Training Range Complex (No. 2-21-95-F-114)

a. MCAS - Yuma shall designate a management representative and point of contact within the Range Management Department with the duty to ensure compliance with mitigation measures by all military and non-military users of the Goldwater Range. This representative shall have the authority to halt activities that may be in violation of such measures. A single point of contact shall be designated to receive and investigate reports of unauthorized use of the airspace and ground training areas on the Range. MCAS - Yuma shall continue to provide a point of contact within the Range Management Department for addressing concerns expressed by the Service, Bureau of Land Management, Arizona Game and Fish Department, or others about overflights.

b. All users of airspace and lands under R-2301W authorized by MCAS - Yuma, including military and non-military personnel, shall be briefed on federally-listed and proposed threatened and endangered species that may be encountered. Users shall be informed of regulations and protective measures for the Sonoran pronghorn and the flat-tailed horned lizard by way of an education program consisting of a video, a presentation, and/or a pamphlet. The program shall address: 1) the estimated distribution of the flat-tailed horned lizard on the Goldwater Range, 2) the measures to protect flat-tailed horned lizards, Sonoran pronghorn, and their habitats, 3) penalties for disregarding regulations and for violating the Act, and 4) the reporting procedures for flat-tailed horned lizard and Sonoran pronghorn observations. In particular, users of the Range shall be informed of areas to be avoided in order to reduce chance encounters and possible harm to special status species. Aircrews shall

be informed of the provisions of the Act concerning harassment of threatened and endangered species. All users of the Range shall be informed that intentional disturbance or harassment of threatened or endangered species is a violation of the Act and could result in prosecution. All military personnel shall be advised that care should be exercised when commuting to and from the project area to reduce mortality of flat-tailed horned lizards on roads.

c. When training outside of ground support areas, small tactical units shall move on foot to off-road training areas, carry out all trash from these locations, and bury human waste on site.

d. Vehicles shall be restricted to designated roads with three exceptions:

   1) when operating in designated ground support areas, target areas, or the parachute drop zone,

   2) in case of an emergency, such as search and rescue in the case of downed aircraft or lost civilians. and

   3) when there is a bona-fide management need, which is limited to aircraft crash cleanup, access for development of new, approved facilities, natural resource restoration and revegetation work, and other natural resource work where access by road or foot is impossible or impractical. Designated roads shall include only those shown on Figure l, and existing roads to the EOD operating area and the parachute drop zone.

e. Roads designated for military use and the locations of ground support areas shall be clearly marked with non-obtrusive posts and signs in the field and on maps issued to troops.

f. Vehicles and equipment from which hazardous materials may be spilled or leaked shall be placed over temporary containment aprons of plastic and sandbags. A hazardous materials response plan and team in place at MCAS - Yuma shall respond immediately to any spills at the air station or in the field.

g. In the event of an aircraft crash in Sonoran pronghorn or flat-tailed horned lizard habitat, determination of appropriate site cleanup and restoration procedures shall be coordinated with the Service within 24 hours.

h. MCAS - Yuma shall establish a system for monitoring military compliance with the restrictions for limiting vehicle use to designated roads and ground support areas.

i. MCAS - Yuma shall establish an annual conference with representatives of agencies involved with land and resource management on the Goldwater Range and with interested members of the public. The purposes of the conference shall include reviewing the previous year's training activities, disclosing the military record for compliance with environmental

regulations, and receiving input from agencies and the public about YTRC operations and environmental issues.

j. Actions requiring new surface disturbance shall be limited in areal extent as much as possible and confined to established roadways when feasible.

k. Where new roadways and ground support areas are established, cross- or through- drainages of existing washes (e.g., dip crossings) shall be provided to the extent practical so as to not alter natural drainage or create ponding conditions.

l. All construction work and operational activities shall be planned and completed to minimize increases in the potential for sheet, gully. and rill erosion. All earthwork shall be shaped in a manner that will permit storm runoff with a minimum of erosion. Other measures to minimize erosion may include the construction of temporary and/or permanent berms, dikes, dams, sediment basins, and slope drains.

m. Precautions shall be taken to prevent the pollution of soils and drainageways from discarded materials, sediments, muddy water, or other polluting materials

n. Vehicle use in passes through mountain ranges shall be limited to the minimum necessary for training. A single road shall be designated for vehicle travel through mountain passes. Other roads in passes should be-obscured or at least blocked or posted to ensure closure from use.

o. Storage areas for petroleum products and other chemicals used during construction activities or military operations shall be located or protected so that spills shall not contaminate soils, enter drainageways, or impact ground water. Hazardous or toxic waste generated on site shall be disposed of in a manner consistent with Federal and State guidelines.

p. Human sewage at base camps and other locations of troop concentrations shall be contained and disposed of in a manner that meets all applicable disposal standards.

q. All litter generated by ground troops or other personnel shall be policed and contained daily and shall be carried off the ranges to approved landfill sites. Base camps and other troop concentration areas shall be supported by the placement of commercial dumpsters for litter collection.

r. All discarded matter (including but not limited to human waste, trash, garbage, oil drums, fuel, ashes, equipment, concrete, and chemicals) that is generated by development of and operation of ground support areas shall be removed or disposed of in a manner satisfactory to Federal and State regulations. Ground support areas shall be maintained in a sanitary condition at all times.

s. No ground-based military activities or aircraft flights below 1,500 AGL shall occur on the Cabeza Prieta NWR unless authorized by specific legislation or in accordance with written agreements or MOUs with the Service.·

t. MCAS - Yuma shall work with the Bureau of Land Management to develop and implement actions as necessary to curtail unauthorized use of the Range that adversely affects the Sonoran pronghorn or the flat-tailed horned lizard, such as unauthorized off- highway vehicle activity south of the Foothills and in the Mohawk Dunes.

u. Within flat-tailed horned lizard and Sonoran pronghorn habitat, the area of ground disturbance from construction shall be minimized to the maximum extent practicable. The outer boundaries of construction areas shall be clearly flagged or marked to define the limit of work activities. All construction workers shall strictly limit their activities and vehicles to areas which have been flagged to eliminate adverse impacts to flat- tailed horned lizard or Sonoran pronghorn habitat. All workers shall be instructed that their activities are restricted to flagged areas.

v. MCAS - Yuma shall cooperate with Luke Air Force Base and Arizona Game and Fish Department in an evaluation of potential adverse effects to Sonoran pronghorn from ordnance delivery and unexploded ordnance at target sites on the North and South tactical ranges. Assuming cooperation and authorization from Luke Air Force Base, the evaluation shall, at a minimum, include monitoring of HE Hill and the South tactical range during the fall, 1996 WTI course and other times during 1996 that would be representative of types of disturbance and ordnance delivery that occurs during WTI courses. The duration of the monitoring shall be for at least three months when the HE Hill target area is active and pronghorn are in the area or likely to occur in the area. The results of this evaluation shall be described in a report to be finalized by February, 1997. The report shall include recommendations for mitigating adverse effects to Sonoran pronghorn. In coordination with this office, MCAS - Yuma (and Luke Air Force Base, as appropriate) shall develop these recommendations into mitigation actions that will be promptly implemented. The Service anticipates that mitigation measures could include monitoring target areas for pronghorn immediately before target use, not using specific target areas when pronghorn are present on them, and excluding or discouraging pronghorn use of high risk areas.

2. The following terms and conditions implement reasonable and prudent measure number 2:

a. Whenever possible, and given the requirements of the mission or action, MCAS - Yuma shall locate air and ground activities outside of sensitive flat-tailed horned lizard habitat and Sonoran pronghorn habitat. Examples could include using ground-support zone 1 for specific maneuvers, rather than zones 2 or 3 or other ground-support areas within Sonoran pronghorn habitat.

b. Ground-disturbing activities shall occur on previously disturbed sites or, when in flat-tailed horned lizard habitat, on desert pavement, whenever possible.

c. Ground-disturbing activities shall occur on previously disturbed sites or, when in flat-tailed horned lizard habitat, on desert pavement, whenever possible.

d. Ground disturbing activities within the Gran Desieno Dunes and Tinajas Altas, and Mohawk Mountains/Sand Dunes ACECs [Areas of Critical Environmental Concern] shall be limited to the maximum extent possible consistent with the training mission.

3. The following terms and conditions implement reasonable and prudent measure number 4.

a. MCAS - Yuma shall submit an annual monitoring report to the Arizona Ecological Services State Office and the Cabeza Prieta NWR by January 1 of each year, beginning in 1997. The report shall be brief and in letter form and include the actual acres of flat-tailed horned lizard and Sonoran pronghorn habitat disturbed, numbers and locations of flat-tailed horned lizards and Sonoran pronghorn encountered, and numbers of flat-tailed horned lizards and Sonoran pronghorn killed, injured, moved, or otherwise taken as a result of activities authorized by this opinion (notification and reporting of dead, injured, or sick listed species shall also conform to requirements in the section entitled "DISPOSITION OF DEAD, INJURED OR SICK INDIVIDUALS OF LISTED SPECIES"). The report shall also make recommendations for modifying or refining the terms and conditions stipulated herein to enhance protection of listed or proposed species or to reduce needless hardship on MCAS - Yuma.

b. Anticipated take limits that would require reinitiation are addressed in "AMOUNT OR EXTENT OF TAKE" and are based on implementation of the proposed action without these terms and conditions. With implementation of terms and conditions the Service believes that no more than one Sonoran pronghorn in the form of direct mortality or injury, an undeterminable number of Sonoran pronghorn under low-level flight corridors and areas in the form of harassment, no more than ten flat-tailed horned lizards per year resulting from direct mortality, eight flat-tailed horned lizards per year in the form of harm, and an undeterminable number of flat-tailed horned lizards per year in the form of harassment will be incidentally taken. If, during the course of the proposed action, this minimized level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures. MCAS - Yuma 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 measures.

Appendix H - Special Status Species and Justification For Exclusion of Occurrence within the Gila Bend Addition

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Appendix H
Special Status Species and Justification for Exclusion of Occurrence within the Gila Bend Addition

The USFWS Information for Planning and Consultation System (2020a) provides a project-specific list of threatened, endangered, and candidate species and/or suitable habitat that have the potential to occur in a project area. The AZGFD Heritage Data Management System is a network of natural heritage programs and conservation data resources that identify plant and animal species of concern in Arizona and provides information about their distribution and status through an environmental online tool report. These databases were reviewed for special status species with the potential to occur within the proposed Gila Bend Addition. Table H-1 lists the species identified with an explanation for why the species would not be expected to occur on these lands based on a review of the 2018 INRMP (Luke AFB and MCAS Yuma 2018a), BLM Sensitive Species List (2017b), species listed by the AZGFD as Wildlife of Special Concern in Arizona (2019a), and AZGFD's Heritage Data Management System.

The USFWS Information for Planning and Consultation System and the AZGFD environmental online tool reports follow Table H-1.

Table H-1. Special Status Species and Justification for Exclusion within the Gila Bend Addition

Class	Species Name	Status*	Habitat	Exclusion Justification
Amphibian	Arizona Toad (*Anaxyrus microscaphus*)	BLM-S SCGN 1B	Riparian or wetlands	No permanent water to support all stages of lifecycle is present.
Amphibian	Sonoran Green Toad (*Anaxyrus retiformis*)	BLM-S SCGN 1B	Healthy grasslands	No. The Gila Bend Addition is too xeric and outside species known range.
Amphibian	Lowland Burrowing Tree Frog (*Smilisca fodiens*)	BLM-S SCGN 1B	Healthy grasslands	No. The Gila Bend Addition is too low in elevation and too xeric.
Amphibian	Lowland Leopard Frog (*Lithobates yavapaiensis*)	BLM-S SCGN 1A	Wetlands	No permanent water to support all stages of lifecycle is present.
Amphibian	Northern Leopard Frog (*Lithobates pipiens*)	BLM-S SCGN 1A	Wetlands	No permanent water to support all stages of lifecycle is present.
Amphibian	Great Plains Narrow-mouthed Toad (*Gastophryne olivacea*)	BLM-S	Healthy grasslands	No. The Gila Bend Addition is too low in elevation and too xeric.
Bird	American Peregrine Falcon (*Falco peregrinus anatum*)	BLM-S SGCN 1A	Areas with rocky, steep cliffs, primarily near water, where prey (primarily shorebirds, songbirds, and waterfowl) concentrations are high. Nests are found on ledges of cliffs, and sometimes on man-made structures such as office towers and bridge abutments. Elevation range between 400 to 9,000 feet.	No rocky cliffs or high structures used for nesting and prey species are present.
Bird	Bald Eagle (*Haliaeetus leucocephalus*)	BGEPA BLM-S PIF SGCN 1A	Large trees or cliffs near water (reservoirs, rivers, and streams) with abundant fish or waterfowl prey.	No cliffs or large bodies of water used for nesting or foraging are present.
Bird	Cactus Ferruginous Pygmy-Owl (*Glaucidium brasilianum cactorum*)	BLM-S SGCN 1B	Areas of desert woodlands with tall canopy cover. Primarily found in dense Sonoran scrub and occasionally in riparian drainages and woodlands within semi-desert grassland communities. Prefers to nest in cavities in saguaro cactus but has been found in low-density suburban developments that include natural open spaces.	No dense scrub and woodlands with tall canopy cover for nesting and foraging is present.

Class	Species Name	Status*	Habitat	Exclusion Justification
Bird	California Condor (*Gymnogyps californianus*)	ESA-E BLM-S SGCN 1A	High desert canyon lands and plateaus for nesting; open grasslands and savannahs for foraging on large mammal carcasses at elevations of 2,000 to 6,500 feet.	No suitable nesting or foraging habitat is present.
Bird	California Least Tern (*Sternula antillarum browni*)	ESA-E BLM-S	Open, bare or sparsely vegetated sand, sandbars, gravel pits, or exposed flats along shorelines of inland rivers, lakes, reservoirs, or drainage systems below 2,000 feet.	No suitable nesting or foraging habitat is present.
Bird	Desert Purple Martin (*Progne subis hesperia*)	BLM-S	Densely vegetated Sonoran desertscrub with large saguaros.	No suitable nesting habitat (large, numerous saguaros) or foraging habitat is present.
Bird	Ferruginous Hawk (*Buteo regalis*)	BLM-S SGCN 1B	Open, rolling landscapes including grass-lands, sagebrush, pinyon-juniper woodlands in northern Arizona. Winter migrant forages over agricultural lands. Nest site in top of tree, 20-50 feet above ground, but can be as low as 6 feet.	No suitable nesting or foraging habitat is present.
Bird	Gilded Flicker (*Colaptes chrysoides*)	BLM-S	Sonoran Desert uplands with dense saguaro forests, desert riparian woodlands.	No suitable nesting or foraging habitat is present.
Bird	Mexican Spotted Owl (*Strix occidentalis lucida*)	ESA-T BLM-S SGCN 1A	Mature montane forest and woodland, shady wooded canyons, and steep canyons at elevations between 4,100 to 9,000 feet. Key habitat components include uneven-aged stands with high canopy closure, high tree density, and a sloped terrain.	No suitable forest or canyon habitat is present.
Bird	Northern Aplomado Falcon (*Falco femoralis septentrionalis*)	ESA- E BLM-S SGCN 1A	Open arid country, grasslands, deserts, and savannahs. Elevation range between 3,500 to 9,000 feet. Recorded in Cochise County southeastern Arizona.	No suitable grasslands habitat is present. The Gila Bend Addition is outside of geographic range of the falcon.
Bird	Northern Goshawk (*Accipiter gentilis atricapillus*)	BLM-S PIF SGCN 1B	Ponderosa pine and mixed conifer forest. Nest in large trees.	No suitable forest habitat is present.
Bird	Pinyon Jay (*Gymnorhinus cyanocephalus*)	BLM-S	Pinyon-juniper woodlands, grasslands with juniper and pinyon pine, sagebrush desertscrub, oak woodlands.	No suitable nesting or foraging habitat is present.

Class	Species Name	Status*	Habitat	Exclusion Justification
Bird	Southwestern Willow Flycatcher (*Empidonax traillii extimus*)	ESA-E BLM-S	Dense riparian woodland communities along rivers, streams, lakesides, and wetlands below 8,500 feet elevation. Prefers dense canopy cover, large volume of understory foliage, and surface water during mid-summer.	No suitable nesting or foraging habitat is present.
Bird	Western Yellow-billed Cuckoo (*Coccyzus americanus*)	ESA-T BLM-S	Densely vegetated lowland riparian woodlands.	No suitable nesting or foraging habitat is present.
Bird	Yuma Ridgway's rail (*Rallus obsoletus [longirostris] yumanensis*)	ESA-E BLM-S	Freshwater marshes and emergent vegetation along ponds, reservoirs, canals, and slow-moving rivers.	No suitable nesting or foraging habitat is present.
Mammal	Spotted Bat (*Euderma maculatum*)	BLM-S SCGN 1B	Forages in arid or ponderosa pine forest, and marshlands. Roosts in cliffs and stony outcrops.	No suitable roosting habitat is present. Not documented utilizing BMGR East during previous bat studies.
Mammal	Allen's Big-eared Bat (*Idionycteris phyllotis*)	BLM-S	Roosts in caves and mines. Forages for insects.	No suitable roosting habitat is present. Not documented utilizing BMGR East during previous bat studies.
Mammal	Arizona Myotis (*Myotis occultus*)	BLM-S SCGN 1B	Roosts in caves and mines.	No suitable roosting habitat is present. Not documented utilizing BMGR East during previous bat studies.
Mammal	Mexican Gray Wolf (*Canus lupus baileyi*)	ESA-E/XN SCGN 1A	Forests and woodlands in mountainous areas.	No suitable habitat or prey base (elk) is present.
Plant	Aravaipa Woodfern (*Thelypteris puberula sonorensis*)	BLM-S	Springs and shaded canyons.	No suitable springs and canyon habitat present within the Gila Bend Addition.
Plant	Acuña Cactus (*Echinomastus erectocentrus acunensis*)	ESA-E CH HS	Rocky hillsides and ridges above 1,200 feet elevation with a very limited distribution.	No suitable rocky hillside or bajada habitat present. Outside species elevation range. Probabilistic habitat modeling predicts no new acuña cactus habitat occurs on the BMGR East near the Gila Bend Addition.

Class	Species Name	Status*	Habitat	Exclusion Justification
Plant	Arizona Hedgehog Cactus (*Echinocereus triglochiatus arizonicus*)	ESA-E HS	Rocky granitic hillsides above 3,200 feet elevation in woodland and chaparral.	No suitable granitic hillside habitat is present within the Gila Bend Addition. Outside documented range of the cactus.
Plant	Fickeisen Plains Cactus (*Pediocactus peeblesianus var fickeiseniae*)	ESA-E HS	Flat mesas, canyon edges, and washes; very limited range; 4,000-6,000 feet elevation on soils derived from Kaibab limestone.	No suitable soils present within the Gila Bend Addition. Outside the species range.
Plant	Arizona Sonoran Rosewood (*Vauquelinia californica sonorensis*)	BLM-S	Sonoran desertscrub, oak woodland, rocky canyons and mountain slopes above 2,500 feet elevation; can occur in carbonates.	No suitable habitat is present within the Gila Bend Addition.
Plant	California Flannelbush (*Fremontodendron californicum*)	BLM-S	Upper elevation chaparral, pinyon-juniper woodland mountain slopes, gravel washes between 1,300- and 6,500-feet elevation.	Despite the low elevation listed as providing suitable habitat, the description reflects what is recorded from coastal California rather than Arizona. It is too dry on the BMGR and the Gila Bend Addition.
Plant	Giant Sedge (*Carex spissa*)	BLM-S	Widespread, but limited to springs, seeps, and streams.	No suitable aquatic habitat present within the Gila Bend Addition.
Plant	Joshua Tree (*Yucca brevifolia*)	BLM-S SR	Very limited range in Arizona north of BMGR above 3,000 feet elevation in washes, valleys and hillsides.	No suitable valley and hillside habitat present within the Gila Bend Addition. Outside species range; elevation too low.
Plant	Kofa Mountain Barberry (*Berberis harrisoniana*)	BLM-S	Very limited range on steep rocky hillsides and shaded canyons and cliffs above 2,500 feet elevation.	No suitable rocky hillside and canyon habitat present within the Gila Bend Addition. Outside species distribution.
Plant	Murphey Agave (*Agave murpheyi*)	BLM-S	Rocky canyon slopes below 3,000 feet elevation. Most Arizona occurrences considered Mexican species cultivated by Native Americans and naturalized at Hohokam ruins in Central Arizona.	No suitable habitat is present within the Gila Bend Addition.
Plant	Pima Indian Mallow (*Abutilon parishii*)	BLM-S SR	Rocky canyons in mountains above 3,000 feet elevation.	No suitable rocky canyon habitat is present within the Gila Bend Addition.
Plant	Schott's Wirelettuce (*Stephanomeria schottii*)	BLM-S	Deep sandy soils, sand dunes and dune fields.	No suitable sandy soil habitat is present within the Gila Bend Addition.

Class	Species Name	Status*	Habitat	Exclusion Justification
Plant	Tumamoc Globeberry (*Tumamoca macdougalii*)	BLM-S SR	Rocky canyons and washes between 1,500 to 2,600 feet elevation in creosote-bursage, desert microphyll woodland.	Despite the low elevation listed as providing suitable habitat, it is too dry on the BMGR and the Gila Bend Addition.
Reptile	Sonoran Mud Turtle (*Kinosternon sonoriense sonoriense*)	BLM-S	Streams and pools	No aquatic habitat is present.
Reptile	Northern Mexican Gartersnake (*Thamnophis eques megalops*)	ESA-E CH SCGN 1A	Wetlands, riparian areas, stock tanks, alkaline seeps.	No wetland habitat is present.

Notes:

Sources: Arizona Department of Agriculture 2016; AZGFD 2019c; BLM 2017a; BLM 2017b; Corman and Wise-Gervais 2005; DoD 2015

* BLM-S = BLM sensitive species on BLM lands
BGEPA = protected under the Bald and Golden Eagle Protection Act
ESA-E = listed as Endangered under the ESA
ESA-T = listed as Threatened under the ESA
CH = Critical Habitat (designated or proposed) under the ESA
HS = Highly safeguarded native plants as determined by the Arizona Department of Agriculture
SR = Salvage restricted native plants as determined by the Arizona Department of Agriculture

PIF = Partner's in Flight mission-sensitive priority bird species for DoD (that is, species [and their habitats] having the highest potential to impact the military mission should they become federally listed)

SGCN = Arizona Species of Greatest Conservation Need
  1A = Vulnerable as determined by SGCN categories and matches one of several criteria under the State Wildlife Action Plan
  1B = Vulnerable as determined by SGCN categories but does not match any criteria
  1C = Unknown status species

US Fish & Wildlife Service Information, Planning, and Conservation Sensitive Species List

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Arizona Ecological Services Field Office
9828 North 31st Ave
#c3
Phoenix, AZ 85051-2517
Phone: (602) 242-0210 Fax: (602) 242-2513
http://www.fws.gov/southwest/es/arizona/
http://www.fws.gov/southwest/es/EndangeredSpecies_Main.html

In Reply Refer To: October 22, 2020
Consultation Code: 02EAAZ00-2020-SLI-0051
Event Code: 02EAAZ00-2021-E-00225
Project Name: Gila Bend Addition

Subject: Updated list of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The Fish and Wildlife Service (Service) is providing this list under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). The list you have generated identifies threatened, endangered, proposed, and candidate species, and designated and proposed critical habitat, that may occur within one or more delineated United States Geological Survey 7.5 minute quadrangles with which your project polygon intersects. Each quadrangle covers, at minimum, 49 square miles. In some cases, a species does not currently occur within a quadrangle but occurs nearby and could be affected by a project. Please refer to the species information links found at:
http://www.fws.gov/southwest/es/arizona/Docs_Species.htm
http://www.fws.gov/southwest/es/arizona/Documents/MiscDocs/AZSpeciesReference.pdf .

The purpose of the Act is to provide a means whereby threatened and endangered species and the habitats upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of Federal trust resources and to consult with us if their projects may affect federally listed species and/or designated critical habitat. A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, we recommend preparing a biological evaluation similar to a Biological Assessment to determine whether the project may

affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If the Federal action agency determines that listed species or critical habitat may be affected by a federally funded, permitted or authorized activity, the agency must consult with us pursuant to 50 CFR 402. Note that a "may affect" determination includes effects that may not be adverse and that may be beneficial, insignificant, or discountable. You should request consultation with us even if only one individual or habitat segment may be affected. The effects analysis should include the entire action area, which often extends well outside the project boundary or "footprint." For example, projects that involve streams and river systems should consider downstream effects. If the Federal action agency determines that the action may jeopardize a proposed species or adversely modify proposed critical habitat, the agency must enter into a section 7 conference. The agency may choose to confer with us on an action that may affect proposed species or critical habitat.
Candidate species are those for which there is sufficient information to support a proposal for listing. Although candidate species have no legal protection under the Act, we recommend considering them in the planning process in the event they become proposed or listed prior to project completion. More information on the regulations (50 CFR 402) and procedures for section 7 consultation, including the role of permit or license applicants, can be found in our Endangered Species Consultation Handbook at:
http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF.

We also advise you to consider species protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712) and the Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. 668 et seq.). The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when authorized by the Service. The Eagle Act prohibits anyone, without a permit, from taking (including disturbing) eagles, and their parts, nests, or eggs. Currently 1026 species of birds are protected by the MBTA, including species such as the western burrowing owl (Athene cunicularia hypugea). Protected western burrowing owls are often found in urban areas and may use their nest/burrows year-round; destruction of the burrow may result in the unpermitted take of the owl or their eggs.

If a bald eagle (or golden eagle) nest occurs in or near the proposed project area, you should evaluate your project to determine whether it is likely to disturb or harm eagles. The National Bald Eagle Management Guidelines provide recommendations to minimize potential project impacts to bald eagles:
https://www.fws.gov/migratorybirds/pdf/management/
nationalbaldeaglenanagementguidelines.pdf
https://www.fws.gov/birds/management/managed-species/eagle-management.php.

The Division of Migratory Birds (505/248-7882) administers and issues permits under the MBTA and Eagle Act, while our office can provide guidance and Technical Assistance. For more information regarding the MBTA, BGEPA, and permitting processes, please visit the following: https://www.fws.gov/birds/policies-and-regulations/incidental-take.php. Guidance for minimizing impacts to migratory birds for communication tower projects (e.g. cellular, digital television, radio, and emergency broadcast) can be found at:

https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds/collisions/communication-towers.php.

Activities that involve streams (including intermittent streams) and/or wetlands are regulated by the U.S. Army Corps of Engineers (Corps). We recommend that you contact the Corps to determine their interest in proposed projects in these areas. For activities within a National Wildlife Refuge, we recommend that you contact refuge staff for specific information about refuge resources.
If your action is on tribal land or has implications for off-reservation tribal interests, we encourage you to contact the tribe(s) and the Bureau of Indian Affairs (BIA) to discuss potential tribal concerns, and to invite any affected tribe and the BIA to participate in the section 7 consultation. In keeping with our tribal trust responsibility, we will notify tribes that may be affected by proposed actions when section 7 consultation is initiated.

We also recommend you seek additional information and coordinate your project with the Arizona Game and Fish Department. Information on known species detections, special status species, and Arizona species of greatest conservation need, such as the western burrowing owl and the Sonoran desert tortoise (Gopherus morafkai) can be found by using their Online Environmental Review Tool, administered through the Heritage Data Management System and Project Evaluation Program https://www.azgfd.com/Wildlife/HeritageFund/.

For additional communications regarding this project, please refer to the consultation Tracking Number in the header of this letter. We appreciate your concern for threatened and endangered species. If we may be of further assistance, please contact our following offices for projects in these areas:

Northern Arizona: Flagstaff Office 928/556-2001
Central Arizona: Phoenix office 602/242-0210
Southern Arizona: Tucson Office 520/670-6144

Sincerely,
/s/ Jeff Humphrey Field Supervisor

Attachment

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Arizona Ecological Services Field Office
9828 North 31st Ave
#c3
Phoenix, AZ 85051-2517
(602) 242-0210

Project Summary

Consultation Code: 02EAAZ00-2020-SLI-0051

Event Code: 02EAAZ00-2021-E-00225

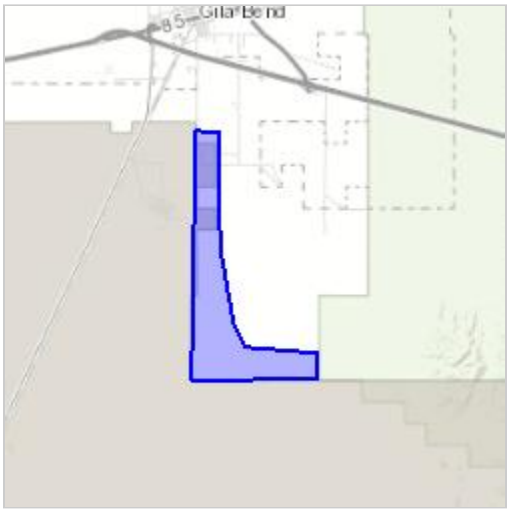
Project Name: Gila Bend Addition

Project Type: LAND - ACQUISITION

Project Description: BMGR land withdrawal

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/32.86768292511029N112.7112331676133W



Counties: Maricopa, AZ

Endangered Species Act Species

There is a total of 5 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Sonoran Pronghorn *Antilocapra americana sonoriensis* Population: U.S.A. (AZ), Mexico No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4750	Experimental Population, Non-Essential

Birds

NAME	STATUS
California Least Tern *Sterna antillarum browni* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8104	Endangered
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **proposed** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened
Yuma Ridgways (clapper) Rail *Rallus obsoletus [=longirostris] yumanensis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3505	Endangered

Reptiles

NAME	STATUS
Sonoran Desert Tortoise *Gopherus morafkai*	Candidate

No critical habitat has been designated for this species.

Species profile: https://ecos.fws.gov/ecp/species/9289

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

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Arizona Game and Fish Department Environmental Review Tool
Sensitive Species List

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Arizona Environmental Online Review Tool Report

Arizona Game and Fish Department Mission
To conserve Arizona's diverse wildlife resources and manage for safe, compatible outdoor recreation opportunities for current and future generations.

Project Name:
BMGR

Project Description:
Air Force acquisition of lands from BLM

Project Type:
Military Activities, Training on ground

Contact Person:
Jill Harris

Organization:
Jacobs Engineering

On Behalf Of:
DOD

Project ID:
HGIS-07378

Please review the entire report for project type and/or species recommendations for the location information entered. Please retain a copy for future reference.

Disclaimer:

1. This Environmental Review is based on the project study area that was entered. The report must be updated if the project study area, location, or the type of project changes.
2. This is a preliminary environmental screening tool. It is not a substitute for the potential knowledge gained by having a biologist conduct a field survey of the project area. This review is also not intended to replace environmental consultation (including federal consultation under the Endangered Species Act), land use permitting, or the Departments review of site-specific projects.
3. The Departments Heritage Data Management System (HDMS) data is not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there. HDMS data contains information about species occurrences that have actually been reported to the Department. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity. Such surveys may reveal previously undocumented population of species of special concern.
4. HabiMap Arizona data, specifically Species of Greatest Conservation Need (SGCN) under our State Wildlife Action Plan (SWAP) and Species of Economic and Recreational Importance (SERI), represent potential species distribution models for the State of Arizona which are subject to ongoing change, modification and refinement. The status of a wildlife resource can change quickly, and the availability of new data will necessitate a refined assessment.

Locations Accuracy Disclaimer:
Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Report is solely responsible for the project location and thus the correctness of the Project Review Report content.

Recommendations Disclaimer:

1. The Department is interested in the conservation of all fish and wildlife resources, including those species listed in this report and those that may have not been documented within the project vicinity as well as other game and nongame wildlife.
2. Recommendations have been made by the Department, under authority of Arizona Revised Statutes Title 5 (Amusements and Sports), 17 (Game and Fish), and 28 (Transportation).
3. Potential impacts to fish and wildlife resources may be minimized or avoided by the recommendations generated from information submitted for your proposed project. These recommendations are preliminary in scope, designed to provide early considerations on all species of wildlife.
4. Making this information directly available does not substitute for the Department's review of project proposals, and should not decrease our opportunity to review and evaluate additional project information and/or new project proposals.
5. Further coordination with the Department requires the submittal of this Environmental Review Report with a cover letter and project plans or documentation that includes project narrative, acreage to be impacted, how construction or project activity(s) are to be accomplished, and project locality information (including site map). Once AGFD had received the information, please allow 30 days for completion of project reviews. Send requests to:
   Project Evaluation Program, Habitat Branch
   Arizona Game and Fish Department
   5000 West Carefree Highway
   Phoenix, Arizona 85086-5000
   Phone Number: (623) 236-7600
   Fax Number: (623) 236-7366
   Or
   PEP@azgfd.gov
6. Coordination may also be necessary under the National Environmental Policy Act (NEPA) and/or Endangered Species Act (ESA). Site specific recommendations may be proposed during further NEPA/ESA analysis or through coordination with affected agencies

BMGR

USA Topo Basemap With Locator Map

Project Boundary

Buffered Project Boundary

Project Size (acres): 5.21

Lat/Long (DD): 32.8435 / -112.7145

County(s): Maricopa

AGFD Region(s): Yuma

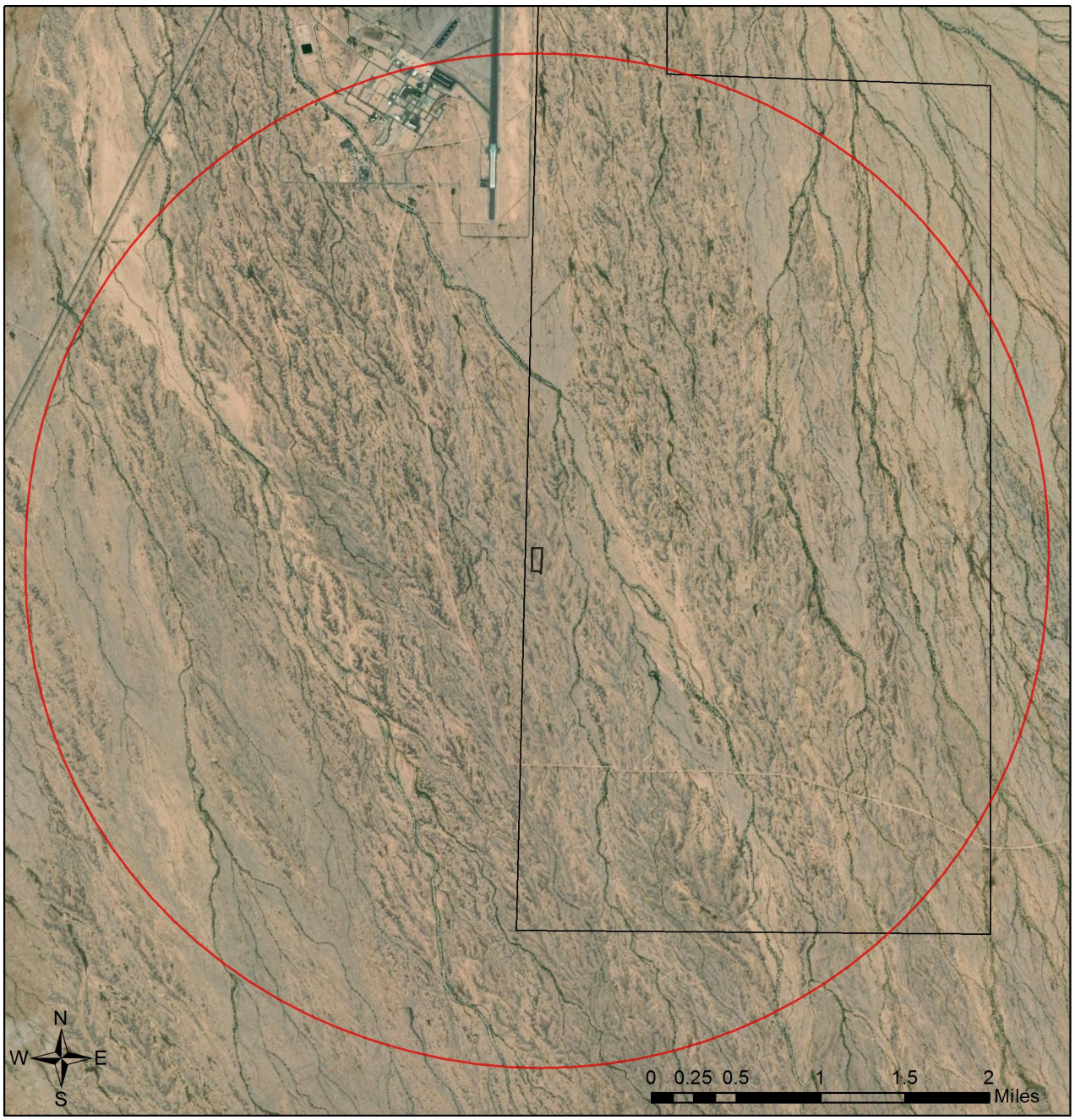
Township/Range(s): T7S, R4W

USGS Quad(s): SOUTH OF GILA BEND

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap

BMGR

Web Map As Submitted By User



Project Boundary

Buffered Project Boundary

Project Size (acres): 5.21

Lat/Long (DD): 32.8435 / -112.7145

County(s): Maricopa

AGFD Region(s): Yuma

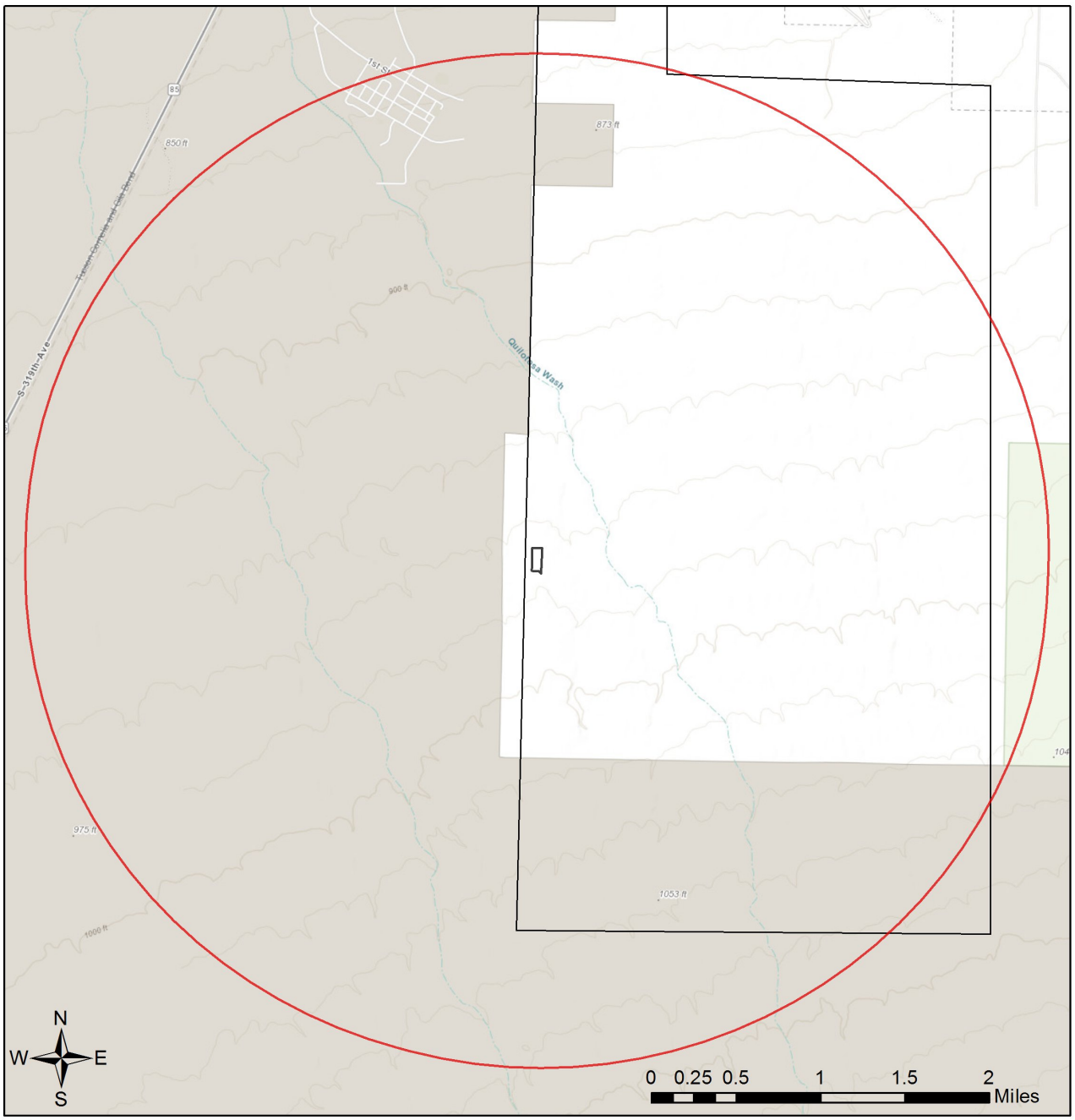
Township/Range(s): T7S, R4W

USGS Quad(s): SOUTH OF GILA BEND

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

BMGR

Important Areas



- Project Boundary
- Buffered Project Boundary
- Wildlife Connectivity
- Important Connectivity Zones
- Pinal County Riparian
- Critical Habitat
- Important Bird Areas

Project Size (acres): 5.21

Lat/Long (DD): 32.8435 / -112.7145

County(s): Maricopa

AGFD Region(s): Yuma

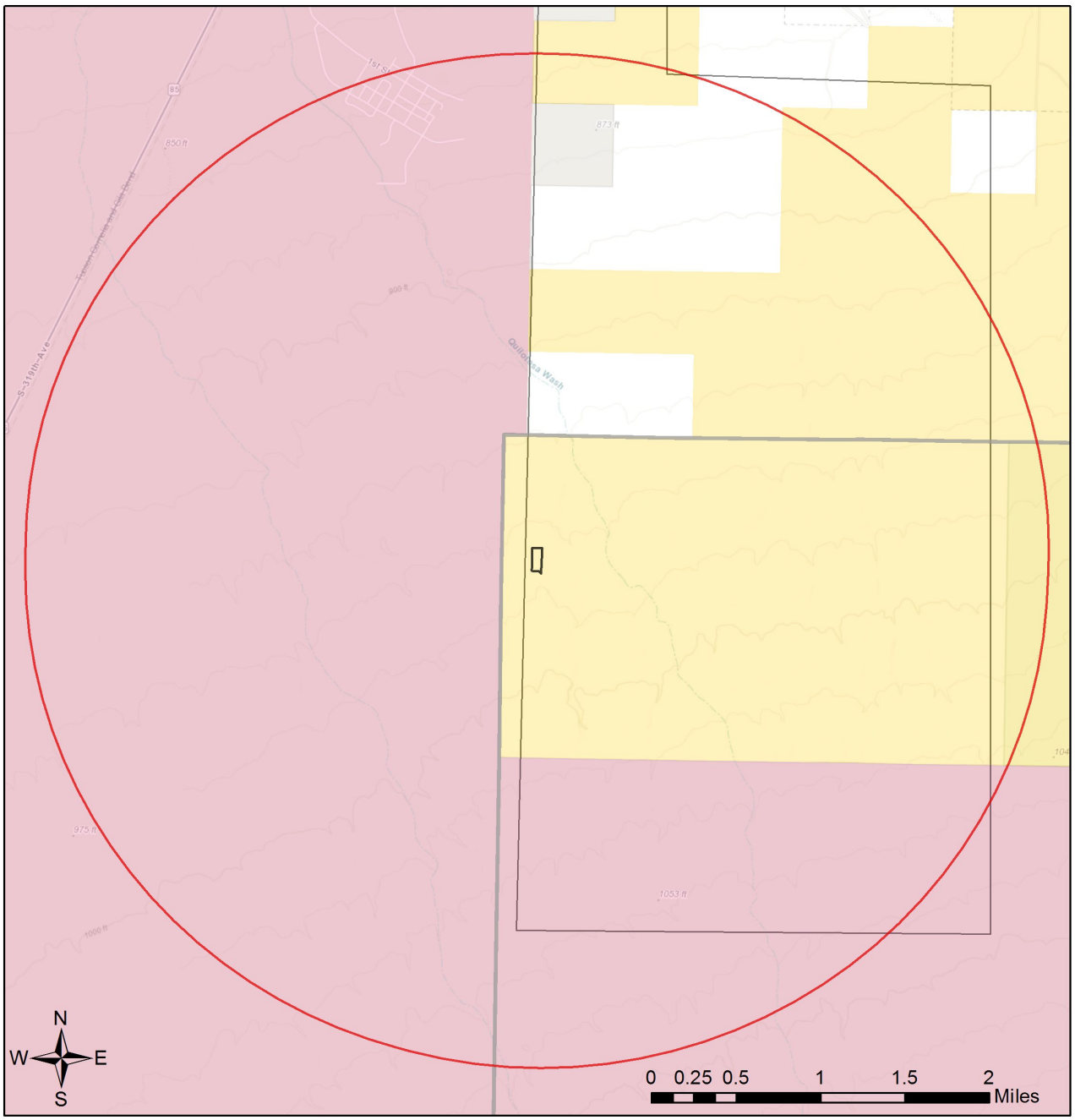
Township/Range(s): T7S, R4W

USGS Quad(s): SOUTH OF GILA BEND

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

BMGR

Township/Ranges and Land Ownership



- Project Boundary
- Buffered Project Boundary
- Township/Ranges

Land Ownership

- AZ Game & Fish Dept.
- BLM
- BOR
- Indian Res.
- Military
- Mixed/Other
- National Park/Mon.
- Private
- State & Regional Parks
- State Trust
- US Forest Service
- Wildlife Area/Refuge

Project Size (acres): 5.21

Lat/Long (DD): 32.8435 / -112.7145

County(s): Maricopa

AGFD Region(s): Yuma

Township/Range(s): T7S, R4W

USGS Quad(s): SOUTH OF GILA BEND

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Special Status Species Documented within 3 Miles of Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Antilocapra americana sonoriensis	Sonoran Pronghorn	LE,XN				1A

Note: Status code definitions can be found at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/statusdefinitions/
.

No Special Areas Detected
No special areas were detected within the project vicinity.

Species of Greatest Conservation Need Predicted within the Project Vicinity based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Ammospermophilus harrisii	Harris' Antelope Squirrel					1B
Anaxyrus retiformis	Sonoran Green Toad			S		1B
Chilomeniscus stramineus	Variable Sandsnake					1B
Colaptes chrysoides	Gilded Flicker			S		1B
Coluber bilineatus	Sonoran Whipsnake					1B
Corynorhinus townsendii pallescens	Pale Townsend's Big-eared Bat	SC	S	S		1B
Crotalus tigris	Tiger Rattlesnake					1B
Crotaphytus nebrius	Sonoran Collared Lizard					1B
Euderma maculatum	Spotted Bat	SC	S	S		1B
Eumops perotis californicus	Greater Western Bonneted Bat	SC		S		1B
Gopherus morafkai	Sonoran Desert Tortoise	CCA	S	S		1A
Heloderma suspectum	Gila Monster					1A
Incilius alvarius	Sonoran Desert Toad					1B
Lasiurus xanthinus	Western Yellow Bat		S			1B
Leptonycteris yerbabuenae	Lesser Long-nosed Bat	SC				1A
Lepus alleni	Antelope Jackrabbit					1B
Macrotus californicus	California Leaf-nosed Bat	SC		S		1B
Melanerpes uropygialis	Gila Woodpecker					1B
Melospiza lincolnii	Lincoln's Sparrow					1B
Micruroides euryxanthus	Sonoran Coralsnake					1B
Myotis velifer	Cave Myotis	SC		S		1B
Myotis yumanensis	Yuma Myotis	SC				1B
Nyctinomops femorosaccus	Pocketed Free-tailed Bat					1B
Oreoscoptes montanus	Sage Thrasher					1C
Perognathus longimembris	Little Pocket Mouse	No Status				1B
Phrynosoma goodei	Goode's Horned Lizard					1B
Phyllorhynchus browni	Saddled Leaf-nosed Snake					1B
Progne subis hesperia	Desert Purple Martin			S		1B
Tadarida brasiliensis	Brazilian Free-tailed Bat					1B
Toxostoma lecontei	LeConte's Thrasher			S		1B

Species of Greatest Conservation Need Predicted within the Project Vicinity based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Vireo bellii arizonae	Arizona Bell's Vireo					1B
Vulpes macrotis	Kit Fox	No Status				1B

Species of Economic and Recreation Importance Predicted within the Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Callipepla gambelii	Gambel's Quail					
Odocoileus hemionus	Mule Deer					
Puma concolor	Mountain Lion					
Zenaida asiatica	White-winged Dove					
Zenaida macroura	Mourning Dove					

Project Type: Military Activities, Training on ground

Project Type Recommendations:
The Department recommends that wildlife surveys are conducted to determine if noise-sensitive species occur within the project area. Avoidance or minimization measures could include conducting project activities outside of breeding seasons.

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Appendix I - Cultural Resources Supporting Documentation

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Appendix I
Cultural Resources Supporting Documentation

This appendix includes:

Cultural resources background documents, which provide an overview of range-wide agreements, inventories, studies, databases, and other documents supporting the understanding of BMGR cultural resources. Background documents specific to Barry M. Goldwater Range (BMGR) East and BMGR West are also described.

Cultural Resources Regulatory Context, including the laws, regulations, Executive Memoranda and Orders, and United States (U.S.) Department of Defense (DoD) requirements that apply to the management of cultural resources on the BMGR.

Culture History, which provides the reader with an overview of the culture history of the Western Papaguería.

Tribal Consultation for the LEIS, including a table of tribes consulted and their responses to date. Refer to Attachment 1 for copies of each correspondence described in this section.

Cultural Resource Background Documents

BMGR Background Documents

The majority of cultural resources data collected is specific to activities conducted on BMGR East or BMGR West and are discussed below specific to those facilities. Documents general to the BMGR as a whole are discussed separately for clarification.

Tribal Ethnographic Studies

Beginning in 1996, the Air Force and the Marine Corps have conducted outreach and Section 106 consultation with Native American communities to establish meaningful consultation protocols and to identify and document TCPs and sacred sites on the BMGR through ethnographic studies. Ongoing consultation with tribes has identified the ongoing funding of ethnographic studies as an area of meaningful concern.

Guidance specific to tribal consultation, TCPs, sacred sites, and ethnographic studies are outlined in Tisdale (1997, 1998, 2001). Specific studies have been compiled by the Hopi Tribe of Arizona (Anyon 1999), Pueblo of Zuni (Panteah 2000), the Yavapai-Prescott Indian Tribe (Hayden 1999), the Yavapai-Apache Nation of the Camp Verde Indian Reservation (Coder et al. 2006), the Hia C'ed O'odham (Doyel and Eiler 2003; Eiler and Doyel 2008).

Cultural Affiliation Studies

One cultural affiliation study has been completed for BMGR West (Fortier and Schaefer 2010), which presents the overviews of the culture, history, and indigenous people of southwestern Arizona. The

information included facts about the Yuman speaking people of the Colorado and Gila River regions and the Piman speaking peoples known as the Tohono O'odham and Hia C-ed O'odham. In addition, the report includes information about Native American resources that have been used for ritual activities, food, and construction materials that are culturally significant to the affiliated tribes of the BMGR West region (MCAS Yuma, Range Management Department 2019).

Agreement Documents

The Air Force and Marine Corps have executed one agreement document regarding potential adverse effects to historic properties resulting from the implementation of the INRMP.

- Programmatic Agreement among 56th Range Management Office, Luke Air Force Base, Marine Corps Air Station Yuma, and Arizona State Historic Preservation Officer Regarding Potential Impacts on Historic Properties of Implementing an Integrated National Resources Management Plan for the Barry M. Goldwater Range, Southwestern Arizona (14 October 2005).

BMGR East Background Documents and Database

Inventory Reports

As of 2019, approximately 264,197 acres (25 percent) of BMGR East land has been investigated by intensive cultural resources inventory survey (56 RMO 2020). The majority of these surveys have been conducted for specific activities requiring cultural resources compliance and have accounted for over 75 percent of the total area surveyed. In addition, several large inventory surveys not specific to certain projects or activities have also been completed (Ahlstrom and Lyon 2000; Slaughter et al. 2000; Tucker 2000).

Research Syntheses and Context Studies

Research syntheses and historic contexts that have been developed to provide NRHP evaluation frameworks for cultural resources identified on BMGR East and recommendations for their future treatment and management include, but are not limited to, the following:

- *Pathways to Preservation: A Research Design and Heritage Management Plan for BMGR East, Arizona* (Heilen and Vanderpot 2013)
- *Gateway to Combat: A Historic Context for Military Aviation Training on the Barry M. Goldwater Range East, Arizona, World War II and Early Cold War Eras* (Thompson 2004).
- *Fragile Patterns: The Archaeology of the Western Papaguería* (Altshul and Rankin 2008)

Agreement Documents

Eight executed agreement documents are currently in place that address the mitigation of adverse effects related to specific undertakings on BMGR East.

- Memorandum of Agreement Among the Department of the Air Force, Air Education and Training Command, 56th Fighter Wing, Luke Air Force Base and Arizona State Historic

Preservation Office Regarding Data Recovery of Imperiled Features and Artifacts at AZ Z:5:55 (ASM) on the Barry M. Goldwater Range East, Maricopa County, Arizona (2019).

- Memorandum of Agreement among the Air Force, Air Education and Training Command, 56th Fighter Wing, Luke Air Force Base and the Arizona State Historic Preservation Office Regarding Implementation of a Historic Properties Treatment Plan for Site AZ Z:5:68(ASM) That Will Be Adversely Affected by Reconstruction of a Segment of the Manned Range 1 Road, Barry M. Goldwater Range East, Maricopa and Pima Counties, Arizona (2015b).
- Memorandum of Agreement among the Department of the Air Force, Air Education and Training Command, 56th Fighter Wing, Luke Air Force Base and the Arizona State Historic Preservation Office Regarding Mitigation of Adverse Effects to Historic Properties by Historical-Period Runway and Levee Construction and Clear Zone Maintenance at the Gila Bend Air Force Auxiliary Field, Maricopa County, Arizona (2015a).
- Memorandum of Agreement among the Department of the Air Force, Air Education and Training Command, 56th Fighter Wing, Luke Air Force Base and the Arizona State Historic Preservation Office Regarding Implementation of a Treatment Plan for Historic Properties Adversely Affected by Construction of a Fiber Optic Line Along State Route 85 Between Ajo and Gila Bend (2007).
- Programmatic Agreement among the Department of the Air Force, Air Education and Training Command, 56th Fighter Wing, Luke Air Force Base, Marine Aviation Weapons and Tactics Squadron One, and the Arizona State Historic Preservation Office Regarding Ongoing Use of Stoval Airfield for Military Training, Barry M. Goldwater Range East, Arizona (2014).
- Programmatic Agreement between the Department of the Air Force, Air Education and Training Command, 56th Fighter Wing, Luke Air Force Base and the Arizona State Historic Preservation Office Regarding Construction, Maintenance, and Use of a Sensor Training Area, Barry M. Goldwater Range East, Arizona (2010).
- Programmatic Agreement between the 56th Range Management Office, Luke Air Force Base, and the Arizona State Historic Preservation Officer Regarding Undertakings on the Barry M. Goldwater Range East That Will Not Affect Historic Properties and Undertakings That Will Have No Adverse Effect on Historic Auxiliary Fields (2011).
- Programmatic Agreement among the Department of the Air Force, Air Education and Training Command, 56th Fighter Wing, Luke Air Force Base, and the Arizona State Historic Preservation Officer Regarding Construction, Maintenance, and Use of a Moving Target on the North Tactical Range, Barry M. Goldwater Range East, Arizona (2013).

Archaeological Site Management Information System and Archaeological Cultural Database Consolidation Cultural Resources Database

The 56 RMO maintains a full library of hard copies and electronic versions of inventory reports and site cards for BMGR East. Copies of archival maps, agency correspondence, and relevant literature specific to the cultural resources of BMGR East are included in the cultural resources library.

Cultural resources information stored in the database incorporates data fields compatible with AZSITE, Arizona's electronic cultural resources database, as well as military threat/disturbance information recorded through the Archaeological Site Management Information System. These data have been compiled into the BMGR East Archaeological Cultural Database Consolidation program. The 56 RMO cultural resources staff and professional consultants follow established data collection guidelines.

As of 2017, the 56 RMO has rejoined the AZSITE consortium and shares information from BMGR East with the AZSITE database. This allows professional researchers access to BMGR East cultural resources data, and the 56 RMO researchers access to relevant cultural resources data outside the BMGR East boundaries. The process of consolidating data between the two databases is in progress.

Future Management Goals

Future year cultural resources compliance priorities for BMGR East include:

- Support military operations through proactive management of cultural resources.
- Maintain the Native American consultation program.
- Ensure actions required under the Programmatic Agreement for the INRMP are completed and develop additional Programmatic Agreements for BMGR actions.
- Provide effective cultural resources training, education, and outreach to BMGR staff, cooperating agencies, and the public.
- Conduct NRHP evaluation studies of cultural resources not previously evaluated.

BMGR West Background Documents and Database

Inventory Reports

As of May 2019, approximately 142,448 acres (20 percent) of BMGR West land has been investigated by approximately 92 cultural resources projects (MCAS Yuma 2019). The majority of these investigations have been conducted for specific activities requiring cultural resources compliance. However, several large inventory surveys have also been completed (Hart and Hart 2011; Hlatky et al. 2016; Keur et al. 2015; Laine and Seymour 2016; Neuzil 2012).

Cultural Affiliation Study

In addition to inventory reports, a cultural affiliation study has been prepared for BMGR West. This document, titled *Barry M. Goldwater Range West, Cultural Affiliation Study* (Fortier and Schaefer 2010) provides an overview of affiliated tribes and their use of the landscape.

Agreement Documents

One executed agreement document is currently in place that standardize BMGR West cultural resources compliance activities.

- Memorandum of Agreement Between Marine Air Ground Task Force Training Center, Marine Corps Air Ground Combat Center Twentynine Palms, California, and Marine Corps Air Station, Yuma, Arizona Concerning Curatorial Services for Marine Corps Air Station Yuma (26 July 2017).

BMGR West Cultural Resources Database

MCAS Yuma maintains a full library of hard copies and electronic versions of inventory reports and site records for BMGR West. Copies of archival maps, agency correspondence, and relevant literature specific to the cultural resources of BMGR West are included in the cultural resources library.

MCAS Yuma maintains a GIS database of all previously conducted cultural resources projects and all previously recorded cultural resources sites on the BMGR West. These data are maintained in the MCAS Yuma Spatial Data Engine. As outlined in the BMGR West Integrated Cultural Resources Management Plan (ICRMP; MCAS Yuma 2019), data within the Spatial Data Engine is collected and managed in two GIS feature classes (*Cultural_Resources* and *Cultural_Resources_Restricted*). Within the *Cultural_Resources* feature class, attributed polygons of inventory areas are maintained. Within the *Cultural_Resources_Restricted* feature class, attributed point and polygon features specific to cultural resources sites and other sensitive locations are maintained. Access to the *Cultural_Resources* files is open to individuals that have Spatial Data Engine permissions, while access to the *Cultural_Resources_Restricted* files is restricted to individuals who have been approved by the MCAS Yuma Cultural Resources Manager.

Data contained within the Spatial Data Engine are collected as per MCAS Yuma's Specifications for Geospatial Data. This document provides instructions to cultural resources contractors for submittal of GIS data in accordance with database and attribute population standards.

While the general public can request information from MCAS Yuma through the Freedom of Information Act, archaeological data are largely exempt from such requests. MCAS Yuma maintains the confidentiality of sensitive archaeological data by limiting access to range planners on a need-to-know basis or to professional archaeologists. Requests by such individuals must be approved by the MCAS Yuma GIS Manager.

Future Management Goals

Future year cultural resources compliance priorities for BMGR West include:

- Update and submit the Tinajas Altas Management Plan (Foster 2006)
- Conduct NRHP evaluation studies of unevaluated cultural resources sites
- Continued implementation of the INRMP Programmatic Agreement Site Monitoring and Management Plan (56 RMO et al. 2005)

- Update collections curation
- Continued update of the BMGR West cultural resources GIS

Cultural Resources Regulatory Context and Culture History

Numerous federal laws, regulations, Executive Memoranda and Orders, and DoD requirements apply to the management of cultural resources on the BMGR. These are listed in Table I-1 and summarized in the following sections. Regulatory summaries are derived from the 2020 BMGR East and 2019 BMGR West ICRMPs (Air Force 2020; MCAS Yuma 2019).

Table I-1. Summary of Legal Requirements

Regulatory Context	Code
Federal Laws	Military Lands Withdrawal Act (MLWA) of 1999, Public Law (P.L.) 106-65
	Antiquities Act of 1906, P.L. 59-209, 16 United States Code (U.S.C.) 431-433
	Historic Sites Act of 1935, as amended, P.L. 74-292, 16 U.S.C. 461-467
	National Historic Preservation Act of 1966, as amended (NHPA), P.L. 89-665, 54 U.S.C. 306101 et seq.
	National Environmental Policy Act of 1969 (NEPA), P.L. 91-190, 42 U.S.C. 4321 et seq.
	Archeological and Historic Preservation Act of 1974 (AHPA), P.L. 93-291, 16 U.S.C. 469-469c-1
	American Indian Religious Freedom Act of 1978 (AIRFA), as amended, P.L. 95-341, 42 U.S.C. 1996
	Archaeological Resources Protection Act of 1979 (ARPA), as amended, P.L. 96-95, 16 U.S.C. 470aa et seq.
	Native American Graves Protection and Repatriation Act of 1990 (NAGPRA), P.L. 101-601, 25 U.S.C. 3001-3013
Federal Regulations	Protection of Archaeological Resources: Uniform Regulations, 32 Code of Federal Regulations (CFR) Part 229
	National Register of Historic Places, 36 CFR Part 60
	Determinations of Eligibility for Inclusion in the National Register of Historic Places, 36 CFR Part 63
	National Historic Landmarks Program, 36 CFR Part 65
	The Secretary of the Interior's Standards for the Treatment of Historic Properties, 36 CFR Part 68
	Waiver of Federal Agency Responsibilities under Section 110 of the NHPA, 36 CFR Part 78
	Curation of Federally Owned and Administered Archeological Collections, 36 CFR Part 79
	Protection of Historic Properties, 36 CFR Part 800

Regulatory Context	Code
	Preservation of American Antiquities, 43 CFR Part 3
	NAGPRA Regulations, 43 CFR Part 10
Executive Memorandum and Orders	Executive Memorandum, 29 April 1994, Government-to-Government Relations with Native American Tribal Governments
	Executive Order 11593, 13 May 1971, Protection and Enhancement of the Cultural Environment
	Executive Order 13006, 24 May 1996, Locating Federal Facilities on Historic Properties in Our Nation's Central Cities
	Executive Order 13007, 24 May 1996, Indian Sacred Sites
	Executive Order 13175, 6 November 2000, Consultation and Coordination with Indian Tribal Governments
	Executive Order 13287, 3 March 2003, Preserve America
Military Requirements	Department of the Air Force Instruction 90-2002, Interactions with Federally Recognized Tribes, 24 August 2020
	DoD Directive 4710.1, Archeological and Historic Resources Management, 21 June 1984
	DoD Instruction 4710.02, DoD Interactions with Federally Recognized Tribes, 14 September 2006
	DoD Instruction 4715.3, Environmental Conservation Program, 3 May 1996
	DoD Instruction 4715.16, Cultural Resources Management, 18 September 2008
	DoD American Indian and Alaska Native Policy, 20 October 1998
	U.S. Air Force (Air Force) Manual 32-7003, Environmental Conservation, 19 April 2020
	Interim Guidance: Treatment of Cold War Historic Properties for Air Force Installations, June 1993
	Secretary of the Department of the Navy Instruction 4000.35A, Department of the Navy Cultural Resources Program, 9 April 2001
	Secretary of the Department of the Navy Instruction 11010.14 and 11010.14A, Department of the Navy Policy for Consultation with Federally Recognized Tribes
	Office of the Chief of Naval Operations Instruction 11010, Indian Sacred Sites on Navy Lands
	Office of the Chief of Naval Operations Instruction 11170.2, Navy Responsibilities Regarding Undocumented Human Burials or Cemeteries
	Marine Corps Order P5090.2A, U.S. Marine Corps (Marine Corps) Environmental Compliance and Protection Manual, Chapter 8

Regulatory Context	Code
	Office of the Chief of Naval Operations Instruction 5090.1B, Change 3, Department of the Navy Environmental and Natural Resources Program Manual
	Marine Corps Order P5750.1G, Manual for the Marine Corps Historical Program
Other Guidance	Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines, 48 FR 44716
	The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings
	Guidelines for Federal Agency Responsibilities under Section 110 of the NHPA
	Guidelines for Restricting Information on the Location of National Register Properties
	Consultation with Native Americans Concerning Properties of Traditional Religious Cultural Importance, Advisory Council on Historic Preservation, 1993
	Guidelines for Evaluating and Documenting Traditional Cultural Properties, 1994

Military Lands Withdrawal Act of 1999 (P.L. 106-65)

The MLWA of 1999 includes provisions that emphasize the importance of natural and cultural resource management in sustaining the withdrawal. The Secretary of the Interior, upon determining that the withdrawn lands are not being managed in accordance with the INRMP and that "the failure to do so is resulting in significant and verifiable degradation of the natural or cultural resources of such lands," is required to notify the Secretaries of the Air Force and Navy. Ultimately, if identified problems are not resolved, responsibility for the management of natural and cultural resources on the BMGR may be transferred to the Secretary of the Interior.

MLWA (Section 3031(b)(9)(B)) also defines sacred sites:

The term "sacred site" means any specific, discrete, narrowly delineated location on federal land that is identified by an Indian tribe, or its designee, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion, but only to the extent that the tribe or its designee, has informed the Secretary of the Navy or Air Force of the existence of such site. Neither the Secretary of the DoD, Secretary of the Navy, Secretary of the Air Force, nor the Secretary of the Interior shall be required under Section 552 of Title 5, U.S.C., to make available to the public any information concerning the location, character, or use of any traditional Indian religious or sacred site located on lands withdrawn and reserved by this subsection.

Antiquities Act of 1906 (16 U.S.C. Sections 431-433)

The Antiquities Act codified at 43 CFR Part 3 is the first federal law to provide protection of ruins and objects of antiquity on federal lands. It authorizes the President to establish national monuments and

objects of historic or scientific interest. The Antiquities Act also established a system to permit examination and excavation by qualified researchers to increase knowledge and collect antiquities for permanent preservation in public museums. Penalties were established for unauthorized excavation and collection. Other laws have largely superseded the Antiquities Act; however, the authority to withdraw public lands from multiple use status to create national monuments continues to be exercised. Also, the Antiquities Act remains the fundamental authorization for protection of paleontological resources.

Historic Sites Act of 1935 (16 U.S.C. Sections 461-467)

The Historic Sites Act (36 CFR Part 65) established a national policy to identify and preserve historic sites, buildings, objects, and antiquities of national significance. The law authorized the Secretary of the Interior to conduct surveys, collect and preserve data, and acquire historic and archaeological sites. The Historic American Building Survey and Historic American Engineering Record stem from this Act, as well as the National Park Service program of designating National Historic Landmarks.

National Historic Preservation Act of 1966 (54 U.S.C. Section 306101 et seq.)

The NHPA, as amended, is the cornerstone of the current federal cultural resource preservation program. The NHPA proclaims the historical and cultural foundations of the Nation should be preserved as a living part of our community life to give a sense of orientation to the American people. The NHPA expanded the policy enunciated by the Historic Sites Act to encompass resources of state and local significance as well as national, thus providing the basis for an expanded National Register of Historic Places (National Register) maintained by the Secretary of the Interior.

The NHPA also established the Advisory Council on Historic Preservation (ACHP) and the network of State Historic Preservation Offices. The ACHP advises the President and Congress on matters relating to historic preservation, encourages public interest and participation in historic preservation, and assists state and local governments in drafting legislation relating to historic preservation. The NHPA also directed the ACHP to promulgate regulations implementing Section 106. Under that regulation (36 CFR Part 800, Protection of Historic Properties) the State Historic Preservation Offices represent the people's interests in consultation with federal agencies regarding historic properties.

The main purpose of the NHPA is to protect "historic properties," defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in the National Register. To be determined eligible for the National Register, properties must be significant in American history, architecture, archaeology, engineering, or culture, and generally must be at least 50 years old. They must also possess integrity of location, design, setting, materials, workmanship, feeling, or association, and meet at least one of the criteria set forth in the National Register regulations (36 CFR Part 60).

Section 106 establishes a strategy for protecting historic properties by directing federal agencies to make reasonable and good faith efforts to identify properties eligible for listing on the National Register and take into account the effects of their undertakings on such properties and to provide the Council an opportunity to comment on these activities. Section 110(a)(2) directs agencies to identify, evaluate, and nominate to the National Register historic properties under their jurisdiction or control. This section also stipulates that these activities be conducted in consultation with federal, state, and local agencies, Native American tribes, and interested parties.

The NHPA was substantially amended in 1992 to recognize that properties of traditional religious or cultural importance to a Native American tribe may be eligible for inclusion in the National Register. Section 101(d)(6)(B) of the NHPA requires agency officials to consult with any Native American tribe or Native Hawaiian organization that attaches religious and cultural significance to historic properties that may be affected by an undertaking. The Council issued revised regulations in 2001 that significantly modified the Section 106 review process to emphasize the role of Native American consultation.

Other regulations implementing NHPA include the Secretary of Interior's Standards for Historic Preservation Projects (36 CFR Part 68), which address approaches to preservation, rehabilitation, restoration, and reconstruction. Additional direction is provided by Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines, which address preservation planning; identification, evaluation, and registration of resources; historical, architectural and engineering, and archaeological documentation; and professional qualification standards.

National Environmental Policy Act of 1969 (42 U.S.C. Section 4321 et seq.)

NEPA established the protection and enhancement of the environment as national policy. In addition to natural resources, NEPA specifically stipulates that federal agencies should work to preserve historic and cultural aspects of our national heritage. Implementing regulations issued by the Council on Environmental Quality are codified at 40 CFR Parts 1500-1508, and the Air Force has published counterpart regulations at 32 CFR Part 989. These regulations encourage combining NEPA compliance with other regulatory requirements such as those of the NHPA, AIRFA, and NAGPRA.

Archeological and Historic Preservation Act of 1974 (16 U.S.C. Sections 469-469c-1)

The AHPA, promulgated as an amendment of the Reservoir Salvage Act of 1960, provides for the preservation of archaeological and historical information that otherwise might be lost as a result of federal construction projects and other federally licensed activities and programs. This Act stipulates that up to 1 percent of the funding appropriated by Congress for federal undertakings can be spent to recover, preserve, and protect archaeological and historical data. A subsequent amendment authorized the 1 percent limit to be administratively exceeded under certain circumstances.

American Indian Religious Freedom Act of 1978 (42 U.S.C. Section 1996)

The AIRFA reiterates the First Amendment guarantee of religious freedom, with specific reference to the inherent right of Native Americans, Native Alaskans, and Native Hawaiians to believe, express, and exercise their traditional religions. Such rights include, but are not limited to, access to religious sites, use and possession of sacred objects, and freedom to worship through ceremonial and traditional rites. Federal agencies are directed to evaluate their policies and procedures to determine if changes are needed to ensure that such rights and freedoms are not disrupted by agency practices. The Act is not implemented by regulations.

Archeological Resources Protection Act of 1979 (54 U.S.C. Section 306101et seq.)

The ARPA strengthened protection of archaeological resources on federal and tribal lands by increasing the penalties for unauthorized excavation, collection, or damage from misdemeanors defined by the

Antiquities Act of 1906 to felonies with fines up to $10,000 and 1 year of imprisonment for first offenses. Trafficking in archaeological resources from public and tribal lands is also prohibited by ARPA. ARPA requires notification of affected Native American tribes if archaeological investigations would result in harm to or destruction of any location considered by tribes to have religious or cultural importance. When archaeological investigations are performed under contract to the installation or facility where they are located, such contracts serve in lieu of a permit. The implementing regulations are at 32 CFR Part 229.

Regulations for Curation of Federally Owned and Administered Archeological Collections, 36 CFR Part 79, define standards, procedures, and guidelines to be followed by federal agencies to preserve collections of prehistoric and historic material remains and associated records. These regulations apply not only to collections recovered under the authority of ARPA, but also the Antiquities Act, AHPA, and NHPA.

Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. Section 3001 et seq.)

The NAGPRA protects human remains, funerary objects, sacred objects, and items of cultural patrimony of indigenous peoples on federal lands. The Act stipulates priorities for assigning ownership or control of such cultural items excavated or discovered on federal or tribal lands.

The Act also provides for repatriation of human remains and cultural items previously collected from federal lands and in the possession or control of a federal agency or federally funded repository. Implementing regulations are codified at 43 CFR Part 10. In addition to defining procedures for dealing with previously collected human remains and cultural items, these regulations outline procedures for negotiating plans of action or comprehensive agreements for treatment of human remains and cultural items encountered in intentional excavations or inadvertent discoveries on federal or tribal lands.

Executive Memorandum and Orders

The following presidential directives are particularly relevant to managing cultural resources. An Executive Memorandum and an Executive Order address how executive agencies should consult with Native American tribal governments, which have a unique status as dependent sovereign nations. Another Executive Order directs executive agencies to protect sites that are sacred to Native Americans.

Executive Memorandum, 29 April 1994, Government-to-Government Relations with Native American Tribal Governments

Executive Memorandum of 29 April 1994 addressed the nature of relations with Native American tribes. It requires federal agencies to establish and operate within a government-to-government relationship with federally recognized tribes.

Executive Order 11593, Protection and Enhancement of the Cultural Environment

This Executive Order was issued in 1971. It directs the federal government to provide guidance and oversight to preserve, restore, and maintain the historic and cultural environment of the nation by initiating measures necessary to maintain and preserve sites, structures, and objects of

historical/architectural/archaeological significance that are federally owned for the benefit of American citizens.

Executive Order 13006, Locating Federal Facilities on Historic Properties in Our Nation's Central Cities

This Executive Order was issued in 1996. It required the federal government to maintain and utilize historic properties in urban areas (especially central business districts) when it is operationally appropriate and economically feasible to do so.

Executive Order 13007 of May 24, 1996, on Indian Sacred Sites

Executive Order 13007 addressed Native American sacred sites. It requires that to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions, federal land managers must accommodate access to and ceremonial use of Native American sacred sites by native religious practitioners, and avoid adversely affecting the physical integrity of sacred sites. The order also charges agencies to maintain the confidentiality of sacred sites when appropriate.

Executive Order 13175 of November 6, 2000, on Consultation and Coordination with Indian Tribal Governments

This Executive Order established provisions for regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications. It further has provisions to strengthen government-to-government relationships and reduce the imposition of unfunded mandates on Native American tribes. Executive Order 13175 directs agencies to establish an accountable process to ensure meaningful and timely input by tribal officials in the development of any regulatory policies that have tribal implications.

Executive Order 13287, Preserve America

This Executive Order was issued in 2003. It directs federal agencies to provide leadership in the preservation and protection of America's heritage by advancing provisions for the contemporary use of historic properties under the control of the federal government. Specifically, this Executive Order promotes intergovernmental cooperation and partnership for the preservation of historic properties and promotes eco-tourism. It also establishes a requirement for annual reporting for federal agencies with historic properties under their purview.

Military Requirements

In addition to federal legislation and regulations, the DoD, Air Force, Navy, and Marine Corps have developed formal guidance to aid land managers in implementing cultural resource regulations. Relevant documents are summarized in the following subsections.

DoD Directive 4710.1, Archaeological and Historic Resources Management, 21 June 1984

This directive provides policy, prescribes procedures, and assigns responsibilities for the management of archaeological and historic resources under DoD control. It is the policy of DoD to integrate historic

preservation requirements with the planning and management of activities under DoD control. It also is DoD policy to minimize expenditures through judicious application of options available in complying with applicable laws, and to encourage practical and economical rehabilitation and adaptive use of significant historic buildings and structures.

DoD Instruction 4710.02, DoD Interactions with Federally Recognized Tribes, 14 September 2006

This instruction implements DoD policy, assigns responsibilities, and provided procedures for DoD interactions with federally recognized tribes in accordance with DoD guidance, executive orders, and presidential memoranda. It is the policy of DoD to:

1. Meet its responsibilities to tribes and comply with applicable statutes, regulations, and guidance
2. Build stable and enduring relationships with tribal governments
3. Fully integrate the principles and practices of meaningful consultation and communication with tribes
4. Consider the significance that tribes ascribe to protected tribal resources

DoD Instruction 4715.3, Environmental Conservation Program, 3 May 1996

DoD Instruction (DoDI) 4715.3 covers a wide range of topics pertinent to the integrated management of natural and cultural resources on properties under DoD control and describes means and assigns responsibilities for implementing policies and prescribes appropriate procedures. It also directs DoD installations to take a proactive approach to consultation with Native American tribes, both in the Section 106 process and with respect to tribal cultural concerns in general. Among other things, it also directs installations to select a staff member to serve as a liaison to tribes and to educate appropriate staff about tribes with cultural ties to lands managed by DoD.

DoD Instruction 4715.16, Cultural Resources Management, 18 September 2008

This instruction establishes DoD policy and assigns responsibilities in accordance with other DoD instructions and directives for compliance with applicable federal statutory and regulatory requirements, Executive Orders and Memoranda for the integrated management of cultural resources on DoD-managed lands. It is DoD policy to:

- Manage and maintain cultural resources under DoD control in a sustainable manner through a comprehensive program that considers the preservation of historic, archaeological, architectural, and cultural values; is mission supporting; and results in sound and responsible stewardship.
- Be an international and national leader in the stewardship of cultural resources by promoting and interpreting the cultural resources it manages to inspire DoD personnel and to encourage and maintain U.S. public support for its military.
- Consult in good faith with internal and external stakeholders and promote partnerships to manage and maintain cultural resources by developing and fostering positive partnerships with

federal, tribal, state, and local government agencies; professional and advocacy organizations; and the general public.

It provides guidance in several areas, including the processes of cultural resource management, programming funds for cultural resource programs, and the contents of ICRMPs, and establishes cultural resource metrics for DoD components.

DoD American Indian and Alaska Native Policy, 20 October 1998

The DoD American Indian and Alaska Native Policy addresses trust responsibilities to tribes. This policy enunciates principles based on federal statutes, treaties, and other policies for DoD to use in working with federally recognized American Indian and Alaska Native Governments. The goal of the policy is to build stable and enduring relationships and to establish procedures for meaningful consultation and communication with tribes. The policy recognizes that tribes ascribe significance to certain natural resources and properties of traditional or customary religious or cultural importance, and that DoD will manage its lands to conserve, protect, and provide access to those resources to the extent practicable and consistent with military training, security, and readiness requirements.

The policy supports tribal self-governance and recognizes the obligations for establishing government-to-government relations between the federal government and tribes. It recognizes the importance of increasing understanding and addressing tribal concerns of the past, present, and future. The policy stipulates that tribal consultation needs to be conducted prior to reaching decisions on matters that have the potential to significantly affect protected tribal resources, tribal rights, or Indian lands.

Air Force Manual 32-7003, Environmental Conservation, 19 April 2020

Air Force Manual 32-7003, Environmental Conservation, 19 April 2020, provides guidance for protecting and managing cultural resources and implements DoDI 4715.3. This Air Force Instruction is comprehensive and covers the full range of cultural resource management issues pertinent to Air Force operations. It outlines the requirements for cultural resource management plans such as this document, also addresses appropriate training of Air Force personnel with regard to cultural resource management and describes the steps to follow in evaluating and nominating eligible properties to the National Register. The Air Force Instruction defines compliance requirements for protecting cultural resources.

Air Force Manual 32-7003, Environmental Conservation, 19 April 2020, also provides guidance for determining the eligibility of properties for National Register listing and for nominating those properties that qualify. Guidance for consulting with experts and preparing military operations areas is included, along with advice about preparing statements of work and when necessary, issuing ARPA permits. The Air Force Instruction includes general guidelines for data recovery, budgeting, database management, and cultural resource management training.

Interim Guidance: Treatment of Cold War Historic Properties for Air Force Installations, June 1993

The Cold War had a tremendous impact on cultural and political developments throughout the world. Because of concern that highly significant properties may be destroyed prior to reaching the normal

50-year age for evaluation, the Air Force requires its installations in the U.S. to consider Cold War-era properties for National Register eligibility and offers "Interim Guidance." Only a carefully selected, relatively small number of these resources are expected to meet eligibility requirements for National Register listing for properties less than 50 years of age.

Secretary of the Navy Instruction 4000.35A, Navy Cultural Resources Program, 9 April 2001

Secretary of the Navy Instruction 4000.35A establishes policy and assigns responsibilities for a cultural resources program under the direction and oversight of the Secretary of the Navy (Installations and Environment). This instruction assigns responsibilities to the Commandant of the Marine Corps, which are applicable to Marine Corps activities on the BMGR, and the Commandant will issue implementing instructions. The Navy Historic and Archaeological Resources Protection Planning Guidelines also address preparation of Historic and Archaeological Resource Protection plans, which are comparable to ICRMPs.

Secretary of the Navy Instruction 11010.14 and 11010.14A, Navy Policy for Consultation with Federally Recognized Tribes

This policy provides Navy procedures and responsibilities for consultation with federally recognized Indian tribes.

Office of the Chief of Naval Operations Instruction 11010, Indian Sacred Sites on Navy Lands

This Navy Instruction required Navy offices and facilities to protect and accommodate access to Native American sacred sites located on property owned or controlled by the agency. Because Navy installations encompass large tracts of ancestral Native American lands, Navy facilities with responsibilities for land management are required to evaluate and inventory historical and archaeological resources, including those associated with Native Americans.

Office of the Chief of Naval Operations Instruction 11070.2, Navy Responsibilities Regarding Undocumented Human Remains

This instruction provides Navy policy, procedures, and guidance regarding the discovery of undocumented human burials or cemeteries during the course of the Navy's mission.

Marine Corps Order P5090.2A, Environmental Compliance and Protection Program

Chapter 8 of Marine Corps Order P5090.2A, Environmental Compliance and Protection Program, addresses historic and archaeological resources protection. This manual defines regulatory requirements, states Marine Corps policy, and assigns responsibilities to staff of the Commandant of the Marine Corps and installation commanders.

Office of the Chief of Naval Operations 5090. 1B, Change 3, Department of the Navy Environmental and Natural Resources Program Manual

This Navy policy defines responsibilities and procedures for compliance with NEPA and NHPA, among other areas of environmental compliance. Chapter 23 of the instruction addresses Navy policy regarding the management of cultural resources.

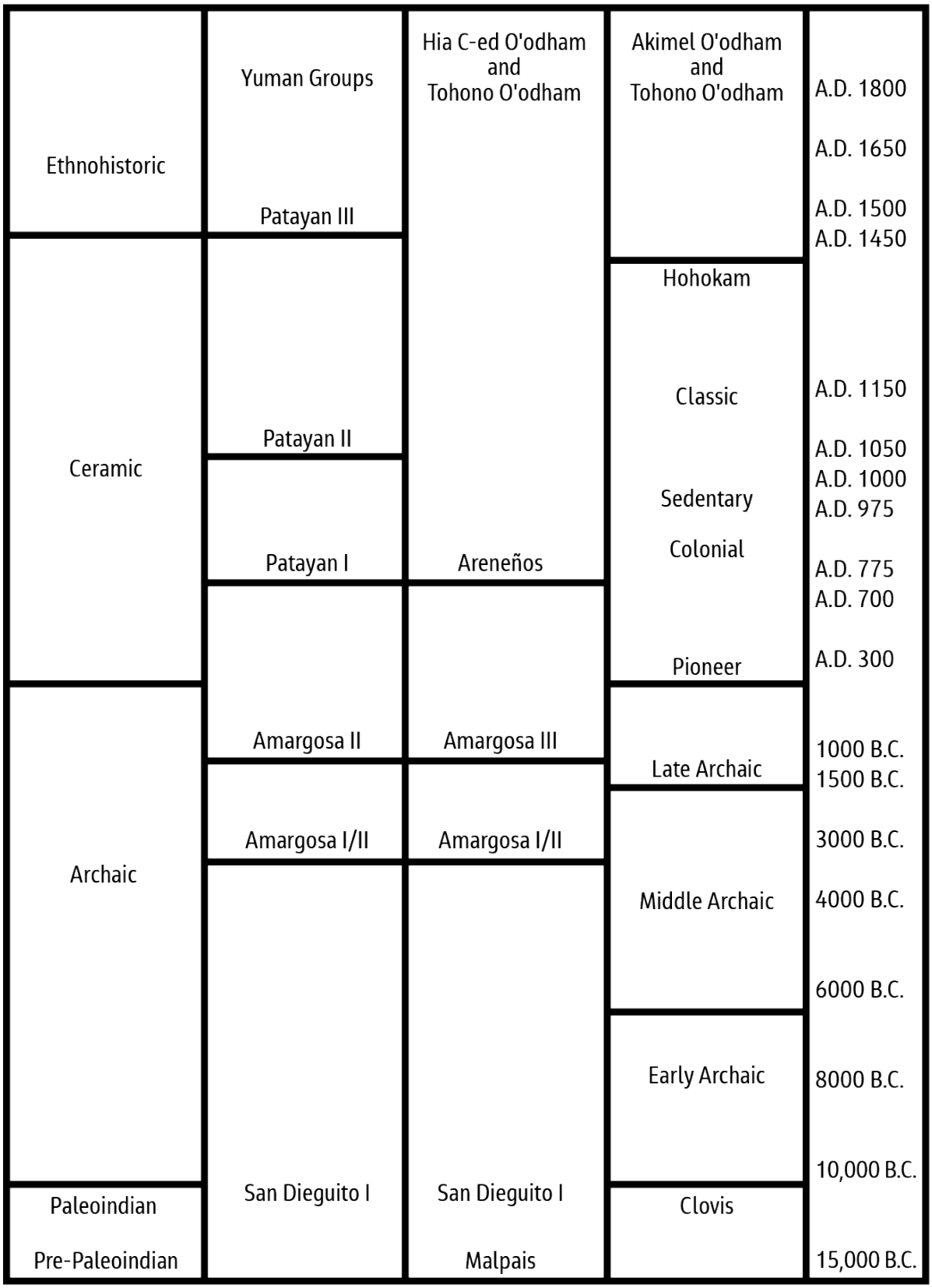
Marine Corps Order P5750.1G, Manual for the Marine Corps Historical Program

This document sets forth policies and procedures governing the administration of the Marine Corps Historical Program and delineates the respective responsibilities of the Marine Corps Headquarters and the field commands in the execution of the program. It is published at the instruction and guidance of commanders, staff members, and individuals.

Culture History

This section provides the reader with an overview of the culture history of the Western Papaguería. More extensive culture histories of the Papaguería and the BMGR are available in Ahlstrom, ed. (2000), Altschul and Rankin (2008), and Heilen and Vanderpot (2013). Figure I-1 provides a basic chronology of the region's prehistory and history as it is currently understood.

Figure I-1. Regional Chronology



Source: Heilen and Vanderpot 2013

Pre-Paleoindian Period (13,000 to 11,500 B.C.)

The traditional archaeological viewpoint of human entrance into North America is being challenged by archaeologists exploring possible pre-Clovis coastal migration of people dating back as far as 13,000 Before Common Era (B.C.) (Fiedel 2014). Sites such as Monte Verde in southern Chile (Dillehay 1997; Dillehay et al. 2008), the Debra L. Friedkin site in Texas (Waters et al. 2011), and the Paisley Caves in southern Oregon have provided intriguing archaeological and genetic evidence to support a pre-Clovis model (Beck and Jones 2010; Bodner et al. 2012; Erlandson and Braje 2011). However, critiques of deposition contexts and site formation processes have raised doubts regarding some of the early dates reported (Fiedel 2014). Critics have additionally noted that no pre-Clovis sites have been identified along the Pacific coastline from Alaska to Tierra del Fuego older than 11,500 B.C. (Dickinson 2011), raising further skepticism.

In the Southwest, a pre-projectile point cultural complex was first proposed by Malcolm Rogers; Rogers referred to this cultural tradition as the "Malpais Pattern" (Rogers 1939). As defined by Rogers, the Malpais Pattern lacked diagnostic projectile points and consisted of heavily-varnished crude stone choppers and scraping tools, typically associated with exposures of desert pavement and cleared circles. Following his early definition of this pre-Paleoindian complex, Rogers renamed it "San Dieguito I," which has caused confusion in naming conventions.

Rogers' work was refined by Julian Hayden in his studies in the Sierra Pinacate region of Mexico. Hayden (1976a, 1976b, 1998) proposed that much of the Southwest was populated by the "Malpais," and the artifacts of that tradition can be dated by analyzing the desert varnish present on some surficial sites situated on desert pavement. Hayden proposed that the Malpais occupied much of the American Southwest between 33,700 years Before Present (B.P.) and 17,000 B.P., followed by a later San Dieguito occupation between 17,000 B.P. and 9000 B.P. (Heilen and Vanderpot 2013). Hayden based his chronology on his belief that desert varnish present on Malpais artifacts were formed during the Holocene Altithermal (9000 to 5000 B.P.) and an earlier Malpais Altithermal (18,000 to 20,000 B.P.) and that varnish present on flake scars must have developed prior to these altithermal events (Hayden 1976a, 1976b, 1998). While the Malpais artifacts described by Rogers and Hayden are undoubtedly cultural in origin, their chronological affiliation has not been definitively proven.

Paleoindian Period (11,500 to 8500 B.C.)

While the chronological association of the postulated pre-Paleoindian Malpais tradition has not been definitively established, the Paleoindian period defines the earliest patterned cultural traditions identified in the Americas. Beginning about 11,500 B.C., the Clovis cultural tradition is clearly recognizable in the archaeological record across North America. Originating in southern Siberia, the Clovis people crossed Beringia around 12,500 B.C. and subsequently migrated through a corridor between the receding Laurentide and Cordilleran ice sheets and rapidly expanded across the continent.

The Clovis cultural tradition is characterized by mobile populations that focused on big-game hunting. The primary marker of this tradition is known as a Clovis Point, which is described as a distinctive lanceolate spear point with a concave base, longitudinal fluting, and lateral and marginal grinding (Slaughter 1992). These projectiles have been identified in clear association with the fossil remains of

now extinct animals, particularly mammoth (*Mammuthus* spp.) and ancient bison (*Bison antiquus*) (Reid and Whittlesey 1997).

Reported Clovis materials found in the Western Papaguería include isolated finds of diagnostic projectile points (Altschul and Rankin 2008; Vanderpot and Keur 2015). A surface find of three Clovis-style fluted projectile points and point fragments was identified at AZ Y:8:100(ASM), located on the North Tactical Range of BMGR East (Kayser et al. 2000). A later visit to the site during research conducted by Matt Dooley yielded the identification of another Clovis-style projectile point, which was collected in 2006 (pers. com. Rankin 2018b). While surface features were also reported at the site, the association between the features and the diagnostic Clovis-style projectile points could not be determined. A recent survey on MCAS Yuma land in the Eastern Mohawk Valley identified a Clovis point indicative of Paleoindian use of the landscape (James, pers. comm. 2020).

Following Clovis, a later Paleoindian complex in the Southwest is the Folsom tradition (13,000-11,300 B.P). The Folsom tradition is characterized by large and distinctive fluted projectile points and a reliance on bison hunting. While Folsom points are found across North America, no specific archaeological sites in the Papaguería have exhibited Folsom projectile points. Spatial distribution of Folsom sites follows a north-south trending band along the Rocky Mountains; Folsom technology suggests cultural continuity with the earlier Clovis tradition (Heilen and Vanderpot 2013).

The San Dieguito/Lake Mohave complex is a separate Paleoindian culture that is thought to have followed the Clovis tradition. Unlike Clovis and Folsom traditions, the San Dieguito/Lake Mohave people are thought to have focused subsistence activities along late Pleistocene and early Holocene desert lakes and coastal marshes. The complex is divided into three phases (San Dieguito I, II, and III) which are based on the presence or absence of various lithic tools (Heilen and Vanderpot 2013). Overall, the San Dieguito toolkit is defined by large percussion-flaked bifaces, distinctive large projectile points, cleavers, cobble choppers, and an absence of groundstone implements. San Dieguito I has been identified in the southwestern Arizona desert; San Dieguito II and III are found along the Colorado River and to the west in the deserts of California.

The chronological association of the San Dieguito complex is confusing; different researchers have assigned different temporal spans. Hayden (1976a, 1976b) assigns both a pre- and post-Clovis occupation sequence for San Dieguito; Haury (1950) postulates a post-Clovis temporal sequence.

In the Papaguería, the best evidence for Paleoindian occupation comes from stratified rockshelter deposits found at Ventana Cave, located in the Eastern Papaguería and radiocarbon dated to 11,300 to 12,000 B.P. These radiocarbon dates were obtained from the basal level of the cave deposits in the same stratigraphic layer as large, crude cobble tools and were interpreted to represent possible Folsom occupation (Heilen and Vanderpot 2013). More current research, including accelerator mass spectrometry dating, indicate the basal cave deposits date to the late Holocene and are not representative of a specific cultural complex (Huckell and Haynes 2003). Nevertheless, Ventana Cave can be interpreted as representing late Paleoindian or Early Archaic occupation in the Papaguería.

Archaic Period (circa 8500 B.C.to A.D. 1)

Paleoenviromental data suggest that during the late Pleistocene epoch, southwestern Arizona, including the Papaguería, was wetter and cooler than modern conditions (Heilen and Vanderpot 2013). The greater region contained a woodland vegetation community containing singleleaf piñon–Utah juniper (*Pinus monophylla–Juniperus osteosperma*); in the Western Papaguería, vegetation was similar to the modern Mojave Desert, with yucca and tall grass species present. Megafauna, such as camels, mammoth, horse, and giant ground sloth, were also present. These conditions were thus suitable for the Paleoindian big-game-focused subsistence patterns.

By the Middle Holocene (circa 8000 B.C.) these conditions had changed. Megafauna were extinct, Sonoran Desert vegetation was established, and environmental conditions were transitioning to those consistent with the modern Sonoran Desert (Heilen and Vanderpot 2013). However, little paleoenvironmental data specific to the Papaguería is available, leaving questions regarding the availability of water and resource distribution unanswered. In response to these changing environmental conditions, cultural traditions emphasizing the hunting of smaller game and gathering of new plant resources replaced the more big-game-focused subsistence pattern of the Paleoindian period. Archaeologists refer to this stage as the Archaic period (Huckell 1996).

The transition from Paleoindian to Archaic probably was not abrupt, and some archaeologists have suggested that the two subsistence strategies overlapped temporally and possibly spatially (Faught and Freeman 1998). Nevertheless, 8500 B.C. is taken as the starting point of the Archaic period because it was around this time that a ground stone tool industry consisting of handstones and netherstones became common across the Southwest (Huckell 1996).

Several Archaic traditions are recognized in the Southwest; in Arizona the period is generally discussed in terms of Early, Middle, or Late Archaic period occupations. These occupations correspond with distinct projectile point morphology and limited carbon dating results. The variability in site types, locations, and material culture that has been associated with the broad Archaic traditions indicates the diverse and frequent adaptive strategies to local environments rather than behaviors and economies common to large regions (Heilen and Vanderpot 2013).

Historically, the Archaic period in the Papaguería has been interpreted archaeologically to represent a transitional area between the Archaic period traditions expressed as the Amargosa and Cochise cultures (Heilen and Vanderpot 2013). More recent research has incorporated older Archaic traditions into the Southwestern Archaic Culture temporal framework.

Amargosa Culture: The Amargosa Culture was first defined by Rogers in 1939 and was further refined by researchers such as Haury (1950) and Hayden (1967). Rogers' original temporal framework now corresponds to the Amargosa I, II, and III designations proposed by Haury (1950) based on Ventana Cave deposits; Hayden's sequence for the Sierra Pinacate includes Amargosa I (which incorporates Haury's Amargosa I and II) and Amargosa II (circa 1000 B.C. to A.D. 1850).

The Amargosa Culture was interpreted as a regional Archaic tradition that followed the earlier San Dieguito sequence in southern California and western Arizona; the assemblage contains hallmark San Dieguito-type artifacts in association with ground stone tools and distinctive projectile points. Sites commonly associated with the Amargosa Culture include cleared areas, sleeping circles, intaglios, trails, and trail shrines (Heilen and Vanderpot 2013).

Cochise Culture: The Cochise Culture was originally defined by Sayles and Antevs (1941) and corresponds to the Archaic sequence expressed in southeastern Arizona. The Cochise Culture was defined based on buried deposits exposed in arroyos; the original temporal sequence consisted of the Sulphur Spring, Chiricahua, and San Pedro phases. Later, the Cazador phase was included as a subdivision between the Sulphur Spring and Chiricahua phases (Sayles 1983). The phases are differentiated largely on projectile point styles and different ground stone tool kits.

Southwestern Archaic Culture: Subsequent research has led to the rethinking of Archaic period temporal constructs and the concept of Amargosa and Cochise cultures as standalone cultural traditions. Rather, the Archaic period is viewed as a large-scale post-Pleistocene hunter-gatherer lifeway with regional variations based on environmental conditions (Heilen and Vanderpot 2013). The contemporary chronological framework of the Archaic is thus divided into Early, Middle, and Late phases, which are defined based on changes in archaeological toolkits and subsistence strategies, as well as shared attributes such as seasonal mobility and settlement patterns. The Early, Middle, and Late phases of the Archaic period incorporate the temporal frameworks previously defined for both the Amargosa and Cochise cultures. These phases are discussed generally below, with focus on the regional manifestation of each as present in the Papaguería.

Early Archaic: The Early Archaic period spans from 8500 B.C to 4800 B.C. It incorporates the Sulphur Springs phase (Sayles and Antevs 1941), Rogers' (1939) Amargosa I phase, and the Ventana-Amargosa I phase derived from stratified Ventana Cave deposits (Mabry and Faught 1998). Early Archaic assemblages are characterized by percussion-flaked scrapers, bifacial knives, choppers, flat slab metates, oval manos, and tapering-stem projectile points reminiscent of Silver Lake or Lake Mohave styles. On the BMGR, Early Archaic period sites are identified by the presence of Great Basin stemmed projectile points. Five are contained in the 56 Range Management Office (RMO) database reported by Heilen and Vanderpot (2013); these consist of four artifact scatters with feature(s) and one lithic scatter with feature(s). Two of these sites contain rockshelters; all the known sites are large in size and contain ground stone and a diverse chipped stone tool assemblage. Common features at these sites include bedrock mortars, cairns, thermal features, rock alignments, and trails.

Middle Archaic: The Middle Archaic period spans from 4800 B.C. to 1500 B.C. It incorporates the Amargosa II phase (Rogers 1958), the Chiricahua phase (Sayles and Antevs 1941), and the Chiricahua-Amargosa II phase defined at Ventana Cave (Haury 1950). Middle Archaic assemblages are characterized by the addition of basin-shaped metates, mortars and pestles, bifacial tools, and distinctive projectile points (Pinto, Chiricahua, Gypsum Cave, and Bajada points) to the overall tool assemblage. Middle Archaic period components have been identified at 40 sites and in 10 isolated finds on BMGR East (Heilen and Vanderpot 2013).

As noted by Heilen and Vanderpot (2013), many sites on the BMGR that exhibit Middle Archaic assemblages may represent places that were persistently used, as many contain artifacts that may be attributed to later use or occupation. Middle Archaic sites on the BMGR are smaller in size than their Early Archaic counterparts; features associated with these sites include bedrock grinding slicks, bedrock mortars, thermal features, cleared areas, geoglyphs, rock alignments, rock rings, rock shelters, rock images, and trails. Site assemblages include diverse faunal remains, ground stone, and flaked stone.

Late Archaic: The Late Archaic spans from 1500 B.C. to A.D. 1–300. It incorporates Amargosa III (Rogers 1958), and the San Pedro phase of the Cochise Culture (Sayles and Antevs 1941). In well-watered areas outside the Papaguería, changes in population, settlement patterns, and subsistence strategies around 1500 B.C. distinguish the Late Archaic period from the preceding Middle Archaic period and last until A.D. 1 to 300 (Gilman 1995; Huckell 1988, 1990, 1995; Irwin-Williams 1979; Matson 1991; Roth 1996, Heilen and Vanderpot 2013). These changes are linked to four interrelated factors:

1. An increasing regionalism among Late Archaic groups, resulting apparently from an increase in population relative to earlier times
2. The existence of a broad-based interaction network that allowed for the rapid dissemination of information and materials
3. The increasing importance of maize in the diet as seen in the development and spread of agriculture
4. The appearance of large settlements that are, perhaps, the first expressions of sedentary village life (Mabry and Faught 1998)

Many of these Late Archaic manifestations are not evident in the Western Papaguería where larger settlements and maize farming have not yet been identified at any Late Archaic sites (Vanderpot and Keur 2015). The artifact assemblage present on sites with Late Archaic temporal affiliation include a greater diversity of ground stone tools (including deep-basin metates), refined biface production, and the integration of Great Basin-style Elko Corner-notch projectile points (Heilen and Vanderpot 2013). Late Archaic period components have been identified at 51 sites and in 15 isolated finds on BMGR East (Heilen and Vanderpot 2013), including three sites investigated on the Gila Bend Air Force Auxiliary Field (BMGR-02-E-01, BMGR-02-E-03, and BMGR-02-E-09) that indicate seasonal procurement and processing of local mesquite, grasses, and seeds (Vanderpot and Keur 2015). On BMGR East Manned Range 1, recent investigations occurred at AZ Z:5:68 (ASM), a Late Archaic site, and resulted in the identification of 217 cultural features (Vanderpot et al. 2017).

Ceramic Period (A.D. 1 to A.D. 1450)

The Ceramic period refers to the prehistoric period during which people made, used, and exchanged ceramic goods. While the term “Formative period” has been used to refer to this prehistoric period elsewhere, Heilen and Vanderpot (2013) note that “Ceramic period” is a more accurate descriptor for the prehistoric lifeways of the inhabitants of the Western Papaguería during this time period given that it does not imply association with greater cultural complexity and reliance on agriculture.

In the Ceramic period, distinct groups had developed around the Western Papaguería: the Hohokam to the north and east, centered around the Phoenix and Tucson basins; the Patayan to the west and northwest, centered around the Colorado River Basin; and the Trincheras to the south, centered in modern-day Mexico. As discussed in Heilen and Vanderpot (2013), Western Papaguerían prehistory during the Ceramic period is often interpreted and correlated to Hohokam and Patayan cultural sequences due to the presence of diagnostic ceramic types. Often, Ceramic period Western Papaguerían sites can be dated based only on the presence of Hohokam and Patayan (and, to a lesser degree, Trincheras) ceramics. This is due to the fact that many Ceramic period sites in the Western Papaguería contain only non-diagnostic plainware ceramics.

Within the Ceramic period, the chronological framework is defined as the Vamori and Sells phases, which can be generally correlated to the Hohokam pre-Classic and Classic periods (Ahlstrom et al. 2000a). The finer-tuned chronological framework defined for the Hohokam, Patayan, and Trincheras cultural sequences has not been realized on the Papaguería given that fewer archaeological investigations have been conducted, and fewer sites have been identified (Heilen and Vanderpot 2013).

Given the distribution and types of ceramics present, there is current discussion amongst researchers whether the Western Papaguería was populated by multiple groups including the Hohokam or Patayan; or whether a distinctive cultural group (the Areneños) used the Western Papaguería as a core area and interacted with their Patayan and Hohokam neighbors. For this reason, the following discussion of the Ceramic period in the Western Papaguería correlates Hohokam and Patayan temporal frameworks with regional Ceramic period manifestations present in the Papaguería.

Hohokam

The Hohokam cultural tradition was originally defined by the widespread distribution of Red-on-buff pottery associated with evidence of irrigation agricultural practices, and cremation burials (Gladwin and Gladwin 1928; Gladwin et al. 1975). Later archaeologists described the Hohokam as a “regional system” rather than as a specific population group (Crown 1991; Wilcox 1979) in an effort to understand the dynamics of such a large and widespread population, regional interaction, and evolving social complexity. Although it was previously considered that the Hohokam migrated across the Sonoran Desert from Mesoamerica (DiPeso 1956; Gladwin 1948; Haury 1976; Schroeder 1966), current theory posits that Hohokam origins evolved *in situ* from the earlier Archaic adaptation (Wallace et al. 1995).

The Hohokam inhabited south-central Arizona over a period of nearly 1,500 years, during which time there is evidence of increased sedentism and social complexity (Doyel 1991; Haury 1976; Wilcox 1979). The largest populations or biggest villages tended to be located near rivers or in areas that supported canal irrigation practices. The archaeological record indicates that the Hohokam also exploited nearby mountain *bajada* settings for wild plant foods.

Hohokam occupation traditionally is divided into four temporal periods, each with one or more phases that are distinguished by certain hallmarks of material culture or developmental peaks. Variations to the chronology exist (Dean 1991), but consensus is strong for the ordering of the phase sequence that was originally based on stratigraphic deposits of decorated ceramics from Snaketown, one of the largest Hohokam sites located along the Gila River.

Pioneer period: A total of eight sites with Pioneer period ceramic artifacts and projectile points have been recognized on BMGR East. Sites temporally associated with this time period tend to be larger in size and contain diverse artifacts and features that are reused during later time periods. Pioneer period sites are often located on elevated landforms that gave a good view of the surrounding landscape. Features at sites with Pioneer period components include bedrock mortars, cairns, thermal features, rock alignments/piles, and a rock ring (Heilen and Vanderpot 2013).

Colonial period: A total of 45 sites with Colonial period ceramics and projectile points have been identified on BMGR East. The majority of the Colonial period sites identified on BMGR East are either artifact scatters with feature(s), or artifact scatters. These sites tend to be in elevated locations (in the East Pass of the Crater Range) and in upper *bajada*, foothill, and valley areas (in the Sauceda–Quilotosa Valley). The sites are large and diverse; many exhibit features such as rock cairns, bedrock mortars, rock rings, areas of cleared desert pavement, and trails (Heilen and Vanderpot 2013).

Sedentary period: A total of 82 sites and 11 isolated finds with Sedentary period ceramic artifacts and projectile points have been recognized on BMGR East. In some areas of the BMGR, Sedentary period sites share locations with Colonial period sites. However, in the areas along the drainages from the Growler Mountains and Daniels Arroyo, Sedentary period sites appear in areas where previous Ceramic period sites do not occur. This expansion into new areas could be an expression of a more extensive use of the landscape for farming and exploitation of native grasses. Interestingly, densities of thermal features also are increasingly present in these areas during this time period, indicating that plant food resources were intensively processed there (Heilen and Vanderpot 2013). Site types with Sedentary period components are artifact scatters with feature(s) and artifact scatters. Features identified at these sites include bedrock grinding slicks, cairns, thermal features, cleared areas, rock alignments/piles, rock rings, rockshelters, rock images, and trails (Heilen and Vanderpot 2013).

Classic period: A total of 66 sites and nine isolated finds with Classic period ceramic artifacts and projectile points have been recognized on BMGR East and demonstrate artifacts affiliated with both the Tucson Basin and Salt–Gila Basin Hohokam. While many of these sites exhibit earlier Ceramic period use or occupation, “clusters” of Classic period sites are found in locations where no earlier Ceramic period sites have been identified. These clusters have been identified along Tenmile Wash at the western end of the Crater Range as well as Growler Wash. Site types with Classic period components are artifact scatters with feature(s) and artifact scatters. Features identified at these sites include bedrock grinding features, bedrock mortars, cairns, thermal features, cleared areas, rock alignments/piles, rockshelters, and rock images (Heilen and Vanderpot 2013).

Patayan

The Patayan culture of the Lower Colorado River Valley and the lower Gila River was initially defined and studied by Rogers (1945), who divided the sequence into three broad periods beginning at approximately A.D. 700. Those periods are based mainly on the temporal distribution of ceramic types (Rogers 1945; Waters 1982). Rogers’ (1945) original chronology was based on his development of a “horizontal stratigraphic” scheme using trail systems and their associated ceramic assemblages and the excavation of several stratified pit shrines (Waters 1982).

The current Patayan chronological model is largely based on the association of Patayan ceramics with well-dated Hohokam sites, or the presence of Hohokam ceramic time-markers at Patayan sites. Unfortunately, due to the lack of excavated sites and good chronometric contexts, absolute dates are rare for the Patayan temporal sequence (Heilen and Vanderpot 2013).

Patayan I: Patayan I dates from A.D. 700 to A.D. 1050. Patayan I ceramics were made from fine-textured, buff-colored clays found on the flood plain of the Colorado River. Decorative elements include the "chimney neck" rim, notched rims, lug and loop handles, the "Colorado shoulder," incising, burnishing, and a red clay slip. Patayan I sites are typically small, with few artifacts. Many of the sites are associated with trails and items such as marine shell and ceramics from surrounding regions (Reid and Whittlesey 1997).

Based on the presence of Patayan I ceramic artifacts, a total of 51 sites and 28 isolated finds with a Patayan I temporal affiliation have been recognized on the BMGR. Notably, the isolated finds are almost all located west of the Crater Range, while the sites are more widely distributed across the landscape. The spatial distribution of these sites suggests to Heilen and Vanderpot (2013) that they are associated with travel for the purposes of scouting the landscape, communication, or exchange. Patayan I site types consist of artifact scatters with feature(s), or artifact scatters. Sites tend to be large and include features such as bedrock grinding slicks, trails, cleared desert pavement, rock rings, cairns, geoglyphs, thermal features, rock features, and rockshelters (Heilen and Vanderpot 2013).

Patayan II/III: The Patayan II period ranges between A.D. 1050 and A.D. 1500. Patayan II ceramic types are found in the Mohave Desert, north along the Colorado River, and along the Gila River east to Agua Caliente. Patayan I ceramic traits such as chimney necks, Colorado shoulders, burnishing, red clay slip, rim notching, incising, and lug and loop handles continued into Patayan II (Rogers 1945; Waters 1982). The decorated types appear to have borrowed design elements from Hohokam ceramics. New traits that appeared in the Lower Colorado buffwares include recurved rims, stucco finish, new vessel forms, and an increased use of fine-line geometric designs (Waters 1982).

The drying up of Lake Cahuilla appears to have ushered in the Patayan III period (post–A.D. 1500) (Rogers 1945). The desiccation of the lake led to increased population size along the lower Colorado River and in coastal southern California, as inhabitants migrated east or west to look for more productive environments. The traits that distinguish Patayan III ceramics from the preceding period include a reinforced rim band and the introduction of a high-necked, small-mouthed olla. Earlier vessel forms also continued in use, except for neckless seed jars. Vessel walls were thinner and better fired, and painted decorations were finer-lined and more symmetrical (Waters 1982).

According to Heilen and Vanderpot (2013), separating the Patayan II and III phases is difficult. This is partly due to the unrefined Patayan chronology and often leads to ambiguous Patayan II and Patayan III temporal affiliations. A total of 72 sites and 10 isolated finds with Patayan II/III artifacts and projectile points have been recognized on the BMGR. Patayan II/III sites tend to occur in clusters and tend to be large artifact scatters, often with associated features such as bedrock grinding slicks, trails, cleared desert pavement, rock rings, cairns, geoglyphs, thermal features, and rock features and rock shelters. Villages are also present in the Patayan II/III sequence, including those at Lost City on the Cabeza Prieta National Wildlife Refuge and Kuakatch Village at Organ Pipe National Monument (pers. com. Rankin 2018a).

Areneños

The Areneños culture was first identified in the Sierra Pinacate region of northwestern Sonora by Hayden (1967). It is discussed here given that earlier Papaguerían researchers, notably Ezell (1954) and Hayden (1965), interpreted the Ceramic period occupation of the Papaguería as representing an indigenous group of people that traded with the Patayan and Hohokam but were separate from those groups. According to Hayden (1965), the Late Archaic Amargosa Culture persisted until A.D. 700 in the Papaguería; hunter-gather populations, termed Amargosa-Areneños, were occupying the region at the same time the Hohokam and Patayan traditions were fully developed in surrounding areas. In the Western Papaguería, the inhabitants were called "Areneños," in the Sierra Pinacate region, they were called "Pinacate-Areneños."

As discussed in Altschul and Rankin (2008), the material culture attributed to the Areneños includes a composite of material culture components found across the Papaguería. Specifically, these are Hohokam and Patayan ceramic types, walk-in wells and reservoirs, house-in-pits, and cremations. As noted in Altschul and Rankin (2008), the Areneños culture concept is best described as a placeholder to refer to a hunter-gatherer lifestyle that persisted in the desert interior through the early historic period.

Native American Ethnohistory

The following section provides an overview of the Native populations of the Western Papaguería.

O'odham

The O'odham people were the most numerous Native American group in southern Arizona when Europeans arrived. The Spaniards differentiated between various O'odham groups; these differentiations were more a function of interactions between the Spanish and the various groups than differentiations recognized by the O'odham people themselves (Heilen and Vanderpot 2013). There are three O'odham groups: the Hia C'ed O'odham, the Tohono O'odham, and the Akimel O'odham.

These different groups follow different subsistence and mobility strategies but share a common language. The Tohono O'odham and Akimel O'odham groups both lived in villages; the Hia C'ed O'odham followed a semi-nomadic lifestyle (Vanderpot and Keur 2015).

Hia C'ed O'odham: The Hia C'ed O'odham lived along the Gila and Colorado rivers in the north, and their territory extended south to the Gulf of California. The Hia C'ed O'odham once occupied and ranged over the entire Western Papaguería and followed a mobile settlement pattern that favored the persistent use of areas such as Antelope Hill, Ajo, Bates Well, Chico Shunie, Darby Wells, and Quitobaquito. They almost entirely relied on hunting and gathering and traded with the Yumans yearly at the Colorado River (McGuire 1982).

Linguistically, the Hia C'ed O'odham have the most distinctive dialect of the O'odham (Heilen and Vanderpot 2013). They first had contact with Father Kino and Captain Juan Mateo Manje in the late seventeenth century (Vanderpot and Keur 2015). The Hia C'ed O'odham were devastated by European diseases through the 1850s and 1860s. Today, they do not have a dedicated reservation but live with other O'odham populations in both Mexico and the United States.

Tohono O'odham: The Tohono O'odham occupied the north-central area of the Papaguería. As described by Fontana (1983), the Tohono O'odham followed a "Two Village" settlement pattern, in which summers were spent farming in lowland villages and winters were spent hunting and gathering at camps near springs or wells. The Tohono O'odham practiced *ak-chin* agriculture, in which water was collected and distributed to crops through check dams placed along washes. Their diet was heavily dependent on the gathering of wild plant foods such as mesquite, prickly pear, saguaro, and cholla.

The Tohono O'odham consisted of patrilineal families and practiced intra-village arranged marriages (Vanderpot and Keur 2015). They were closely related to the Akimel O'odham in terms of language and lifeways, and the two groups frequently traded and intermarried. Today the Tohono O'odham live on the Tohono O'odham Nation, which was established 1874, as well as the Gila Bend Indian Reservation, which was established in 1882.

Akimel O'odham: The Akimel O'odham first had contact with Father Kino in 1694, but their overall contact with Europeans remained limited through the mid-nineteenth century. They were known to trade with the presidio in Tucson and with Spanish traders in the region. Traditionally, the Akimel O'odham lived in villages or smaller settlements called *rancherías* focused around the Gila River and practiced farming, raising maize, beans, squash, melons, and gourds (Vanderpot and Keur 2015).

By the late nineteenth century, only eight Akimel O'odham villages remained along the Gila River, as European settlers diverted their water, drying up their fields. Today, the Akimel O'odham primarily live on the Gila River Indian Community of the Gila River Indian Reservation, the Ak Chin Indian Community of the Maricopa Indian Reservation, and the Salt River Pima-Maricopa Indian Community of the Salt River Reservation (Vanderpot and Keur 2015).

Yumans

The Yumans occupied the lower Colorado River region and had extensive populations in western Arizona, California, and northwestern Mexico. Many different groups and sub-groups of Yumans exist; the Quechan, the Cocopah, and the Piipaash are Central Yuman groups recognized as culturally affiliated with the BMGR West. The Yavapai are an Upland Yuman group also recognized as culturally affiliated with the BMGR.

The Yuman groups practiced a riverine hunter-gatherer subsistence pattern that was augmented by floodplain farming; ethnographic reports suggest the Mohave located north of BMGR West were most heavily invested in agriculture, and the Cocopah the least (Castetter and Bell 1951). The people lived in small clusters of houses grouped in a *ranchería* arrangement and were typically occupied by family groups.

Quechan: Quechan territory is now divided by the states of Arizona and California near the confluence of the Gila and Colorado rivers. Their traditional territory ranged from the modern City of Blythe south to the current international border. Quechan settlements were separated into a series of dispersed villages scattered across the flood plain of the Colorado River (Bee 1983). The populations and bounded locations of these villages changed throughout the year. During winter river flooding, people lived on the terraces of the floodplain. As the winter flow subsided and the planting season began, people

dispersed into the floodplain. During harvest time, people gathered into denser concentrations. The locations of the villages varied through time (Lerch et al. 2016)

The Quechan were first encountered by the Spanish explorer Juan Bautista de Anza in 1774. Franciscan priests were a primary point of contact throughout the community. However, the relationship between the Spaniards and the Quechan quickly soured when Spanish settlers stole Quechan crops. In 1781, the Quechan attacked and destroyed two Spanish settlements, effectively destroying Spanish control of the river crossing (Bee 1983).

The Quechan subsisted primarily on domesticated cultigens, wild plants, and fish (Bee 1983; Forde 1931). Domesticated cultigens planted in the Colorado River floodplain included maize, tepary beans, watermelon, black-eyed beans, pumpkins, and musk-melons. In the historic era, winter wheat was added to the diet. Seine nets were used when the water was low enough to catch razorback, sucker, pike minnow, and bony tail fish from the Colorado River (AECOM 2012). Wild edible plants like mesquite pods and screwbeans were also gathered to supplement the diet. The pods could be crushed and eaten, ground into flour and formed into cakes, or steeped in water as a beverage.

The Quechan community is now mostly concentrated on the Fort Yuma-Quechan Reservation, located along the lower Colorado River in Arizona and California. The Quechan reservation is within their ancestral homeland.

Piipaash: The Piipaash, sometimes referred to as the Maricopa, is a Colorado River Tribe that moved up to the middle Gila due to conflicts with their river neighbors in the seventeenth and eighteenth centuries. The Piipaash language is closely related to the Quechan and Mojave. These three languages are generally considered members of the river branch of the Yuman language family (Joel 1964). The Piipaash now reside primarily on the Gila River Indian Community of the Gila River Indian Reservation and the Salt River Pima-Maricopa Indian Community of the Salt River Reservation in Maricopa and Pinal counties, Arizona.

Cocopah: The Cocopah territory is divided by the states of Arizona and California along the Colorado River. Historically, the Cocopah people inhabited the lower Colorado River and delta in southwestern Arizona, southeastern California, and northern Sonora, Mexico. The Cocopah call themselves “Kwapa,” the river people.

The Cocopah were encountered by early Spanish explorers and first described in the journal of Hernando de Alarcón in A.D 1540. Approximately 6,000 to 7,000 Cocopah were living in the region, as described by Don Juan de Oñate, Father Kino, and Father Garces (Cocopah Indian Tribe, no date).

The Cocopah Indian Reservation, near Yuma, Yuma County, Arizona, was established by President Woodrow Wilson under Executive Order 2711 in 1917. The reservation was expanded by an additional 4,200 acres in 1985 through the Cocopah Land Acquisition Bill (Cocopah Indian Tribe, no date). The reservation is comprised of three non-contiguous areas known as the North, East, and West Reservations, which consist of agricultural land that is largely leased to non-Indian farmers.

Yavapai: Historically, the Yavapai lived in central and western Arizona. They were primarily hunter-gatherers, and also practiced agriculture, as did most Indian tribes in the Southwest (Khera and Mariella

1983). The Yavapai were mobile people following the seasonal availability of a wide variety of plants and animals. The various groups viewed themselves as one people who had originated from in the Red Rock lands near Sedona (Khera and Mariella 1983). The Yavapai spoke a dialect of an Upland Yuman language, closely related to Hualapai and Havasupai dialects.

The westernmost range of the Yavapai included the mountains and sometimes lowland along the Colorado River, and as far south as Yuma. The ancestral lands of Yavapai include Sonoran Desert, mountain, and transition zone environments. While individual groups did not generally range over the entire region, most had access to all three environmental zones. This extensive and resource abundant land base provided them with a steady and varied food supply of plants and animals, conducive to a hunting and gatherer lifestyle. The Yavapai range also included the Colorado, Verde, and Salt rivers, which were all perennial, as well as the springs, numerous seasonal washes, and seasonal tanks of water–*tinajas*–in the western desert region where the project is located.

Modern Yavapai communities are located on the Yavapai-Prescott Indian Tribe reservation and the Yavapai Apache Nation of the Camp Verde Indian Reservation. Both are located in Yavapai County, Arizona.

Spanish Colonial (Mission) Period (1691–1821)

Spanish exploration of the Southwest began as early as 1539 with the preliminary scouting expedition of Fray Marcos de Niza. Although the route used by de Niza and the later expedition of Vásquez de Coronado from 1540 to 1542 is incompletely known and may have followed the San Pedro River (Wilson 1999), at one point, Coronado traveled along *El Camino del Diablo*, an important route that connected northern Mexico with California across southwestern Arizona (Hartmann 1986). From the mid-sixteenth century to the end of the seventeenth century, the region was largely forgotten by the Spanish (Heilen and Vanderpot 2013).

In 1691, Father Eusebio Kino, a Jesuit, introduced the Spanish Mission system in southern Arizona and made at least three trips along the *El Camino del Diablo* (Hartmann 1986). Father Kino identified O'odham people living in the Papaguería of southwest Arizona (Ahlstrom et al. 2000b). Father Kino established a series of missions (24 at the time of his death) along the main rivers of the region. He also is credited with discovering a land route to the Gulf of California, proving it was not an island. The journals of Father Kino and his military escort Captain Juan Mateo Manje remain as an important primary source regarding contact-period native cultures in the area (Heilen and Vanderpot 2013:218).

Kino's first entrance into the Papaguería was 1691, accompanied by Diego Carrasco, a Spanish military officer. At this time, he traveled down the Santa Cruz River to the Gila River and to a point north of Santa Rosa Valley (Heilen and Vanderpot 2013). From there, Kino headed south into the Papaguería and encountered native populations at the O'odham villages of Gu Achi, Ak-Chin, and La Merced del Batqui near the northern end of the Quijotoa Mountains.

The Western Papaguería was heavily utilized as a travel corridor during this period. *El Camino del Diablo* continued to be used during this period and later in history. In addition, a second route through the Quijotoa Valley was utilized as a route between missions in northern Mexico and Native American villages along the Gila River. This route crossed between the Sauceda and Sand Tank mountains,

between the settlements of Pozo Blanco and Gila Bend. Traveled by Father Kino and others in the 1700s, use of the route persisted through the early twentieth century (Heilen and Vanderpot 2013).

In 1767, following other regions in Europe and abroad, and due to the distrust European monarchs had of the Jesuits, Charles III of Spain expelled the Jesuits from Spanish lands in the Americas and installed the Spanish Franciscans to take their place in the missions. The Franciscans subsequently expanded many of the missions in the area.

The Mexican Period (1821-1854)

The Spanish Mission period ended in 1821 when Mexico became an independent country, leading to a decline in the missions and presidios of the Santa Cruz Valley and elsewhere. In 1828, the Mexican government expelled all Spanish-born people from Mexico, including the Spanish-born Franciscan priests that ran many of the missions of the region (Heilen and Vanderpot 2013).

The presence of the mission lands at Mexico's northern frontier was viewed as useful to the new government. Irrigable mission lands in the Santa Cruz Valley were entered by Hispanic settlers, a move protested by the Tohono O'odham population, who claimed their water rights were violated. This conflict eventually became violent, with bloody protests and rebellions occurring in the late 1830s and into the early 1840s. However, the Western Papaguería, given its distance from the prized irrigable mission lands, was not directly affected by these conflicts (Fontana 1989).

Of greater concern during this period were increasing Apache raids, which affected Hispanic settlers and native populations alike. These raids did encroach into the Western Papaguería, where the settlement of Batki, located in the Santa Rosa Valley north of the Quijotoa Mountains, was destroyed by such a raid in 1852 (Fontana 1989).

The American Period (post-1854)

American interest in the Western Papaguería began primarily in its value as a travel route for miners en route to the gold fields of California. *El Camino del Diablo*, the Pozo Blanco–Gila Bend road, and other established routes became critical links between California and the eastern U.S. The Treaty of Guadalupe-Hidalgo, signed in 1848 following the conclusion of the Mexican-American War, ceded the portion of land lying north of the Gila River (what is now Arizona) to the U.S.

In 1853, the Gadsden Purchase expanded Arizona from the Gila River south to the present-day Mexican border. In keeping with the times, travel was an important consideration in the Gadsden Purchase, as the land was obtained for the purpose of establishing a southern transcontinental railroad route (Heilen and Vanderpot 2013). Early American presence in the region consisted of surveyors mapping the newly defined national border and travelers on their way to California. United States Geological Survey geologist Kirk Bryan visited the region in 1917; his results are presented in later documents (Bryan 1922, 1925). Stagecoach routes were also established. Travel through this area was treacherous during the Civil War period, as the lack of U.S. military presence made travelers vulnerable to increased Apache attacks.

Increased settlement in Arizona followed the Civil War, and ranches and mines were established across the region, including in the arid Western Papaguería. To protect these interests, U.S. military presence was increased; numerous military posts were established, which were, in turn, provisioned by the new ranches. Mines were opened in Ajo, and new roads were cut through the region to supply the mines and ranches. Many of these followed native trails across the landscape. In 1880, the Southern Pacific Railroad (SPRR), the long-awaited southern transcontinental rail line, crossed the Papaguería, providing an instant link to the rest of the nation. The railroad transformed the region, providing transport for goods and people and increasing local settlement, ranching, and mining in the Papaguería. Spur lines were constructed across the landscape during this period as well (Heilen and Vanderpot 2013).

Cadastral survey in southwest Arizona is documented by the construction of GLO markers and the resulting plats. The dates stamped on the various markers reveal active surveys beginning in 1927 to 1934, declining during World War II, and increasing again in the late 1940s (Heilen and Vanderpot 2013). Prior to these active cadastral surveys, Hat Trimble, a professional surveyor, visited Eagle Tank on 22 April 1913 (Rankin personal communication 2018b).

In 1912, Arizona was admitted to the Union as a state. Increasing demands for mining products (specifically copper) and agricultural products (such as beef) during World War I created further impetus for growth in the region. Mining, ranching, automotive routes, and the BMGR are important historic themes to the development of the Papaguería during the early twentieth century and into modern times.

Gila Bend

The town of Gila Bend was named for the so-called “Great Bend” where the Gila River comes in from the north and resumes its westerly flow. The original settlement of Gila Bend was located on the river about 6 miles north of the present railroad station. The present location was originally a stage station from 1877 to 1880 for the SPRR (Barnes 1988). The Tucson Cornelia & Gila Bend Railroad was established in 1915/1916 and ran from Gila Bend to Ajo (Walker and Bufkin 1986).

Gila Bend is situated along the historic Gila Trail, which followed the Gila River from the New Mexico border to Yuma. Use of the Gila Trail dates to the Spanish period; it was traveled by Father Francisco Eusebio Kino, who helped establish the first farm in Gila Bend in 1699 (Stein 1994). During the eighteenth century, the Gila Trail was a major transportation artery across Arizona. It later became Cooke’s Wagon Road, the first military road built across Arizona, and ultimately, one of the most important immigrant routes in the west. It was also used as a major stage, freight, and toll route (Stein 1994), with several stagecoach lines traversing it over time (Walker and Bufkin 1986). By 1940, this route was used as an automotive road (Stein 1994).

Yuma

The City of Yuma owes its location to the presence of two large granite outcrops that channeled the Colorado River into a natural crossing. This location, originally known as “Yuma Crossing,” was first described by the Spanish explorers Hernando de Alarcón and Melchior Diaz in 1540. They called the native people that they encountered in this location “Humo (smoke)” due to the smoke from cooking fires in the Yuma Valley (Visit Yuma 2019).

Subsequent European explorers through the area included Father Eusebio Kino in the 1690s and Juan Bautista de Anza in 1775; the "Anza Trail" led through modern-day Yuma. The importance of Yuma Crossing to Spanish exploration into Alta California was underscored, and the Spanish attempted to gain control over this strategic crossing with a small settlement. However, in 1781, the settlement was destroyed by the local Quechan population as a result of the Spanish encroachment.

The California Gold Rush of 1849 led to hundreds of thousands of gold seekers crossing the Colorado River at what was then known as "Colorado City." In 1852, the U.S. Army established Fort Yuma on a point overlooking the strategic river crossing; in 1854, the Gadsen Purchase led to the incorporation of Yuma into the U.S. Given its location, Yuma became an important port city on the Colorado River, and served as a supply port for the U.S. Army from the 1860s through the 1880s, when it was replaced by transcontinental rail.

Yuma continues to serve as an important transportation hub, with the railroad and Interstate 8 (the Ocean-to-Ocean Highway) passing through it. The Yuma Project, an ambitious irrigation project developed and implemented by the U.S. Bureau of Reclamation, led to the emergence of widespread irrigated agriculture in Yuma (Visit Yuma 2019).

Mining

Mining became an important pursuit in western Arizona during the 1860s and 1870s. In the Papaguería, the most important mineral resource was copper. Copper was first identified in the Ajo Hills in the eighteenth century; the first efforts to extract it followed the Gadsden Purchase in 1854 (Wilson 1949). These early attempts at mining were not a success; it was not until the late nineteenth century that a series of claim consolidations and mining companies eventually led to the formation of the New Cornelia Copper Company in 1909. The construction of the Tucson, Cornelia, and Gila Bend Railroad between the SPRR mainline and the Ajo copper mines in 1915–1916 helped to boost production; by 1916, the mine employed 1,200 men and contained community housing (Heilen and Vandepot 2013). In 1917, the mine produced 10,000 tons of copper, which was the start of a regional mining boom until the stock market collapse in 1929. The New Cornelia Copper Company was eventually bought by Phelps Dodge Corporation in 1931. Phelps Dodge continued to operate the mines until they were eventually closed in 1984.

Automotive Routes

Few inventions have changed the American landscape and culture as dramatically as the introduction of the automobile. Following Henry Ford's initial introduction of the Model T in 1907, nationwide automobile ownership grew exponentially, from an estimated 10,000 privately-owned automobiles in 1910 to over 280 million owned in 1940 (Keane and Bruder 2004). In the Papaguería, automotive routes were established in the 1910s; these predominately followed native trails and wagon roads. In the early 1920s, the region's travel routes were visited by geologist Kirk Bryan, who published a book that described the condition of the roads, presence of reliable water sources, and the general landscape (Bryan 1922). At the time of Bryan's writing, most established routes in BMGR East were north-south alignments that connected Gila Bend with points south (such as Ajo) (Heilen and Vanderpot 2013).

Following the establishment of a regional military presence, new roads were constructed that served to connect military facilities; as a result, many of the older roads were abandoned. Given the proximity to Mexico, many of these older roads have been used for smuggling, from Prohibition times to the modern day (Heilen and Vanderpot 2013).

Ranching and Homesteading

In 1863, the Arizona Territory was established after successful lobbying by Charles D. Poston. A year before, in 1862, the National Homestead Act offered land tracts of 160 acres at $1.25 per acre or 80 aces at $2.50 per acre for land within a railroad grant (Stein 1990). This began a series of homesteading acts that sparked a boom in homesteading in Arizona that peaked between 1910 and 1940 (Stein 1990). However, given the arid conditions in the Papaguería, many homesteads were never "proved up," due to access difficulties, lack of water, and rugged conditions (Ahlstrom et al. 2000b).

Cattle ranching, however, was an important economic pastime in the region. Ranching in the Western Papaguería began in earnest in the mid-nineteenth century when ranchers developed water sources for their livestock in water-scarce areas. Given the lack of surface water, a regional feature of ranching in the Papaguería is the establishment of tanks and wells to provide water for stock animals. This system became more efficient following the addition of gasoline-powered pumps. The lack of water meant that ranching in the region was very much a family-sponsored and isolated venture (Heilen and Vanderpot 2013). Limited agriculture was practiced; this primarily consisted of growing alfalfa to feed the ranch livestock, rather than as a cash crop.

In 1941, with the establishment of the Gila Bend Gunnery Range, local ranchers were forced to surrender their grazing rights and vacate their ranch lands. Some local ranchers returned following World War II to reestablish their holdings and built fences and water conveyance systems to support their ranching activities. The most prominent of these local ranching families are the Stout and Childs families.

The Childs family operated a ranch headquarters located on Tenmile Wash. The ranch was started by Tom Childs, Sr. in the 1880s; under the management of Tom Childs, Jr., the ranch became a major operation in the region. They grazed as many as 2,500 head of cattle and operated ranch holdings at Batamote Well, Hotshot Well, Green Gate Well, the Drift Fence Well, Okie Well, Sloven Well, and the Well that Johnny Dug.

The Childs family became synonymous with southern Arizona, intermarried with native people, and intermingled with the local settlers of the region. Tom Childs, Jr. and his Hia C'ed O'odham wife, Marta, had 13 children, who also acquired land and ran cattle in the area. Tom Childs, Jr. was responsible for helping many other ranchers in the family locate water and dig wells. As a testament to the Childs' influence in the region, two important geographical features bear the Childs' family name: Childs Mountain and Childs Valley. At his death, Tom Childs, Jr. willed his land holdings to the Tohono O'odham (Heilen and Vanderpot 2013).

The Stout family operated a ranch with holdings that ranged from Gila Bend to Ajo to the Tohono O'odham Nation reservation (Heilen and Vanderpot 2013). Much of the Stout ranch holdings were composed of Bureau of Land Management lease lands and incorporated the present Gila Bend Addition.

The Stout family homesteaded land on Quilotosa Wash near the Gila Bend Addition, and the ranch headquarters were in Gila Bend. Charles Stout opened the Stout Hotel in Gila Bend in 1911, and it remains a Main Street landmark.

The Stout family drilled a well at Tom Thumb in the 1950s, which they outfitted with a windmill and gasoline-powered pump. From the well, they ran approximately 60 miles of water pipeline to various watering tanks (Heilen and Vanderpot 2013). In the mid-1960s, the Stouts lost access to their leased land and sold their remaining holdings and cattle.

BMGR and Gila Bend Air Force Auxiliary Field

The area south of Gila Bend is known for its military history. As the United States was facing the possibility of World War II, it established Luke and Williams airfields in the Phoenix area. The U.S. Army Air Corps sought to expand its training facilities in the open desert south and southwest of Gila Bend (Thompson 2004). The Gila Bend Airfield was constructed in 1942, and its first flights began in 1943 (Keane et al. 1998). Five additional airfields and gunnery ranges were constructed and used between Gila Bend and Ajo from 1942 to 1946. Each airfield encompassed approximately 640 acres (Thompson 2004).

The combined 2.1-million-acre range that was used for military training during World War II was divided into western and eastern components and named the Yuma Aerial Gunnery and Bombing Range and the Gila Bend Gunnery Range, respectively. As military training became less necessary after the end of World War II, the range was closed between 1946 and 1951 and was renamed the Williams Bombing and Gunnery Range when it reopened (Keane et al. 1998). It was redesignated as Luke Air Force Range in 1963, with the Marine Corps and Navy using the western section (Chenault no date). The eastern section contained the Gila Bend Air Force Auxiliary Field, which was designated as a major military post in 1980 (Walker and Bufkin 1986: Map 56). Congress combined all the military parcels within the range together in 1986 (Public Law 99-606) and renamed the range in honor of Barry M. Goldwater, who had served at Luke Air Force Base during World War II (Keane et al. 1998). While the range reached a maximum size of about 2.6 million acres in 1962, its size was reduced in 1999 to about 1.7 million acres. Additional information on the historic context for military activities at BMGR East, including World War II and early Cold War training activities, is available in Thompson (2004).

Tribal Consultation for the LEIS

Tables I-2, I-3, and I-4 provide summaries of the tribal consultations for the LEIS. Refer to Attachment 1 for copies of each correspondence outlined in this section.

Table I-2. Initial Section 106 Consultation: Request for Consultation on the LEIS, Distribution of Participation Questionnaire (16 January 2020)

Tribal Organization	Date of Response	Response
Ak Chin Indian Community of the Maricopa Indian Reservation	29 January 2020	Verified receipt of materials via follow-up phone call. No formal response.

Tribal Organization	Date of Response	Response
Chemehuevi Indian Tribe of the Chemehuevi Reservation	3 February 2020	Verified receipt of materials via follow-up phone call. No formal response.
Cocopah Indian Tribe of Arizona	28 January 2020	Verified receipt of materials via follow-up phone call. No formal response received.
Colorado River Indian Tribes of the Colorado River Indian Reservation	3 February 2020	Response expressed general Colorado River Indian Tribes of the Colorado River Indian Reservation position regarding the treatment of ancestral resources and deferred comments to other affiliated tribes.
Fort McDowell Yavapai Nation	28 January 2020	Verified receipt of materials via follow-up phone call. No formal response received.
Fort Mojave Indian Tribe	No response	No response or verification of receipt of materials received.
Quechan Tribe of the Fort Yuma Indian Reservation	3 February 2020	Verified receipt of materials via follow-up phone call. No formal response received.
Gila River Indian Community of the Gila River Indian Reservation	3 February 2020	Verified receipt of materials via follow-up phone call. No formal response received.
Havasupai Tribe of the Havasupai Reservation	No response	No response or verification of receipt of materials received.
Hia-Ced Hemakajam	30 January 2020	Response received affirming desire to participate in consultation on the Legislative Environmental Impact Statement (LEIS) and returning participation questionnaire.
Hia-Ced O'odham Alliance	No response	No response or verification of receipt of materials received.
Hopi Tribe of Arizona	13 March 2020	Response received affirming desire to participate in consultation on the LEIS and returning participation questionnaire.
Hualapai Tribe	28 January 2020	Verified receipt of materials via follow-up phone call. Verbally expressed desire to not participate in further consultation. No formal response received.
Pascua Yaqui Tribe of Arizona	23 January 2020	Response received affirming desire to participate in consultation on the LEIS and returning participation questionnaire.
Pueblo of Zuni	28 January 2020	Verified receipt of materials via follow-up phone call. No formal response received.
Kaibab Band of Paiute Indians of the Kaibab Indian Reservation	29 January 2020	Verified receipt of materials via follow-up phone call. No formal response received.
Salt River Pima-Maricopa Indian Community of the Salt River Reservation	17 February 2020	Verified receipt of materials via follow-up phone call. No formal response received.

Tribal Organization	Date of Response	Response
San Carlos Apache Tribe of the San Carlos Reservation	23 April 2020	Returned response questionnaire stating that San Carlos Apache Tribe of the San Carlos Reservation defers consultation to the Four Southern Tribes, Pueblo of Zuni, and Hopi Tribe of Arizona. San Carlos Apache Tribe of the San Carlos Reservation does not wish to be included in further consultation on the LEIS.
Tohono O'odham Nation	18 February 2020	Verified receipt of materials and verbally confirmed desire to participate in consultation on the LEIS. No formal response received.
Torres-Martinez Desert Cahuilla Indians	28 January 2020	Verified receipt of materials via follow-up phone call. No formal response received.
White Mountain Apache Tribe of the Fort Apache Reservation	28 January 2020	Verified receipt of materials via follow-up phone call. No formal response received.
Yavapai-Apache Nation of the Camp Verde Indian Reservation	29 January 2020	Response received affirming desire to participate in consultation on the LEIS and returning participation questionnaire.
Yavapai-Prescott Indian Tribe	3 February 2020	Verified receipt of materials via follow-up phone call. No formal response received.
InterTribal Council of Arizona	28 January 2020	Verified receipt of materials via follow-up phone call. No formal response received.

Table I-3. Continuing Section 106 Consultation: Distribution of LEIS Scoping Brochure (20 April 2020)

Tribal Organization	Date of Response	Response
Ak Chin Indian Community of the Maricopa Indian Reservation	23 April 2020	Acknowledged receipt of materials and stated participation in consultation was restricted by COVID-19 distancing guidelines.
Chemehuevi Indian Tribe of the Chemehuevi Reservation	Not applicable	Tribal Offices Closed for COVID-19.
Cocopah Tribe of Arizona	Not applicable	Tribal Offices Closed for COVID-19.
Colorado River Indian Tribes of the Colorado River Indian Reservation	Not applicable	Tribal Offices Closed for COVID-19.
Fort McDowell Yavapai Nation	Not applicable	Tribal Offices Closed for COVID-19.
Fort Mojave Indian Tribe	Not applicable	Tribal Offices Closed for COVID-19.
Quechan Tribe of the Fort Yuma Indian Reservation	Not applicable	Tribal Offices Closed for COVID-19.

Tribal Organization	Date of Response	Response
Gila River Indian Community of the Gila River Indian Reservation	Not applicable	Tribal Offices Closed for COVID-19.
Havasupai Tribe of the Havasupai Reservation	Not applicable	Tribal Offices Closed for COVID-19.
Hia-Ced Hemakajam	28 April 2020	Acknowledged receipt of materials, emphasized desire to continue participation in LEIS consultation, expressed interest in tribal member participation in fieldwork.
Hia-Ced O'odham Alliance	Not applicable	Tribal Offices Closed for COVID-19.
Hopi Tribe of Arizona	Not applicable	Tribal Offices Closed for COVID-19.
Hualapai Indian Tribe of the Hualapai Indian Reservation	Not applicable	Tribal Offices Closed for COVID-19.
Pascua Yaqui Tribe of Arizona	Not applicable	Tribal Offices Closed for COVID-19.
Pueblo of Zuni	Not applicable	Tribal Offices Closed for COVID-19.
Kaibab Band of Paiute Indians of the Kaibab Indian Reservation	Not applicable	Tribal Offices Closed for COVID-19.
Salt River Pima-Maricopa Indian Community of the Salt River Reservation	Not applicable	Tribal Offices Closed for COVID-19.
San Carlos Apache Tribe of the San Carlos Reservation	Not applicable	Tribal Offices Closed for COVID-19.
Tohono O'odham Nation	Not applicable	Tribal Offices Closed for COVID-19.
Torres-Martinez Desert Cahuilla Indians	Not applicable	Tribal Offices Closed for COVID-19.
White Mountain Apache Tribe of the Fort Apache Reservation	Not applicable	Tribal Offices Closed for COVID-19.
Yavapai-Apache Nation of the Camp Verde Indian Reservation	Not applicable	Tribal Offices Closed for COVID-19.
Yavapai-Prescott Indian Tribe	Not applicable	Tribal Offices Closed for COVID-19.
InterTribal Council of Arizona	Not applicable	Tribal Offices Closed for COVID-19.

Table I-4. Continuing Section 106 Consultation: Consultation Status Update for the Draft LEIS (6 May 2021)

Tribal Organization	Date of Response	Response
Ak-Chin Indian Community of the Maricopa Indian Reservation	Not applicable	No response received.
Chemehuevi Tribe of the Chemehuevi Reservation	Not applicable	No response received.
Cocopah Indian Tribe of Arizona	Not applicable	No response received.
Fort McDowell Yavapai Nation	Not applicable	No response received.
Fort Mojave Indian Tribe	Not applicable	No response received.
Quechan Tribe of the Fort Yuma Indian Reservation	Not applicable	No response received.
Gila River Indian Community of the Gila River Indian Reservation	Not applicable	No response received.
Havasupai Tribe of the Havasupai Reservation	Not applicable	No response received.
Hia-Ced Hemajkam	Not applicable	No response received.
Hia -Ced O'odham Alliance	Not applicable	No response received.
Hopi Tribe of Arizona	Not applicable	No response received.
Pascua Yaqui Tribe of Arizona	Not applicable	No response received.
Pueblo of Zuni	Not applicable	No response received.
Kaibab Band of Paiute Indians of the Kaibab Indian Reservation	Not applicable	No response received.
Salt River Pima-Maricopa Indian Community of the Salt River Reservation	Not applicable	No response received.
San Carlos Apache Tribe of the San Carlos Reservation	Not applicable	No response received.
Tohono O'odham Nation	Not applicable	No response received.
Torres Martinez Desert Cahuilla Indians	Not applicable	No response received.
White Mountain Apache Tribe of the Fort Apache Reservation	Not applicable	No response received.
Yavapai-Apache Nation of the Camp Verde Indian Reservation	Not applicable	No response received.
Yavapai-Prescott Indian Tribe	Not applicable	No response received.
InterTribal Council of Arizona	Not applicable	No response received.

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Acronyms

Acronym	Definition
ACHP	Advisory Council on Historic Preservation
AHPA	Archeological and Historic Preservation Act of 1974
Air Force	U.S. Air Force
AIRFA	American Indian Religious Freedom Act of 1978
ARPA	Archaeological Resources Protection Act of 1979
B.P.	Before Present
BMGR	Barry M. Goldwater Range
CFR	*Code of Federal Regulations*
DoD	Department of Defense
DoDI	DoD Instruction
DOI	Department of the Interior
ICRMP	Integrated Cultural Resources Management Plan(s)
INRMP	Integrated Natural Resources Management Plan
LEIS	Legislative Environmental Impact Statement
Marine Corps	U.S. Marine Corps
MLWA	Military Lands Withdrawal Act of 1999, as amended
NAGPRA	Native American Graves Protection and Repatriation Act of 1990, as amended
Navy	Department of the Navy
NEPA	National Environmental Policy Act of 1969, as amended
NHPA	National Historic Preservation Act of 1966, as amended
P.L.	Public Law
RMO	Range Management Office
SPRR	Southern Pacific Railroad
U.S.	United States
U.S.C.	United States Code

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Attachment 1
Tribal Consultation Correspondence

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DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

January 16th, 2020

Brigadier General Todd D. Canterbury
Commander, 56th Fighter Wing
14185 West Falcon Street
Luke AFB AZ 85309

Mr. Robert Miguel
Chairman, Ak-Chin Indian Community
42507 West Peters & Nall Road
Maricopa AZ 85138

RE: Preparation of a Legislative Environmental Impact Statement for the Extension of the Barry M. Goldwater Range Land Withdrawal

Dear Chairman Miguel

Under the Military Lands Withdrawal Act (MLWA) of 1999, Congress reauthorized the withdrawal of over 1,650,000 acres of public land at the Barry M. Goldwater Range (BMGR) for military use and delegated natural and cultural resource management responsibilities for BMGR East and BMGR West to the Air Force and Marine Corps, respectively. The 56th Range Management Office at Luke Air Force Base administers BMGR East, and the Range Management Department at Marine Corps Air Station Yuma administers BMGR West. The current land withdrawal for the BMGR expires in October 2024.

The Air Force and Marine Corps are jointly preparing a Legislative Environmental Impact Statement (LEIS), in accordance with the National Environmental Policy Act (NEPA) of 1969, to assess the potential environmental impacts of extending the land withdrawal for continued military use of the BMGR. The military services will ask Congress to once again extend the land withdrawal to keep the BMGR available for military training and testing purposes for an additional 25 years or more.

We invite your community to comment on the preparation of the LEIS. Your knowledge of the region will help to improve our understanding of resources on the BMGR and ways to protect them. We welcome your input throughout the NEPA scoping process, with follow-on consultation that will enable the open exchange of information about the BMGR land withdrawal with a focus on incorporating tribal input into the LEIS. In particular, we would like to know of any general concerns your community may have about the proposal and the impact it may have on resources of importance to your tribe.

Concurrent with these discussions, we request government-to-government consultation with your community pursuant to Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and 36 CFR Part 800, *Protection of Historic Properties*. We would like to consult with you on the effects of the land withdrawal extension on historic properties, traditional cultural properties, sacred sites, and other tribal interests. Consultation results will shape the LEIS conclusions.

You may use the enclosed response checklist to indicate the level of involvement your community may wish to have in the study; parties to be involved; methods of communication; and your preferences for the location, format and timing of meetings. Based on your preferences, the LEIS project team will contact you soon to discuss specific interests you may have and to provide further details about how the study is to be conducted. Written correspondence may be submitted to: BMGR LEIS, P.O. Box 2324, Phoenix, Arizona 85003.

For additional information or to propose alternative arrangements for consulting with you or other tribal members, please feel free to contact Luke AFB Installation Tribal Liaison Officer Mr. Kevin O'Berry at (623) 856-5857 or kevin.oberry@us.af.mil; Luke AFB Archaeologist, Ms. Adrianne Rankin, at (623) 856-8410 or adrianne.rankin@us.af.mil; or MCAS Yuma Archaeologist Ms. Karla James at (928) 269-2288 or karla.james@usmc.mil.

Thank you in advance for your assistance in this effort.

Sincerely

Todd D. Canterbury

TODD D. CANTERBURY
Brigadier General, USAF
Commander, 56th Fighter Wing

4 Attachments:
1. Response Form
2. BMGR Map
3. Land Withdrawal Alternatives
4. List of other copy recipients

DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

Attachment 1: Barry M. Goldwater Range Land Withdrawal Legislative Environmental Impact Statement (LEIS) - Communication Preference Checklist

☐ Yes, our community is interested in receiving additional information about the Barry M. Goldwater Range Land Withdrawal LEIS. Our preferred communication protocol is indicated below:

☐ Contact me by phone: Name_____ Phone_____

☐ Email me: Email address_____

☐ Additional parties to be included in future communications:

Name and Title: _____

Communication Preference:_____

Address: _____

Email Address:_____

Phone:_____

☐ If more than one additional party will be included in future communication, please check this box and fill out their information on the attached Communication Contact Continuation Sheet

☐ Request an in-person meeting

Suggested venue for in-person meeting:_____

☐ Request a meeting for community participation

Suggested venue for community meeting:_____

☐ Yes, our community wishes to comment on the Barry M. Goldwater Range Land Withdrawal LEIS but no additional information is required at this time.

☐ No, our community does not wish comment on the Barry M. Goldwater Range Land Withdrawal LEIS. Please remove us from future communications.

Name of Respondent:_____

Tribal Community:_____

Date:_____

Please return response to:
BMGR LEIS
P.O. Box 2324
Phoenix, Arizona 85003

Responses may also be emailed to:
BMGR_LEIS@jacobs.com

DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

Communication Contact Continuation Sheet

Name and Title: _____

Communication Preference:_____

Address: _____

Email Address:_____

Phone:_____

Name and Title: _____

Communication Preference:_____

Address: _____

Email Address:_____

Phone:_____

Name and Title: _____

Communication Preference:_____

Address: _____

Email Address:_____

Phone:_____

Name and Title: _____

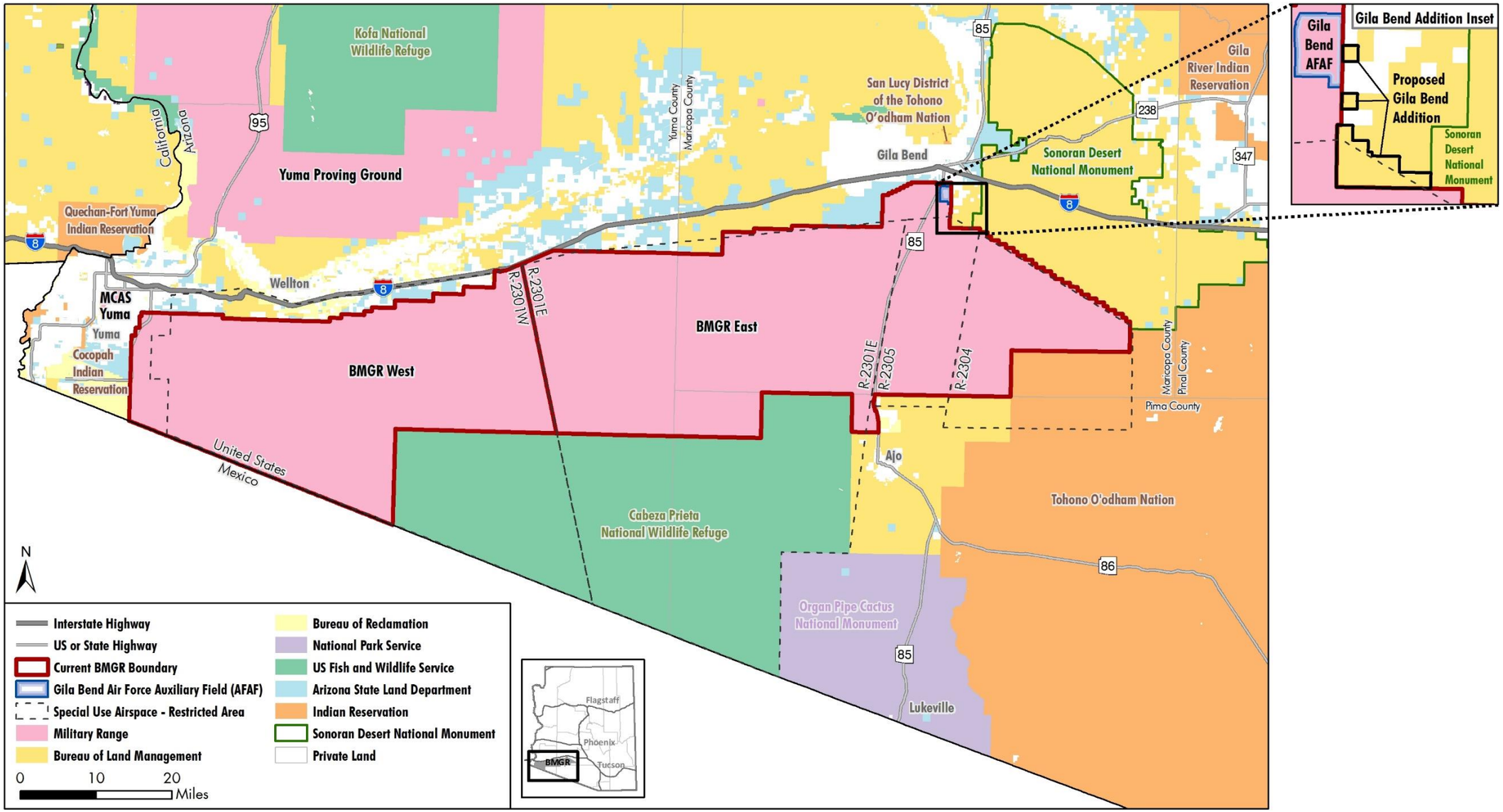
Communication Preference:_____

Address: _____

Email Address:_____

Phone:_____

Attachment 2: Barry M. Goldwater Range Map



Attachment 3. Summary of Alternatives				
Alternative Element	**Action Alternatives**			
	Alternative A (existing conditions)	**Alternative B (preferred alternative)**	**Alternative C**	**Alternative D**
1. Duration of Withdrawal and Reservation	Withdraw and reserve the BMGR for 25 years with the option to request subsequent extensions.	Indefinite withdrawal and reservation of the BMGR and Gila Bend Addition[2] as a result of transferring administrative jurisdiction (Element 3).	Indefinite withdrawal and reservation of the BMGR as a result of transferring administrative jurisdiction (Element 3).	Withdraw and reserve the BMGR and Gila Bend Addition for 50 years with the option to request subsequent extensions.
2. BMGR Boundary and Land Area	Maintain existing BMGR boundary and land area (about 1,743,428 acres).	Alternative A and add the Gila Bend Addition (about 2,366 acres) to BMGR East.	Same as Alternative A.	Same as Alternative B.
3. Administrative Jurisdiction	Continue SECAF and SECNAV jurisdiction over and interests in withdrawn lands in BMGR East and West. SECAF/SECNAV would consult SECDOI before using the BMGR for non-reserved purposes. Continue existing SECDOI roles for INRMP and IEC[1].	Transfer administrative jurisdiction for the lands comprising BMGR East and the Gila Bend Addition from the SECDOI to the SECAF and for the lands comprising BMGR West from the SECDOI to the SECNAV. Continue existing IEC participation roles.	Transfer administrative jurisdiction for the lands comprising BMGR East from the SECDOI to the SECAF and for the lands comprising BMGR West from the SECDOI to the SECNAV. Continue existing IEC participation roles.	Same as Alternative A.

[1] IEC = Intergovernmental Executive Committee: A committee mandated by the MLWA of 1999 composed locally of the Air Force, Marine Corps, BLM, and other federal, state, and local agencies and Native American tribes that may have a direct responsibility for, potential impact upon, or direct interest in the lands or resources of the BMGR. The IEC provides a forum solely for the purpose of exchanging views, information, and advice relating to the management of the natural and cultural resources within the BMGR.

[2] Gila Bend Addition = Refers to the proposed withdrawal of roughly 2,366 acres of public lands to the BMGR East (see Figures 2-2 and 2-3). The public land parcels are adjacent to and south of the existing Gila Bend Air Force Auxiliary Field. This addition would increase the overall size of the BMGR by 0.14% to approximately 1,745,794 acres.

Attachment 4: List of Other Copy Recipients

Ms. Elaine Peters, Museum Director, Him-Dak Museum, Ak-Chin Indian Community, 42507 West Peters & Nall Road, Maricopa, AZ 85138

Ms. Carmen Narcia, Acting Manager, Cultural Resource Program, Ak-Chin Indian Community, 42507 W. Peters and Nall Road, Maricopa, AZ 85138

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Jacobs

Transmittal

101 N. First Avenue, Suite 2600
Phoenix, AZ 85003
602-253-1200
602-253-1202
www.jacobs.com

Subject	**BMGR Scoping Period Brochure**		
Attention	Tribal Leaders and Tribal Historic Preservation Officers/Cultural Resources Specialists	**Company**	See attached distribution list
From	Beth Defend	**Date**	April 20, 2020
Project Email address	BMGR_LEIS@jacobs.com	**No. of Pages**	transmittal (1) distribution list (3) brochure (12)
Project	BMGR Land Withdrawal Legislative Environmental Impact Statement (LEIS)		
Project No.	W7Y16602	**File**	Tribal Correspondence
Copies to	Kevin O'Berry, Luke AFB Native American Liaison Adrianne Rankin, Luke AFB Archaeologist Karla James, MCAS Yuma Archaeologist		

The enclosed brochure, prepared as a handout for the proposed Barry M. Goldwater Range (BMGR) land withdrawal reauthorization scoping meetings, is being provided on behalf of the Air Force and Marine Corps. As a direct result of the National Emergency declared by the President on Friday, March 13, 2020, regarding the coronavirus (COVID-19) pandemic in the United States and in keeping with Center for Disease Control's recommendations for promoting social distancing and avoiding large public gatherings, plans to hold public scoping meetings on the proposed continuing authorization of the BMGR have been canceled. In addition, Arizona Governor Ducey issued an Executive Order for a "Stay home, Stay healthy, Stay connected" policy that took effect on March 31, 2020 and remains in effect until April 30, 2020, unless extended. Requests for tribal meetings will continue to be considered once it is safe to have gatherings of more than 10 persons.

The enclosed brochure is intended to provide additional information on the proposed undertaking. The brochure and other relevant project documents are available on the project website: https://barry-m-goldwater-leis.com.

For additional information, please feel free to contact Luke AFB Installation Tribal Liaison Officer Mr. Kevin O'Berry at (623) 856-5857 or kevin.oberry@us.af.mil; Luke AFB Archaeologist, Ms. Adrianne Rankin, at (623) 856-8410 or adrianne.rankin@us.af.mil; or MCAS Yuma Archaeologist Ms. Karla James at karla.james@usmc.mil.

Jacobs Engineering Group Inc.

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Distribution List

Individual	Department	Tribe
Mr. Robert Miguel, Chairman		Ak-Chin Indian Community
Ms. Elaine Peters, Museum Director	Him-Dak Museum	Ak-Chin Indian Community
Ms. Carmen Narcia, Acting Manager	Cultural Resource Program	Ak-Chin Indian Community
Mr. Charles Wood, Chairman	Chemehuevi Tribal Council	Chemehuevi Tribe
Mr. Bridget Sandate, Director	Nuwuvi Cultural Center	Chemehuevi Tribe
Ms. Anna Ochoa, Archivist		Chemehuevi Tribe
Ms. June Leivas, Secretary-Treasurer		Chemehuevi Tribe
Ms. Sherry Cordova, Chairwoman		Cocopah Indian Tribe
Mr. Justin Brundin, Manager	Cultural Resources Department	Cocopah Indian Tribe
Ms. Bernadine Burnette, President		Fort McDowell Yavapai Nation
Mr. Albert Nelson, Acting Culture Coordinator	Cultural Center and Museum	Fort McDowell Yavapai Nation
Mr. Mark Frank, Director	Economic Development Division	Fort McDowell Yavapai Nation
Ms. Erika McCalvin, Planning and Project Manager		Fort McDowell Yavapai Nation
Mr. Timothy Williams, Chairman		Fort Mojave Indian Tribe
Ms. Linda Otero, Director	AhaMacav Cultural Society	Fort Mojave Indian Tribe
Mr. Christopher Harper, Manager	Cultural Heritage	Fort Mojave Indian Tribe
Mr. Jordan Joaquin, President		Fort Yuma-Quechan Tribe
Mr. Manfred Scott, Chairman	Quechan Cultural Committee	Fort Yuma-Quechan Tribe
Ms. Jill McCormick, Historic Preservation Officer		Fort Yuma-Quechan Tribe
Mr. Stephen Roe Lewis, Governor		Gila River Indian Community
Mr. Barnaby Lewis, Tribal Historic Preservation Officer	Tribal Historic Preservation Office	Gila River Indian Community
Mr. Larry Benally, Jr., Archaeological Compliance Specialist	Tribal Historic Preservation Office	Gila River Indian Community
Ms. Reylynne Williams, Cultural Resources Specialist	Tribal Historic Preservation Office	Gila River Indian Community
Dr. Kyle Woodson, Director	Cultural Resources Management Program	Gila River Indian Community
Ms. Muriel Uqualla-Coochytewa, Chairwoman		Havasupai Tribe

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Individual	Department	Tribe
Mr. Travis Hamidreek, Director	Natural Resources	Havasupai Tribe
Mrs. Christina C.B. Andrews, Chairwoman		Hia-Ced Hemajkam, LLC
Mrs. Lorraine Marquez Eiler, President		Hia-Ced O'odham Alliance
Dr. Karl Hoerig, Tribal Historic Preservation Officer	Tribal Historic Preservation Office	Pascua Yaqui Tribe
Mr. Robert Valencia, Chairman		Pascua Yaqui Tribe
Mr. Val R. Panteah, Governor		Pueblo of Zuni
Mr. Kurt Dongoske, Director	Heritage and Historic Preservation Office	Pueblo of Zuni
Ms. Ona Segundo, Chair		Kaibab Band of Paiute Indians
Mr. Charley Bulletts, Director	Southern Paiute Consortium/ Cultural Resources	Kaibab Band of Paiute Indians
Mr. Martin Harvier, President		Salt River Pima-Maricopa Indian Community
Mr. Shane Anton, Tribal Historic Preservation Officer	Cultural Preservation Program	Salt River Pima-Maricopa Indian Community
Ms. Angela Garcia-Lewis Cultural Preservation Compliance Supervisor	Cultural Preservation Program	Salt River Pima-Maricopa Indian Community
Ms. Martha Martinez, NAGPRA Coordinator	Cultural Preservation Program	Salt River Pima-Maricopa Indian Community
Mr. Terry Rambler, Chairman		San Carlos Apache Tribe
Ms. Vernelda Grant, Tribal Historic Preservation Officer	Historic Preservation and Archaeology Department	San Carlos Apache Tribe
Mr. Ned Norris, Jr., Chairman		Tohono O'odham Nation
Mr. Peter Steere, Tribal Historic Preservation Officer	Cultural Affairs Office	Tohono O'odham Nation
Mr. Timothy Joaquin, Chairman	Legislative Council	Tohono O'odham Nation
Ms. Thomas Tortez, Chairperson		Torres Martinez Desert Cahuilla Indians
Ms. Gwendena Lee Gatewood, Chairwoman		White Mountain Apache Tribe
Mr. Mark Altaha, Tribal Historic Preservation Officer	Office of Historic Preservation	White Mountain Apache Tribe
Mr. Ramon Riley, Director	Cultural Resources Office/Nowike' Bagowah Museum	White Mountain Apache Tribe
Mr. Jon Huey, Chairman		Yavapai-Apache Nation
Ms. Gertrude Smith, Yavapai Cultural Preservation Director		Yavapai-Apache Nation

Individual	Department	Tribe
Mr. Christopher Coder, Tribal Archaeologist		Yavapai-Apache Nation
Mr. Robert Ogo, Acting President		Yavapai-Prescott Indian Tribe
Ms. Linda Ogo, Director	Culture Research Department	Yavapai-Prescott Indian Tribe
Mr. Greg Glassco, Compliance Officer	Culture Research Department	Yavapai-Prescott Indian Tribe
Ms. Maria Dadgar, Executive Director		InterTribal Council of Arizona

BARRY M. GOLDWATER RANGE

Land Withdrawal Legislative Environmental Impact Statement

PUBLIC SCOPING

Proposed Reauthorization and Expansion of the BMGR Land Withdrawal

March 2020

Saguaro cacti at the BMGR contribute to the unique habitat of the Sonoran Desert

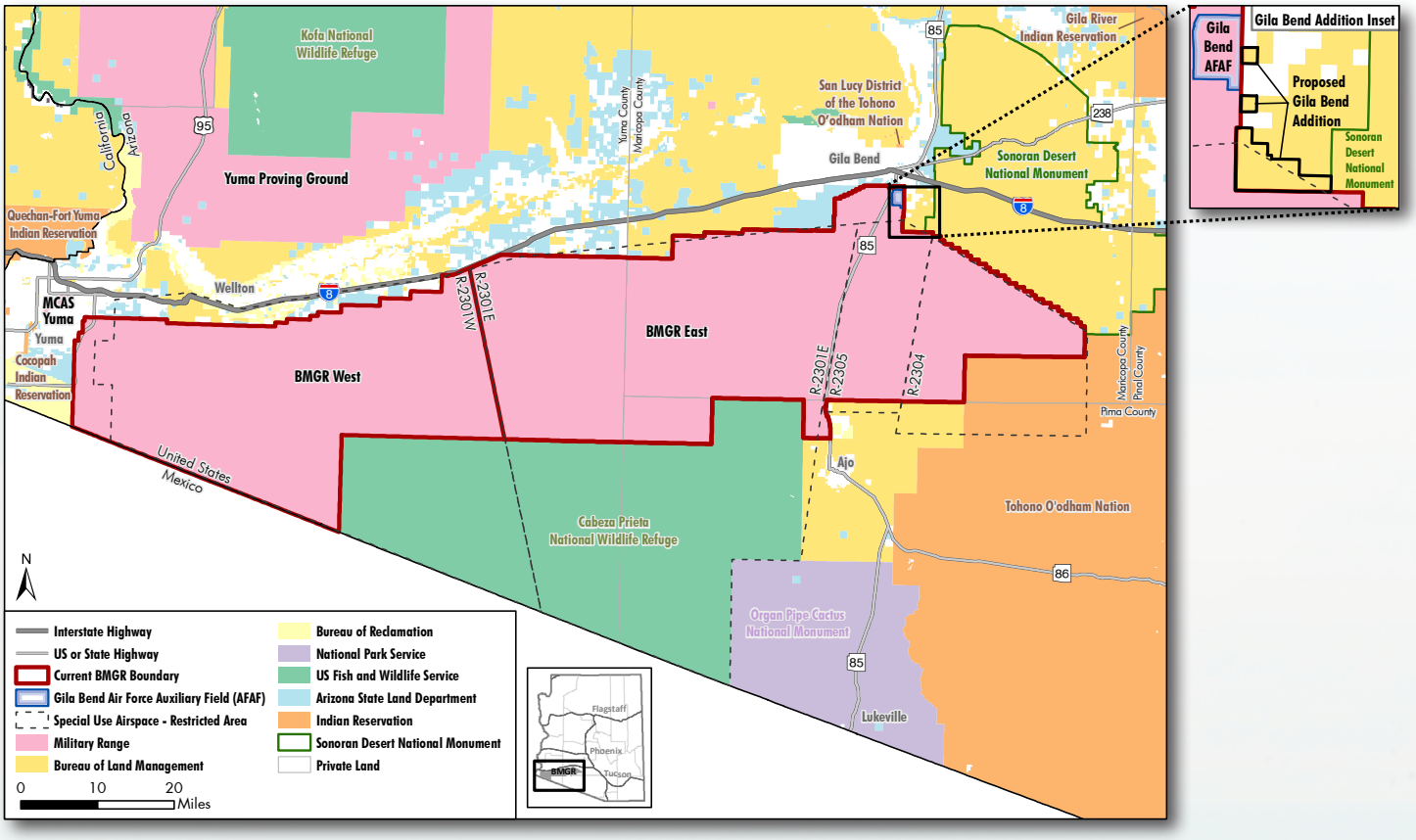
U.S. military foresees continuing need for the Barry M. Goldwater Range

The 1.7-million-acre Barry M. Goldwater Range (BMGR) has served as a military training range since it was established during World War II to train U.S. pilots and other aircrew members. Located in southwestern Arizona, the BMGR is today considered to be one of the nation's most capable and productive training ranges. As such, it has been, and is foreseen to remain, essential for developing and maintaining the readiness of U.S. air-ground combat forces.

More than 95 percent of the BMGR is comprised of federal public lands that have been withdrawn and reserved by Congress for use as a military range. The current authorization for the range was provided by the Military Lands Withdrawal Act of 1999 (Public Law 106-65). This legislative land withdrawal has a duration of 25 years, which expires in October 2024. An extension of the BMGR land withdrawal requires congressional review and new federal legislation. Congress also will be asked to reaffirm and clarify the language of the MLWA of 1999 regarding continuing military use of the Cabeza Prieta National Wildlife Refuge (CPNWR) and the Cabeza Prieta Wilderness (CPW), including military aviation training and operational test and evaluation overflights of the CPNWR/CPW.

The Secretaries of the Air Force (SECAF) and Navy (SECNAV) have determined that the BMGR will continue to be needed to support military training and testing beyond 2024. In accordance with federal procedures, the Secretaries have submitted applications to the Secretary of the Department of the Interior (SECDOI), through the Bureau of Land Management (BLM), to request that Congress: 1) extend the current BMGR land withdrawal and reservation and 2) withdraw and reserve approximately 2,366 acres of BLM public land near Gila Bend Air Force Auxiliary Field as an addition to the existing range. The Air Force and Marine Corps (a component of the Department of the Navy), are the operators and principal users of the BMGR East and West, respectively. A Legislative Environmental Impact Statement (LEIS) on the proposed land withdrawal extension and addition is being jointly prepared by the Air Force and Marine Corps as required under the National Environmental Policy Act (NEPA). When completed, the two land withdrawal applications and the LEIS will be included in the submittal to Congress for its decision on reauthorizing the BMGR.

Project Location Map



An A-10C Thunderbolt II conducts close-air support training

Diverse land formations add to the training realism at the range

Exceptional training qualities of the BMGR justify extending land withdrawal

The BMGR has many attributes that together make it one of the nation's most indispensable training ranges for developing and maintaining air-combat power and for integrating that power with ground forces. Extending the BMGR land withdrawal is needed to keep this unique range available for training tactical air-combat aircrews and other military personnel whose job is fighting in the air-ground battlespace. The attributes that contribute most significantly to the unique and irreplaceable value of the BMGR include:

- A central geographic location, within close flight range of the equivalent of more than 40 Air Force, Marine Corps, Navy, and National Guard and reserve squadrons home-based at 14 military air bases and aircraft carriers
- Year-round flying weather
- Topographically varied terrain that enhances training diversity and realism
- Expansive land and restricted airspace that support diverse, realistic, and high-volume training
- Integrated air and air-ground combat training supported by cutting-edge electronic instrumentation

These and other factors make the BMGR one of the most essential tactical aviation ranges currently available to U.S. armed forces. Extending the land withdrawal will meet the need of providing a military training facility with multiple high-quality training capabilities well into the future. The BMGR's unique attributes make a withdrawal extension critical to national security.

A Marine fires a .50-caliber machine gun out the back of an MV-22B Osprey aircraft to achieve tail gunnery certification

The range provides for integrated air and ground combat training

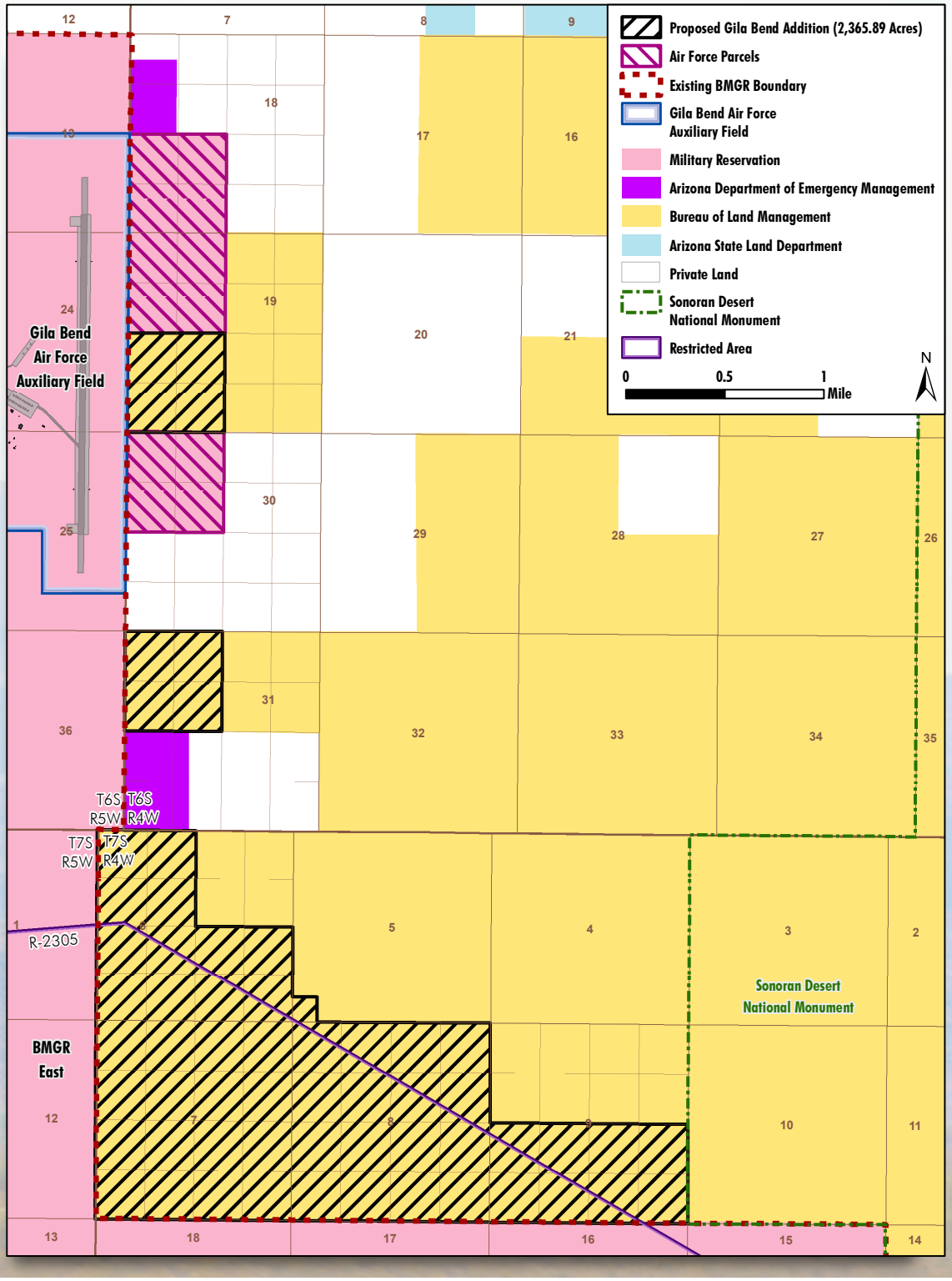
BMGR climate and terrain offer an exceptional training environment

Gila Bend Addition proposed for added safety and security

The military's proposal includes adding 2,366 acres near the Gila Bend Air Force Auxiliary Field to the BMGR. The purpose of and need for the Gila Bend Addition is to:

- Provide increased operational security for the airfield runway
- Enhance the safety of flight operations
- Protect the Gila Bend Air Force Auxiliary Field from encroaching land use
- Ensure the full operability of the R-2305 restricted airspace at the BMGR

Proposed Gila Bend Addition



Preliminary alternatives proposed

The LEIS will assess the environmental impacts of reauthorizing the BMGR and of incorporating the Gila Bend Addition in BMGR East. Eight preliminary alternatives for implementing these proposed actions have been developed. These action alternatives may be modified or supplemented in response to input that is received during the scoping period. Each of the eight action alternatives would keep the BMGR available for military training and testing use after October 2024, but the alternatives differ from each other in terms of the duration of the land withdrawal and reservation (25-year, 50-year, or indefinite extension), land area of the range (extend with or without the Gila Bend Addition), and administrative jurisdictions of the SECAF, SECNAV, and SECDOI. The LEIS will also consider a no-action alternative, which would not extend authorization for the BMGR.

Action Alternatives—BMGR Reauthorization

Alternative 1 would reauthorize the existing BMGR land withdrawal with no boundary changes for another 25 years (until 2049). The SECAF and SECNAV would continue to manage the withdrawn public lands in the BMGR East and the BMGR West and consult the SECDOI before using the BMGR for non-reserved purposes.

Alternative 1A would implement Alternative 1 except the withdrawal would be for 50 years (until 2074).

Alternative 1B would implement Alternative 1 except the withdrawal would be for an indefinite period until the BMGR is no longer needed by the Air Force and Navy.

Alternative 1C would permanently transfer administrative jurisdiction of the public lands currently comprising the BMGR East and the BMGR West to SECAF and SECNAV, respectively.

Alternative 2 would reauthorize the existing BMGR land withdrawal for another 25 years, but the BMGR East boundary would be extended to include the 2,366-acre Gila Bend Addition. Management of the withdrawn public lands in the BMGR would continue as described for Alternative 1.

Alternative 2A would implement Alternative 2 except the withdrawal would be for 50 years.

Alternative 2B would implement Alternative 2 except the withdrawal would be for an indefinite period until the BMGR is no longer needed by the Air Force and Navy.

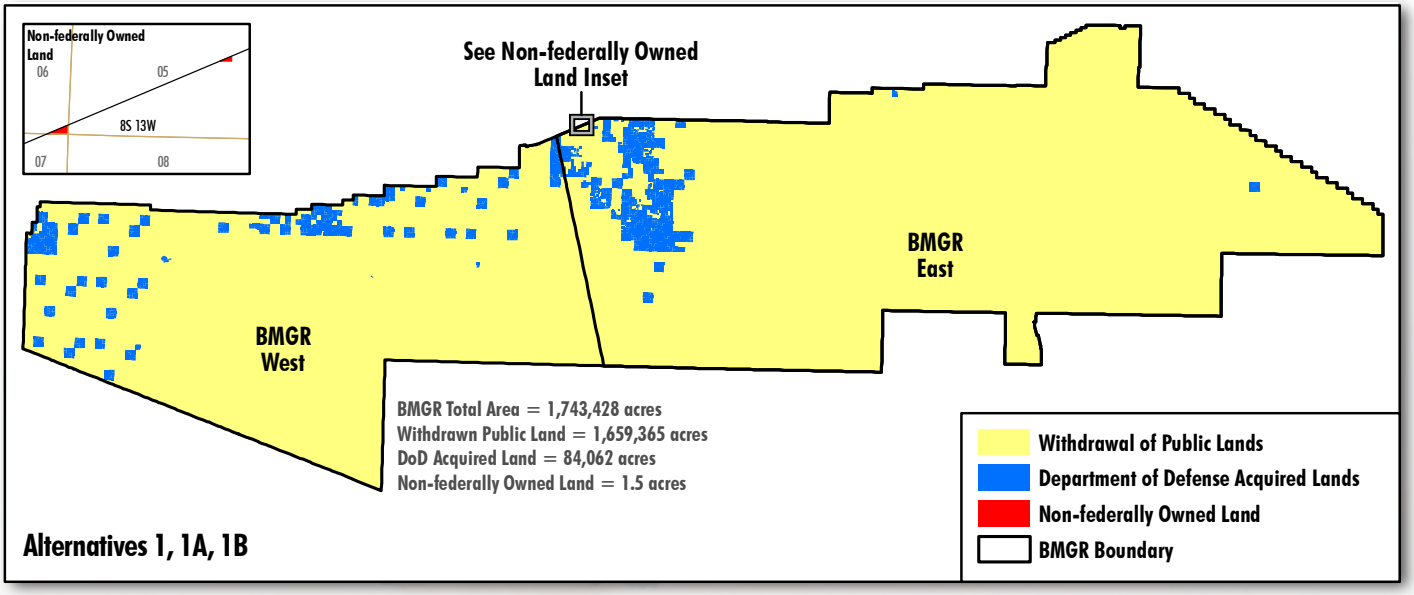
Alternative 2C would permanently transfer administrative jurisdiction of the public lands comprising the BMGR East and the Gila Bend Addition to SECAF and the BMGR West to SECNAV.

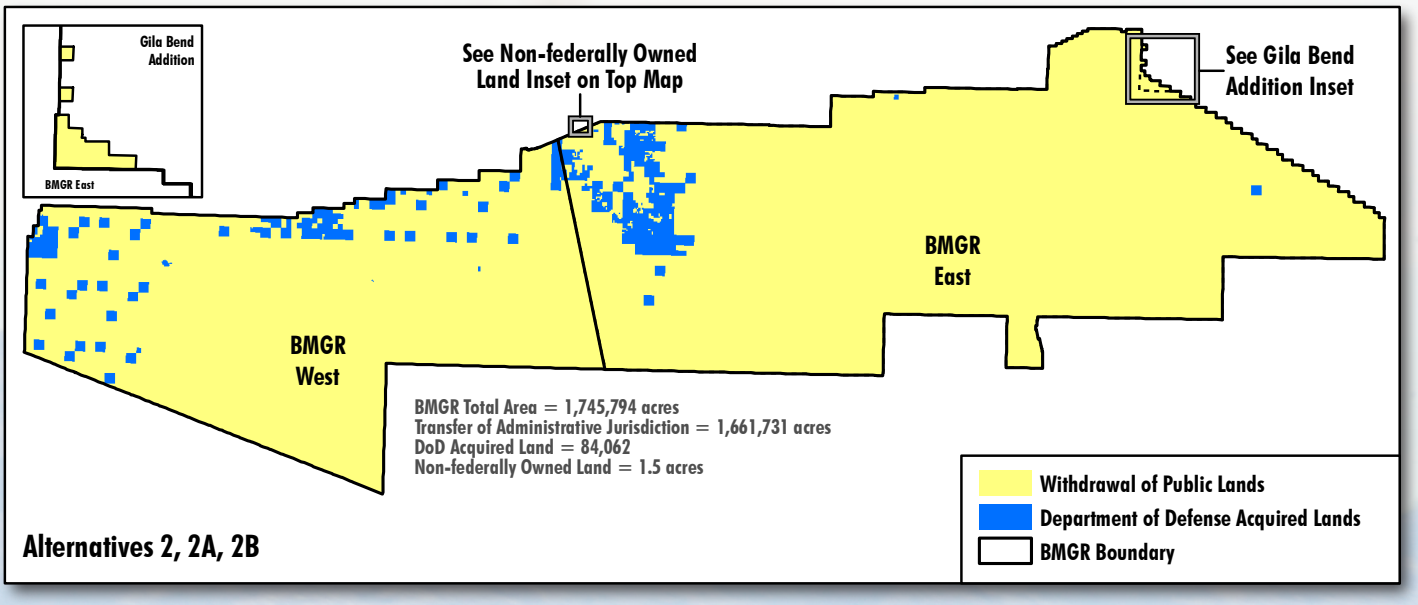
No-Action Alternative—BMGR Closure

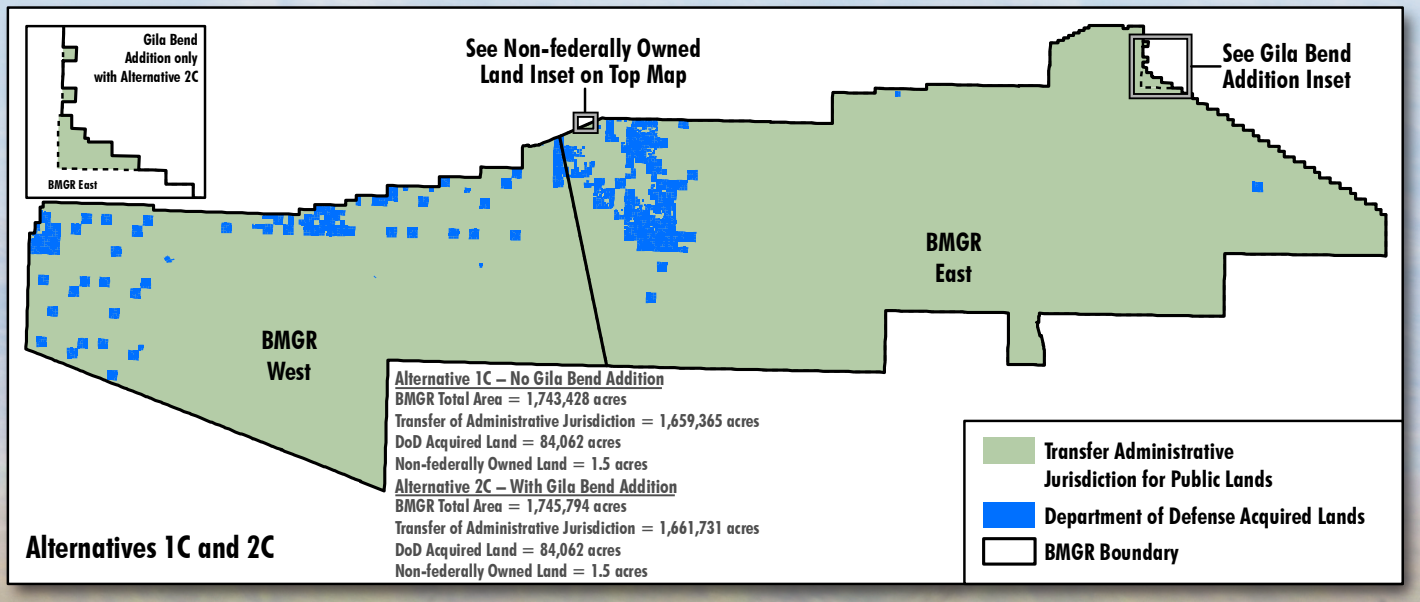
Under the no-action alternative, Congress would not take action to reauthorize the BMGR and the existing land withdrawal and reservation would expire in October 2024. Military training and testing use of the BMGR surface—including support for live-fire use of air-to-air, air-to-ground, ground-to-ground, ground-to-air munitions, and ground-based military training and testing activities—would end at that time. The BMGR, including Gila Bend Air Force Auxiliary Field and other developed facilities in the range, would be subject to closure and decommissioning. Planning for the potential reuse of the range and its facilities would begin only if Congress determines to terminate the BMGR.

Military aviation uses of the restricted airspace overlying the BMGR would not be terminated by the expiration of the land withdrawal. The long-term character of military aviation in this airspace and potential non-military reuse of the land surface would be addressed through future planning processes.

Alternative Land Withdrawal Areas or Transfers of Administrative Jurisdiction



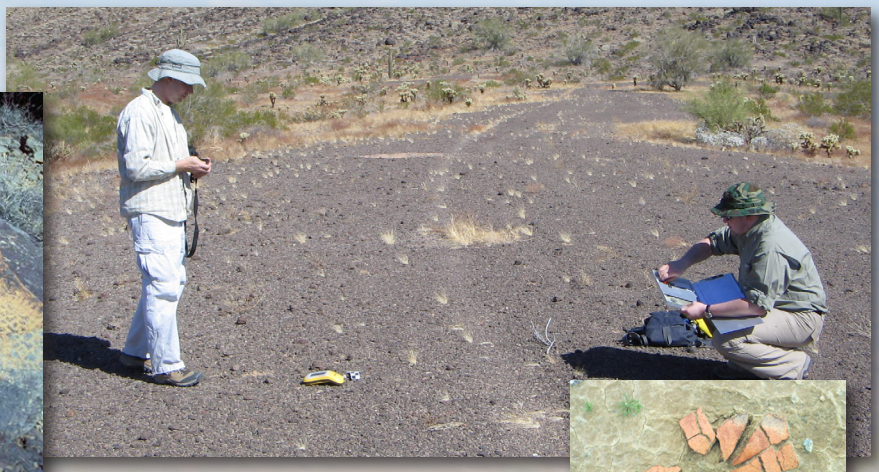




Potential resource and community impacts to be evaluated in the LEIS

Beyond its value as a premier national defense asset, the BMGR is nationally significant as a critical ecological resource. Together with Cabeza Prieta National Wildlife Refuge, Organ Pipe Cactus National Monument, Sonoran Desert National Monument and other federal public lands administered by the BLM, the BMGR comprises the largest remaining expanse of relatively intact Sonoran Desert in the United States. With the exceptions of State Route 85 through the BMGR East and State Route 86 east of Ajo, this more than 5,000-square-mile landscape is unfragmented by development. As such, it serves an important role in maintaining the ecological integrity of the Sonoran Desert landscape, biodiversity, and habitats. The BMGR constitutes 55 percent of this contiguous, multi-jurisdictional Sonoran Desert land area.

Working collaboratively with agencies, tribes and organizations to manage resources



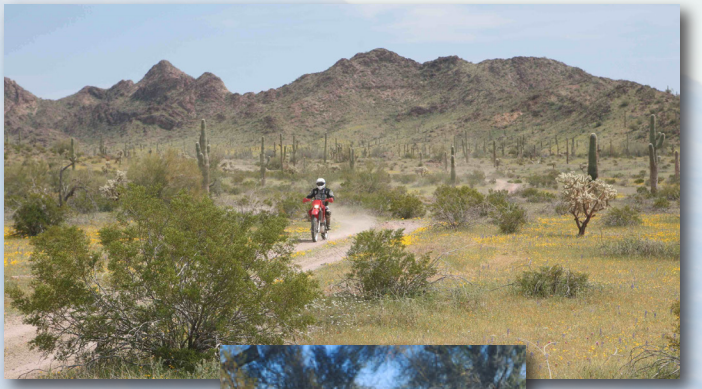
Extensive cultural resource surveys have revealed more than 2,000 sites to date

The proposed list of resources to be considered for potential project impacts in the LEIS consist of:

- Air Quality
- Airspace Use and Management
- Biological Resources
- Cultural Resources
- Mineral Resources and Soils
- Hazardous Materials and Solid Wastes
- Land Use and Management
- Noise
- Public Health and Safety
- Recreation
- Socioeconomics
- Visual Resources
- Water Resources

Comments received during the scoping period may lead to a change in the resource list and the scope of analysis.

The BMGR supports approximately 200 bird species, 60 mammal species, 50 reptile species, 10 amphibian species and 290 plant species



Public access to the 38 percent of the range open to recreation will not change

The Sonoran pronghorn (federally endangered) and flat-tailed horned lizard have benefitted from intensive conservation management

Two concurrent federal processes are required

DOI Federal Land Withdrawal Process

All federal land withdrawal applications, including those for proposed national defense withdrawals and requiring congressional decision, must be submitted to the SECDOI, who acts through the BLM, for review and processing. In this case, the Air Force and Marine Corps have submitted the applications for the BMGR and Gila Bend Addition land withdrawals along with other needed reports, studies, and information to the BLM, which will incorporate these materials along with its recommendations in the case file for the proposed withdrawals. After review and consultations with the SECAF and SECNAV, the SECDOI will submit the BMGR case file to Congress for decision. The procedures for processing land withdrawal applications are provided by the Federal Land Policy and Management Act of 1976 and are found in 43 Code of Federal Regulations 2310. The BLM actively solicits public comments as part of its application review process (see page 11 for how to submit comments).

National Environmental Policy Act Process

NEPA requires all federal agencies making a proposal that may significantly impact the environment to consider: 1) a range of reasonable alternatives; 2) potential environmental or human health consequences; and 3) public and government agency input. For this federal action, an LEIS will document these considerations. An LEIS differs from an administrative environmental impact statement (EIS) because the decision is made by Congress and provided in new legislation. (The decision for a more common administrative EIS is made by a federal agency and provided in a Record of Decision.) The principal opportunities for the public to provide input on the proposed land withdrawals for the BMGR include public scoping at the beginning of the LEIS process and after the Draft LEIS is published for public review and comment. The BLM, U.S. Fish and Wildlife Service, and Arizona Game and Fish Department are serving as cooperating agencies in the preparation of this LEIS.

The U.S. Council of Environmental Quality has prepared a free *Citizen's Guide to the NEPA* to provide the public with more detailed information about the NEPA process. The guide is available online in English and Spanish at https://ceq.doe.gov/get-involved/citizens_guide_to_nepa.html.

Legislative Environmental Impact Statement (LEIS) Timeline

Public scoping comments now requested

The NEPA scoping process actively engages federally recognized tribes; federal, state, and local agencies; non-governmental organizations; and the general public in the preparation of an LEIS. The scoping period for the BMGR LEIS opened on March 18, 2020 with publication of the Notice of Intent to Prepare the LEIS and closes on June 3, 2020. Your scoping comments will help to identify issues of interest or concern regarding the alternatives for the proposed continued authorization of the BMGR by more effectively shaping the range of alternatives considered and better framing the environmental impact analysis of those alternatives.

As a result of the National Emergency declared by the President on Friday, March 13, 2020, regarding the coronavirus (COVID-19) pandemic in the United States and subsequent Center for Disease Control recommendations for social distancing and avoiding large public gatherings, the public scoping period for the LEIS will not include public meetings. In lieu of attending public scoping meetings, interested parties are encouraged to review the information about the proposed reauthorization of the BMGR in this brochure and by consulting the project website at: www.barry-m-goldwater-leis.com. For those who do not have ready access to a computer or the internet, the scoping-related materials posted to the website will be made available upon request by mail. Inquiries, requests for scoping-related materials, and comments regarding the USAF/USMC proposal may be submitted by mail to BMGR Land Withdrawal LEIS, P.O. Box 2324, Phoenix, AZ 85003, or email to BMGR_LEIS@jacobs.com.

You can provide written comments on this LEIS and/or the DOI land withdrawal application process during the scoping period in one of several ways:

- Submit written comments online via the project website at: www.barry-m-goldwater-leis.com using the comment form on the “Contact Us” page
- **Email comments to:** BMGR_LEIS@jacobs.com
- **Mail comments to:**
  BMGR LEIS
  PO Box 2324
  Phoenix, AZ 85003

Rock alignments provide lasting signs of past cultural practices at the BMGR

Your comments on the proposed reauthorization of the BMGR are welcome at any time; however, scoping comments must be submitted by June 3, 2020 to ensure full consideration in the preparation of the Draft LEIS. Comments regarding the LEIS or the Bureau of Land Management's land withdrawal application process need only be submitted once and will be considered in both processes.

The Draft LEIS will be made available for public review and comment when completed, which is tentatively planned for early 2021.

For more information on the proposal

For more information about the proposed continued authorization of the BMGR, please visit the project website at: www.barry-m-goldwater-leis.com

Questions about the project may be directed to:

AIR FORCE

Mail to: 56 FW Public Affairs
14185 West Falcon St.
Luke AFB, AZ 85309
Phone: 623-856-5853
Email: 56fw.pa@us.af.mil

MARINE CORPS

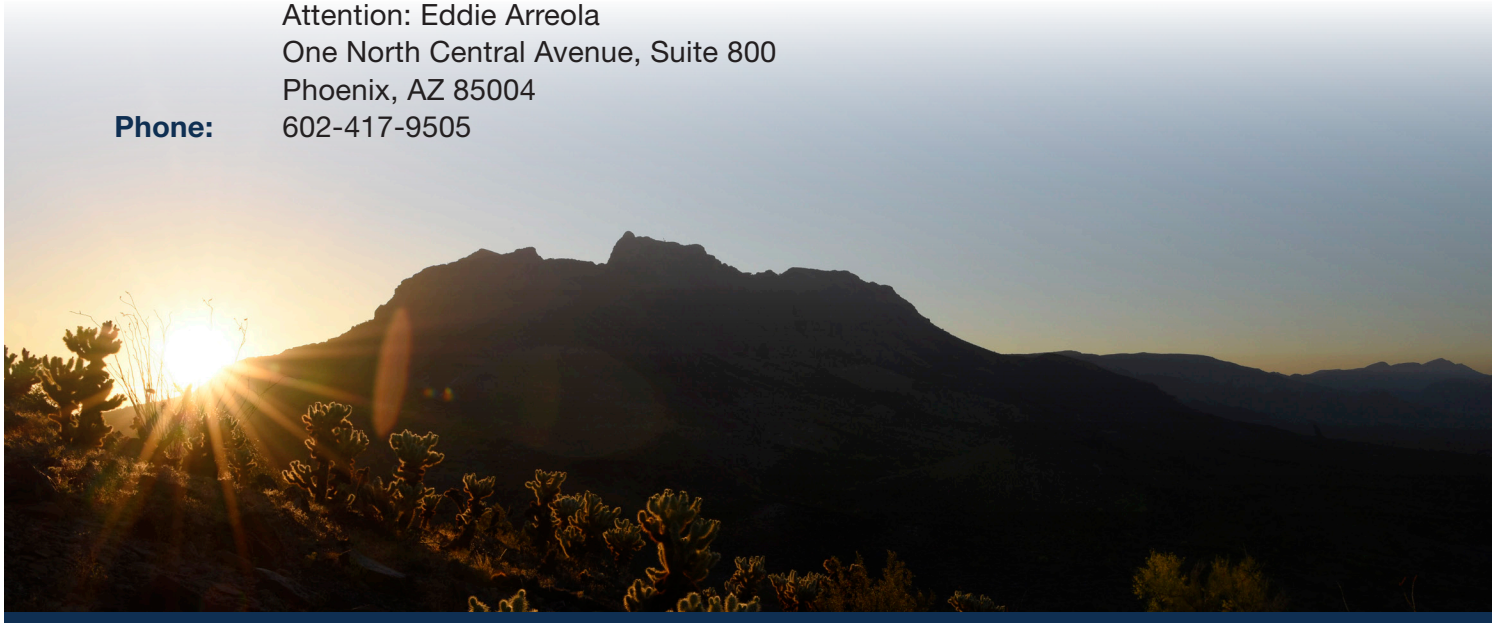
Mail to: MCAS Yuma Public Affairs
Box 99113
Yuma, AZ 85369
Phone: 928-269-5728/5505
Email: MCASYuma_Media@usmc.mil

For more information on the land withdrawal

For more information about the BMGR land withdrawal applications or to submit comments on that process, please contact:

BLM

Email to: BLM_AZ_AZSO_BMGRWithdrawal@blm.gov
Mail to: BMGR Withdrawal
Attention: Eddie Arreola
One North Central Avenue, Suite 800
Phoenix, AZ 85004
Phone: 602-417-9505



DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

6 May 2021

Brigadier General Gregory Kreuder
Commander, 56th Fighter Wing
14185 West Falcon Street
Luke AFB AZ 85309

Honorable Robert Miguel
Chairman, Ak-Chin Indian Community
42507 West Peters & Nall Road
Maricopa AZ 85138

RE: Section 106 Consultation Status Update for the Draft Legislative Environmental Impact Statement (DLEIS) for the Extension of and Addition to the Barry M. Goldwater Range (BMGR) Land Withdrawal

Dear Chairman Miguel

In continuing communication regarding the proposed extension of and addition to the BMGR military land withdrawal, I wish to inform you of a recent determination regarding the Section 106 status of the LEIS effort. The current land withdrawal for the BMGR expires in October 2024, and the military services will ask Congress to again extend the land withdrawal to keep the BMGR available for military purposes. Future operations are not anticipated to change significantly from the current mission. Under the 1958 Engle Act, any decision on whether to extend or add to the current withdrawal is dedicated to Congress; therefore, in conjunction with the Department of the Interior, the Air Force and Marine Corps have determined that Section 106 of the National Historic Preservation Act of 1966, as amended, is not applicable to the administration of this withdrawal. Even were such withdrawal properly considered an undertaking subject to the requirements of Section 106, this letter is to inform you the Air Force and Marine Corps have determined the proposed extension of the BMGR land withdrawal, and a proposed addition of 2,366 acres of public land to BMGR East, is not the type of activity to have potential to cause effects to historic properties under 36 CFR 800.3(a). The Arizona State Historic Preservation Office and the Advisory Council on Historic Preservation concurred with this determination in electronic communication dated January 22, 2021.

While the Section 106 process has been determined to not be relevant to the development of the LEIS, the Air Force and Marine Corps will continue to engage Tribal Nations consistent with our Natural and Cultural Resources Management Plans to consult on projects, findings, mitigation measures, and Tribal access to ancestral lands occurring within the BMGR. I assure you we continue in our endeavor to integrate the Tribal perspective into our management of the BMGR lands. We look forward to learning more of associated Tribal insights and concerns, and seek any additional inputs to the BMGR withdrawal extension process.

For additional information, please contact Luke AFB Installation Tribal Liaison Officer Mr. Kevin O'Berry at (623) 856-5857 or kevin.oberry@us.af.mil; Luke AFB Archaeologist, Ms. Adrianne Rankin, at (623) 856-8410 or adrianne.rankin@us.af.mil; or MCAS Yuma Archaeologist, Ms. Karla James at (928) 269-2288 or karla.james@usmc.mil.

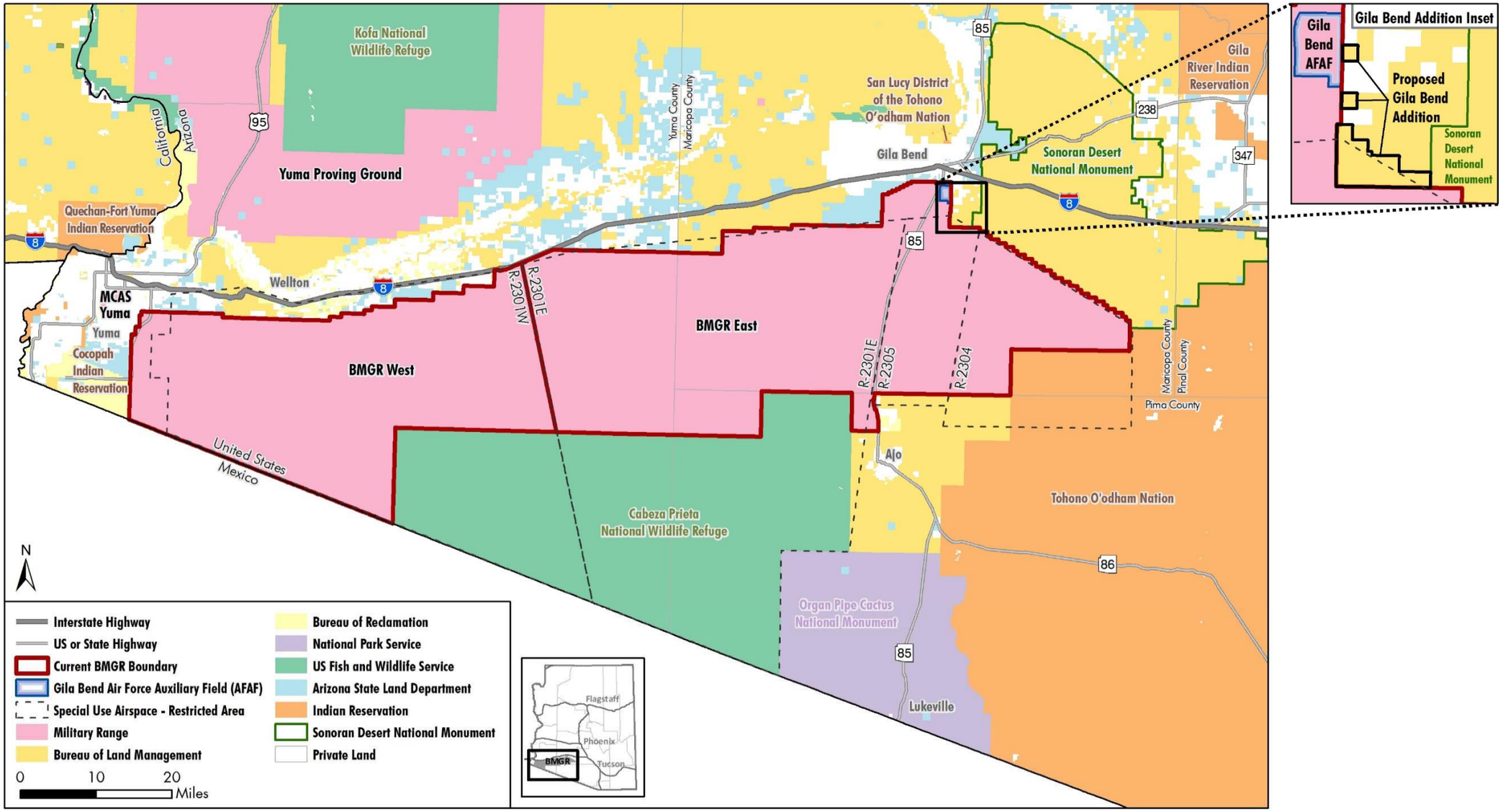
Thank you for your guidance and assistance in this effort.

Sincerely

GREGORY KREUDER
Brigadier General, USAF
Commander, 56th Fighter Wing

2 Attachments:
1. BMGR Map
2. List of other copy recipients

Attachment 1: Barry M. Goldwater Range Map



Attachment 2: List of Other Copy Recipients

Ms. Elaine Peters, Museum Director, Him-Dak Museum, Ak-Chin Indian Community, 42507 West Peters & Nall Road, Maricopa, AZ 85138

Ms. Carmen Narcia, Acting Manager, Cultural Resource Program, Ak-Chin Indian Community, 42507 West Peters and Nall Road, Maricopa, AZ 85138

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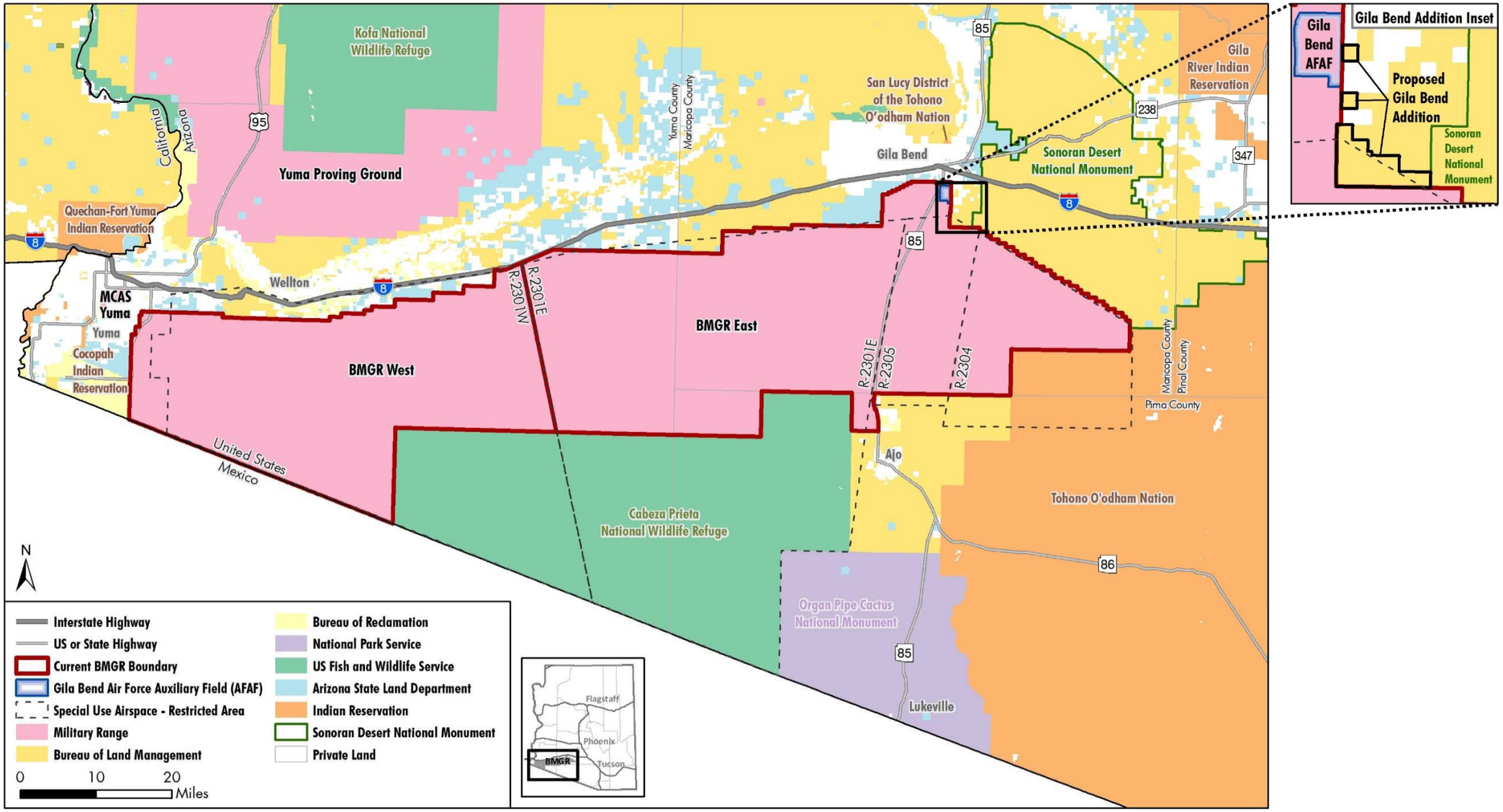

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Appendix J – Socioeconomics Supporting Data

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Appendix J
Socioeconomics Supporting Data

Background

This appendix augments the Socioeconomics sections in the Affected Environment and Environmental Consequences chapters of the LEIS.

Table J-1 addresses population growth between 2010 and 2018 in the counties in which the BMGR is located and in the communities along the range perimeter. Tables J-2 through J-4 are based on data from the 2013-2017 American Community Survey (U.S. Census 2018) and offer information about the region of influence for socioeconomics, which includes counties, communities, and Indian communities in the BMGR perimeter.

The discussion and tables in this appendix provide data pertaining to the socioeconomic impact of military installations in Arizona that regularly use the BMGR and Gila Bend Addition for training purposes. The data were taken a 2017 study prepared for the Arizona Military Affairs Commission, *Economic Impact of Arizona's Principal Military Operations* (The Maguire Company 2017). The study estimated the direct, indirect, and induced economic impact of the six major military installations and four principal National Guard operations in Arizona. Four of Arizona's six military installations evaluated in the 2017 study regularly use the BMGR for their military training needs: Luke Air Force Base (AFB), Marine Corp Air Station (MCAS) Yuma, Davis-Monthan AFB, and Silver Bell Army Heliport. Additionally, two of Arizona's four National Guard operations regularly use the BMGR for their training activities: the Arizona Air National Guard (ANG) 162nd Fighter Wing and the Arizona Army National Guard (ARNG) Papago Heliport, Papago Military Reservation.

Summary data from the 2017 study for personnel (Table J-5), payroll (Table J-6), direct spending (Table J-7) and local economic impact (Table J-8) are provided and summed for this LEIS for the BMGR and the proposed Gila Bend Addition. Direct economic impacts are attributable to the initial economic activity. Indirect economic impacts include economic activities undertaken by vendors and suppliers within the supply chain of the direct activity. Induced economic impacts result from the spending of wages paid to employees involved in direct and indirect activities. The economic impact of military retirees is also included in these tables.

Table J-1. Population in the BMGR Perimeter Communities, 2010 and 2018

Area	2010	2018	Total Change	Percent Change
Arizona	6,392,288	7,171,646	779,358	12.2
Maricopa County	3,817,117	4,410,824	593,707	15.6
Town of Gila Bend	1,922	2,094	172	8.9
Pima County	980,263	1,039,073	58,810	6.0
Ajo CDP	3,304	3,525	221	6.7
Why CDP	167	150	(17)	(10.2)
Yuma County	195,751	212,128	16,377	8.4
City of San Luis	28,413	33,490	5,077	17.9
City of Somerton	14,287	16,491	2,204	15.4
City of Yuma	91,334	97,908	6,574	7.2
Dateland CDP	416	356	(60)	(14.4)
Fortuna Foothills CDP	26,265	28,200	1,935	7.4
Tacna CDP	602	742	140	23.3
Theba CDP	158	75	(83)	(52.5)
Town of Wellton	2,890	3,030	140	5.0
Wellton Hills CDP	258	386	128	49.6
Cocopah Reservation, Arizona	817	1,341	524	64.1
Colorado River Reservation, Arizona/California	8,764	9,652	888	10.1
Fort Yuma Reservation	2,197	1,442	(755)	(34.4)
Tohono O'odham Nation Reservation and Off-Reservation Trust Land, Arizona	10,201	10,703	502	4.9

Source: U.S. Census Bureau 2010, 2018.

Note: 2018 data not available (2017 data provided) for Ajo CDP, Why CDP, Dateland CDP, Fortuna Foothills CDP, Tacna CDP Theba CDP, Wellton Hills CDP, and tribal communities.

Table J-2. Civilian Labor Force, Total Employment, Unemployment and Employment Rates for the Region of Influence, 2013-2017 5-year Estimates

Area	Civilian Labor Force	Employed	Unemployed	Percent Unemployed
Arizona	3,197,116	2,953,891	225,911	4.2
Maricopa County	2,053,225	1,929,015	124,210	6.0
Town of Gila Bend	753	718	35	4.6
Pima County	473,482	433,478	40,004	8.4
Ajo Census-defined Place (CDP)	1,232	908	324	26.3
Why CDP	78	78	0	0.0
Yuma County	84,028	74,891	9,137	10.9
City of San Luis	13,309	11,193	2,116	15.9
City of Somerton	7,001	6,198	803	11.5
City of Yuma	41,054	36,899	4,155	10.1
Dateland CDP	164	150	14	8.5
Fortuna Foothills CDP	8,661	7,928	733	8.5
Tacna CDP	348	294	54	9.4
Theba CDP	40	40	0	0.0
Town of Wellton	668	628	40	6.0
Wellton Hills CDP	213	213	0	0.0
Cocopah Reservation, Arizona	305	248	57	18.7
Colorado River Reservation, Arizona/California	4,264	3,843	421	9.9
Fort Yuma Reservation	528	408	968	22.7
Tohono O'odham Nation Reservation and Off-Reservation Trust Land, Arizona	4,116	3,014	1,102	26.8

Source: U.S. Census 2018.

Note: Data pertains to population 16 years and over.

Table J-3. Income Characteristics of the BMGR Perimeter Communities, 2017

Area	Median Household Income (dollars)
Arizona	53,510
Maricopa County	58,580
Town of Gila Bend	29,771
Pima County	48,676
Ajo CDP	33,178
Why CDP	56,250
Yuma County	43,253
City of San Luis	33,767
City of Somerton	37,252
City of Yuma	46,151
Dateland CDP	36,250
Fortuna Foothills, CDP	49,139
Tacna CDP	32,917
Theba CDP	33,393
Town of Wellton	47,839
Wellton Hills CDP	90,609
Cocopah Reservation, Arizona	32,083
Colorado River Reservation, Arizona /California	32,352
Fort Yuma Reservation, Arizona /California	28,646
Tohono O'odham Nation Reservation and Off-Reservation Trust Land, Arizona	31,524

Source: U.S. Census 2018.

Table J-4. Leading Industry Sectors in the BMGR Perimeter Communities

Area	Leading Industry Sectors
Maricopa County	• Health care and social assistance • Retail trade • Educational services • Accommodation and food services • Manufacturing • Finance and insurance • Professional, scientific and technical services
Town of Gila Bend	• Accommodation and food service • Agriculture • Construction • Retail trade • Educational services • Utilities
Pima County	• Healthcare and social assistance • Retail trade • Educational services • Accommodation and food services • Manufacturing • Administrative and support and waste management services • Construction
Ajo CDP	• Public administration • Retail trade • Arts, entertainment and recreation • Health care and social assistance • Educational services
Why CDP	• Educational services • Construction • Other services • Accommodation and food services • Transportation and warehousing
Yuma County	• Retail trade • Health care and social assistance • Agriculture • Public administration • Accommodation and food services • Educational services • Construction
City of San Luis	• Agriculture • Retail trade • Educational services • Construction • Health care and social assistance
City of Somerton	• Agriculture • Retail trade • Health care and social assistance • Educational services • Public administration • Accommodation and food services

Area	Leading Industry Sectors
City of Yuma	• Health care and social assistance • Retail trade • Public administration • Accommodation and food services • Educational services • Administrative and support and waste management services
Dateland CDP	• Retail trade • Educational services • Agriculture
Fortuna Foothills CDP	• Public administration • Retail trade • Health care and social assistance • Accommodation and food services • Construction • Wholesale trade • Professional, scientific and technical services
Tacna CDP	• Accommodation and food services • Agriculture • Construction • Administrative and support and waste management services
Theba CDP	• Agriculture • Accommodation and food services • Construction • Health care and social assistance • Transportation and warehousing
Town of Wellton	• Agriculture • Health care and social assistance • Transportation and warehousing • Accommodation and food services
Wellton Hills CDP	• Agriculture • Educational services • Real estate
Cocopah Reservation, Arizona	• Arts, entertainment, recreation, accommodation and food service • Educational services, health care and social assistance • Public administration
Colorado River Reservation, Arizona/California	• Arts, entertainment, recreation, accommodation and food service • Educational services, health care and social assistance • Public administration • Agriculture • Retail trade
Fort Yuma Reservation, Arizona/California	• Arts, entertainment, recreation, accommodation and food service • Public administration
Tohono O'odham Nation Reservation and Off-Reservation Trust Land, Arizona	• Construction • Transportation and warehousing, and utilities • Retail trade

Source: U.S. Census 2018

Table J-5. Summary of Personnel for Military Installations in Arizona that Regularly Use the BMGR and Gila Bend AFAF

Personnel Category	Davis-Monthan AFB (Tucson)	Luke AFB (Phoenix)	MCAS Yuma	Army Heliport (Silver Bell)	Arizona ANG 162nd (Tucson)	Papago Park ARNG (Phoenix)	Sub-total (BMGR-regular)	Sub-total (Gila Bend AFAF)	Arizona Total
Active Duty Permanent	5,957	3,391	3,185	150	298	0	12,981	9,796	15,732
Living On-Base	1,123	971	1,520	0	19	0	3,633	2,113	5,033
Living Off-Base	4,834	2,420	1,665	150	279	0	9,348	7,683	10,699
Reserves	1,949	1,750	0	401	863	5,095	10,058	4,963	10,953
Living On-Base	2	0	0	0	0	0	2	2	10
Living Off-Base	1,947	1,750	0	401	863	5,095	10,056	4,961	10,943
Rotational	0	0	644	0	0	0	644	0	867
Students (Military)	160	1,129	0	0	87	0	1,376	1,376	8,000
Civilians	3,703	2,050	2,225	273	816	688	9,755	6,842	19,194
DoD Civilians	2,195	853	995	244	745	688	5,720	4,037	9,974
Non-Military Employees	1,508	1,197	1,230	29	71	0	2,838	2,805	9,132
Non-Appropriated Fund Employees	0	0	0	0	0	0	0	0	88
Linked Retirees	4,830	6,954	598	0	0	0	12,382	11,784	12,650

Source: The Maguire Company 2017.

Notes:

Arizona Total includes all bases in 2017 study, including those not listed in the table: Fort Huachuca, Yuma Proving Ground (YPG), Arizona ANG 161st and U.S. Naval Observatory.

These numbers have been summed for the BMGR and for the Gila Bend Air Force Auxiliary Field (AFAF); however, some personnel on these installations may be in roles that are not directly related to the BMGR or Gila Bend AFAF operations. The sums for Arizona as a whole include military installations that do not use the BMGR on a regular basis so are typically larger than the subtotals provided.

Table J-6. Summary of Payroll for Military Installations in Arizona that Regularly Use the BMGR and Gila Bend AFAF ($000s)

Personnel Category	Davis-Monthan AFB (Tucson)	Luke AFB (Phoenix)	MCAS Yuma	Army Heliport (Silver Bell)	AZ ANG 162nd (Tucson)	Papago Park ARNG (Phoenix)	Sub-total (BMGR-regular)	Sub-total (Gila Bend AFAF)	Arizona Total
Active Duty Permanent	$353.5	$225.1	$167.3	$15.3	$24.5	$0	$785.7	$618.4	$899.9
Living On-Base	$66.6	$26.6	$79.9	$0	$4.2	$0	$177.3	$97.4	$232.7
Living Off-Base	$286.8	$198.4	$87.5	$15.3	$20.3	$0	$608.3	$520.8	$667.2
Reserves	$72.8	$45.8	$0	$1.8	$6.8	$78.9	$206.1	$127.2	$213.2
Living On-Base	$0.2	$0	$0	$0	$0	$0	$0.2	$0.2	$0.7
Living Off-Base	$72.6	$45.8	$0	$1.8	$6.8	$78.9	$205.9	$127	$212.5
Rotational	$0	$0	$33.8	$0	$0	$0	$33.8	$0	$39.7
Students (Military)	$4.0	$33.1	$0	$0	$2.3	$0	$39.4	$39.4	$180.9
Civilians	$209.0	$72.5	$38.2	$20.3	$60.4	$51.7	$452.1	$362.2	$1,058.7
DoD Civilians	$141.5	$63.1	NA[a]	$18.8	$56.6	$51.7	$331.7	$280	$698.2
Non-Military Employees	$67.6	$9.3	NA	$1.6	$3.8	$0	$82.3	$82.3	$320.1
Non-Appropriated Fund Employees	$0	$0	NA	$0	$0	$0	$0	$0	$2.3
Linked Retirees	$128.4	$139.2	$13.7	$0	$0	$0	$281.3	$267.6	$289.9

Source: The Maguire Company 2017. a. NA – Not Available

Note:

Arizona Total includes all bases in 2017 study, including those not listed in the table: Fort Huachuca, YPG, Arizona ANG 161st, and U.S. Naval Observatory.

For this analysis, these numbers have been summed for the BMGR and for the Gila Bend AFAF; however, some of the personnel on these installations may receive pay for services that are not directly related to BMGR or Gila Bend AFAF operations. The sums for Arizona as a whole include military installations that do not use the BMGR on a regular basis.

Table J-7. Summary of Direct Spending from Military Installations in Arizona that Regularly Use the BMGR and Gila Bend AFAF ($000)

Expenditure Category	Davis-Monthan AFB (Tucson)	Luke AFB (Phoenix)	MCAS Yuma	Army Heliport (Silver Bell)	Arizona ANG 162nd (Tucson)	Papago Park ARNG (Phoenix)	Sub-total (BMGR-regular)	Sub-total (Gila Bend AFAF)	Arizona Total
Contracts and Direct Spending: Maintenance and Operations	$25.9	$121.1	$16.5[a]	$2.9	$0.7	$2.7	$169.8	$166.4	$7,252
Contracts: Construction and Building Maintenance and Repair	$33.5	$34.4	$50.8	$0.8	$6.3	$9.8	$135.6	$75	$2,115
Spending for Supplies	$232.6	$143.5	$40.8	$8.3	$69.6	$19.4	$514.2	$454	$5,878
Utilities	$10.9	$5.9	$7.9	$1.2	$1.3	$12.4	$39.6	$19.3	$606
Education Payments	$4.2	$2.6	$1.3	$3.5	$0	$0	$11.6	$10.3	$131
Health Services	$28.4	$261.0	$6.5	$0.6	$0.2	$0	$296.7	$290.2	$3,355
Commissary and Exchange Sales	$92.8	$99.9	$29.6	$0	$0	$0	$222.3	$192.7	$5,292

Source: The Maguire Company 2017.

[a] Marine Corps Air Station Yuma 2018.

Note:

Arizona Total is in millions of U.S. dollars and includes all bases in 2017 study, including those not listed in the table: Fort Huachuca, YPG, Arizona ANG 161st and U.S. Naval Observatory.

For this analysis, these numbers have been summed for the BMGR and for the Gila Bend AFAF; however, some of this direct spending may not be derived from BMGR or Gila Bend AFAF operations. The sums for Arizona as a whole include military installations that do not use the BMGR on a regular basis.

Table J-8. Summary of Local Economic Impacts from Military Installations in Arizona that Regularly Use the BMGR and Gila Bend AFAF

	Personnel Category	Davis-Monthan AFB (Tucson)	Luke AFB (Phoenix)	MCAS Yuma	Army Heliport (Silver Bell)	Arizona ANG 162nd (Tucson)	Papago Park ARNG (Phoenix)	Sub-total (BMGR-regular)	Sub-total (Gila Bend AFAF)	Arizona Total
Jobs	Direct	10,220	6,929	6,054	505	1,378	1,732	26,818	19,032	46,038
Jobs	Indirect	3,106	4,396	989	135	650	221	9,497	8,287	15,926
Jobs	Induced	3,354	3,745	776	176	467	591	9,109	7,742	13,747
Jobs	Total	16,679	15,070	7,819	816	2,496	2,545	45,425	35,061	75,712
Wages ($M)	Direct	$639.3	$376.5	$239.4	$37.5	$93.9	$130.6	$1,517.2	$1147.2	$2,392.5
Wages ($M)	Indirect	$121.8	$316.7	$36.0	$6.1	$23.4	$13.3	$517.3	$468	$850.2
Wages ($M)	Induced	$171.0	$229.8	$36.2	$8.9	$23.5	$37.7	$507.1	$433.2	$733.9
Wages ($M)	Total	$931.2	$923.0	$311.6	$52.5	$140.8	$181.7	$2,540.8	$2,047.5	$3,975.9
Output ($M)	Direct	$1,654.5	$974.4	$619.5	$97.0	$243.1	$338.0	$3,926.5	$2,969	$6,191.8
Output ($M)	Indirect	$291.6	$760.6	$103.6	$16.0	$51.5	$28.9	$1,252.2	$1,119.7	$2,221.6
Output ($M)	Induced	$653.7	$697.4	$164.5	$34.4	$89.0	$117.3	$1,756.3	$1,474.5	$2,638.7
Output ($M)	Total	$2,599.7	$2,432.4	$887.6	$147.4	$383.6	$484.2	$6,934.9	$5,563.1	$11,052

Source: The Maguire Company 2017.

Notes:

Arizona Total includes all bases in 2017 study, including those not listed in the table: Fort Huachuca, YPG, Arizona ANG 161st and U.S. Naval Observatory.

Data have been summed for the BMGR and for the Gila Bend AFAF; however, some of the local economic impacts may not be related to BMGR or Gila Bend AFAF operations. The sums for Arizona as a whole include military installations that do not use the BMGR on a regular basis.

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Acronyms

Acronym	Definition
AFAF	Air Force Auxiliary Field
AFB	Air Force Base
ANG	Air National Guard
ARNG	Army National Guard
BMGR	Barry M. Goldwater Range
CDP	Census defined places
LEIS	Legislative Environmental Impact Statement
MCAS	Marine Corps Air Station

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Appendix K – Public Hearing Recorded Presentation Script and Transcripts

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BMGR Virtual Public Hearing Commander Welcome Messages, Background Video, and Pre-Recorded Presentation Script

Hello! I am Brigadier General Gregory Kreuder, Commander of the 56th Fighter Wing at Luke Air Force Base, and I'd like to welcome you to today's virtual public hearing for the Draft Legislative Environmental Impact Statement addressing the proposed extension of the Barry M. Goldwater Range land withdrawal. The presentation that will be shown momentarily will give you some background information on why this range is so important to the Department of Defense and why we are asking Congress to extend the land withdrawal and reserve the public land for military purposes. The great weather we have in Arizona allows us to fly nearly every day of the year and that's how frequently we train to ensure our pilots and associated ground-based combat specialists have the skills to win on the battlefield. To optimize this resource, the range has been divided into BMGR East, used principally by the Air Force, and BMGR West, which is principally used by the Marine Corps. Much more information is in the presentation, but before we share the presentation with you, let me introduce you to my Marine Corps colleague, Colonel Dudik.
I'm Colonel Charles Dudik, Commanding Officer at Marine Corps Air Station Yuma, and I would also like to thank you for participating in today's hearing. The BMGR is a critically important asset. It is centrally located within a regional complex of more than a dozen military air bases, as well as other ranges and special use airspace that collectively provide diverse and integrated support for tactical aviation and related training. The BMGR has the capacity that make it one of the nation's premier tactical training ranges. The size of the range, its varied terrain, and the training features such as target complexes contribute to our ability to train like we fight. We see no end in our need for this range and we intend to keep investing in it, including in our environmental stewardship programs. It is important for you to understand that Congress expects us to evaluate the environmental effects of our actions and that's what the Draft Legislative Environmental Impact Statement discloses. Equally important, Congress wants to hear your comments on the analysis and findings. With that, let's move on to our presentation so we can get to your important comments.
The Barry M. Goldwater Range, or B-M-G-R, was established in 1941 to support the Army Air Forces flying and training programs at Luke Field and Williams Field near Phoenix. Located in southwestern Arizona and originally comprising 1.1 million acres, the range was divided into eastern and western segments known as the Gila Bend Gunnery Range and the Yuma Aerial Gunnery and Bombing Range. During World War II, the range expanded to 2.1 million acres as more lands were withdrawn to meet training demands for the nation's war effort. In 1986, the range was renamed in honor of Barry M. Goldwater, who had served at Luke Air Force Base during World War II and went on to serve as an Arizona senator. Today, the range consists of approximately 1.7 million acres of land, and spans across Yuma, Maricopa and Pima counties. The Air Force is responsible for 1.05 million acres

of land called BMGR East, while the Navy and Marine Corps are responsible for around 693,000 acres of land called BMGR West.

Due to its vast, largely uninhabitated, undeveloped land area and year-round flying weather, the BMGR is considered a national training treasure. The BMGR supports training for various military bases and organizations including Luke Air Force Base, Davis-Monthan Air Force Base, The United States Navy, Marine Corps Air Station Yuma, Arizona Air National Guard, Silverbell Army Heliport and many others to include several allied units. Its proximity to these installations and fleets in the Pacific Ocean allows for advanced aircrew training and operational combat training, which has helped solidify the BMGR as a critical asset for national defense.

Most of the BMGR is on land under the administrative jurisdiction of the Bureau of Land Management, or BLM. This public land has been withdrawn and reserved for military use. The current withdrawal is scheduled to expire in October 2024. The BLM is responsible for processing Federal land withdrawal applications. The Air Force and the Marine Corps submitted a joint application to extend the existing BMGR land withdrawal so that the range may continue to be reserved for military purposes.

In addition, the Air Force submitted an application for the withdrawal of approximately 2,366 acres of land adjacent to the Gila Bend Air Force Auxiliary Field. This land, referred to in the LEIS as the proposed Gila Bend Addition, has been segregated from the public land laws, putting a hold on mineral extraction and other entry until a decision on withdrawal is made. If withdrawn, the Gila Bend Addition would become part of BMGR East.

The environmental effects of the proposed BMGR land withdrawal extension and the withdrawal of the Gila Bend Addition are being addressed in an LEIS in accordance with the National Environmental Policy Act (or NEPA [nee pa]). The purpose of NEPA is to obtain public input and to disclose potential impacts associated with the action. A Legislative Environmental Impact Statement, also referred to as an LEIS, was prepared to document the NEPA process. The LEIS describes the purpose and need for the action, the alternative selection process, evaluates several alternatives, and discloses potential environmental impacts associated with each alternative. Once public input is received and the LEIS is finalized, it will be added to a case file submitted to the Secretary of the Interior. The Case File will then be used by the Departments of Defense and the Interior to draft proposed withdrawal legislation. Once complete, the Case File and the draft legislation will be forwarded to Congress for review and to inform their decision.

Congress will be asked to make two decisions:

1. Whether to reauthorize the BMGR to allow the continuation of military training and testing, and
2. Whether to expand BMGR East through the additional withdrawal of the Gila Bend Addition if military use of the BMGR is reauthorized.

Let's review the purpose and need for extending the land withdrawal, which is described in more detail in Chapter 1 of the LEIS.

The purpose of securing the BMGR for continuing national defense use after October 2024 is to maintain the readiness of the nation's armed forces by retaining one of its premier ranges for training tactical air combat aircrews and other personnel to fight, survive, and win in the air-ground battlespace. The BMGR provides a safe and secure environment for conducting this training. Air combat is among the most technologically advanced and tactically challenging forms of warfare.
No participant in any form of tactical aviation is likely to survive, much less prevail in combat, without superior training. Combat flying and other essential aircrew skills can be effectively developed and maintained only through ongoing training that is realistic and relevant to the tactical missions that aircrews are expected to perform.
Likewise, continuous operational aviation testing is necessary to maintain and advance the capabilities of the tools available to aviators in combat. U.S. warfighting doctrine also recognizes that success in the air-ground battlespace can only be achieved through an integrated and well-coordinated partnership between air and ground forces.
The level of training needed for ground-based warfighters to achieve operational readiness in this partnership must be no less realistic or rigorous than that required for the aviation element.
The climate of southern Arizona provides some of the most reliable visual flying weather in the country. The size of the range, diversity of its terrain, and available special use airspace supports a wide variety of training opportunities every day of the year.
BMGR East and BMGR West are each equipped with electronic instrumentation systems used to observe, measure, record, and replay the simultaneous actions of aircraft participating in air-to-air and air-to-ground training engagements.
The BMGR is centrally located within a regional complex of military air bases, Navy aircraft carriers, other ranges, and other special use airspace that provide diverse and integrated support for tactical aviation and related training. The air bases and ranges located in proximity to each other optimize productive training time; minimize expensive, noninstructional flight time to and from the range; and minimize the need to refuel.
The Gila Bend Addition would help to resolve some safety concerns and support full use of the R-2305 restricted airspace. The Gila Bend Air Force Auxiliary Field is near the BMGR East boundary. The proposed land withdrawal would enhance the security and safety of flight operations at the airfield, incorporate the Accident Potential Zone into the BMGR, and allow the Air Force to control land use underlying restricted airspace. Controlling surface use and access would enhance safety for military personnel and the public by keeping activities on the land compatible with training operations at the airfield and in the airspace.
The Proposed Action is to extend the existing BMGR land withdrawal, incorporate the Gila Bend Addition into BMGR East, and reserve the land for military purposes. Two sets

of alternatives are considered. The first set, represented by Alternative 1 and its variants, would withdraw the public land in the existing range boundary. The second set, represented by Alternative 2 and its variants, includes extending the existing BMGR withdrawal and expanding BMGR East to include the Gila Bend Addition. There are four variations on each of these two sets of alternatives. In addition, the No Action Alternative was evaluated.

Alternative 1 would continue the status quo of the BMGR by extending the same terms provided by Congress when it last reauthorized the range in 1999. That is, the withdrawal of the existing range would be extended for another 25 years, and administrative jurisdiction would not change. The Marine Corps and Air Force would continue to have management responsibility of military operations, land, and natural and cultural resources for BMGR West and BMGR East. The Department of the Interior would continue to be consulted for actions not covered by the military purposes for which the range was reserved and for non-emergency closures of the range.

Alternative 1A would have the same terms as Alternative 1 with the exception that the withdrawal duration would be for 50 years.

Alternative 1B would also have the same terms as Alternative 1 but the withdrawal duration would be indefinite and would continue until the Secretaries of the Air Force and Navy determine the range is no longer needed for national defense purposes.

Finally, under Alternative 1C, administrative jurisdiction would be permanently transferred from the Secretary of the Interior to the Secretaries of the Air Force and Navy. This would eliminate some of the roles of the Department of the Interior and make the BMGR a permanent Department of Defense facility, much like a military base, until it is no longer needed for military purposes.

Alternative 2 would include the extension of the BMGR land withdrawal as identified in Alternative 1 and would also include the new withdrawal of the Gila Bend Addition. This second set of alternatives would be similar to the first set except the land withdrawal area would be increased by 2,366 acres. That is Alternative 2 would be a 25-year withdrawal period, Alternative 2A would be for 50 years, and Alternative 2B would be until the Department of Defense no longer has a military need for the range. Alternative 2C would transfer administrative jurisdiction, essentially making the range and the Gila Bend Addition a permanent military facility and making the Department of Defense fully accountable for the land.

Under the No Action Alternative, the land withdrawal would expire. Training and testing activities on the range surface would end, but military aviation use of the Special Use Airspace could continue. The BMGR would be decontaminated by clearing unexploded ordnance, where feasible, and military facilities would be decommissioned. The range would revert to BLM administration and management.

In most cases, impacts associated with Alternatives 1 and 2 and their variants are the same because the duration of the withdrawal would not typically change the effects. In the following slides, the impacts identified for the BMGR apply to both sets of alternatives, that is with and without the Gila Bend Addition. After a review of common

impacts, impacts that are specific to the land comprising the Gila Bend Addition are summarized.

While the entire BMGR is needed to provide a safe and secure training environment, only a small portion of the range surface is impacted. Altogether, approximately 8.6 percent of the range surface is affected, and only about 2 percent is moderately to highly disturbed by surface activities. Current surface area use is about half of what it was at the beginning of the withdrawal in 1999 owing to improvements in bombing accuracy and the ability to reduce the extent of explosive ordnance clearance areas.

The LEIS looked at 18 different resource areas of the human and natural environment. The continuation of existing military operations would have little to no change for many of the resource areas. In this presentation we highlight the resources that were identified as areas of interest or concern during the scoping process.

There are numerous recreational areas and opportunities in the surrounding region, including Cabeza Prieta National Wildlife Refuge, Sonoran Desert National Monument, Organ Pipe Cactus National Monument, Kofa National Wildlife Refuge, BLM public lands, and El Pinacate y Gran Desierto de Altar Biosphere Reserve in Mexico. In addition, public recreation that is compatible with the military mission is available on 38 percent of the BMGR with a valid recreation permit; this would not change with any of the alternatives.

Allowable activities at the BMGR include camping, hiking, hunting, sightseeing, bird and wildlife viewing, and use of off-highway vehicles. Under the no action alternative, following needed decontamination and cleanup of areas affected by military ordnance use and training activities, additional areas of the former range may be available for public recreational purposes, although BLM would need to evaluate the potential effects of recreation on natural and cultural resources during a planning process for the future of the land.

The intact desert ecosystem within the BMGR and surrounding areas such as the Cabeza Prieta support diverse wildlife habitat and communities. More than 200 bird species, 60 mammal species, 10 amphibian species, and 50 reptile species can be found within these areas. This includes two species protected under the Endangered Species Act, the acuña cactus and the Sonoran pronghorn, and two species managed in accordance with Candidate Conservation Agreements, the flat-tailed horned lizard and the Sonoran desert tortoise. Impacts to wildlife and vegetation result from disturbance associated with ongoing training and maintenance activities and noise.

Several clusters of the acuña cactus occur on the eastern and northeastern edges of BMGR East. No military activities occur where this cactus grows. The Sonoran pronghorn range includes both BMGR East and BMGR West, and pronghorn have been reintroduced east of State Route 85 within BMGR East. The Air Force and Marine Corps are members of the Sonoran Pronghorn Recovery Team and provide funding and support for the Sonoran Pronghorn Recovery Plan efforts. Some measures implemented to date include developing artificial water sources and feed stations, conducting population surveys, and establishing a supplemental pronghorn breeding facility. To minimize the risk of military activities disturbing, startling, and/or physically

harming Sonoran pronghorn, a surveillance program was launched in the 1990s to ensure that pronghorn are not present in target and other training areas before military activities that could potentially harm them are cleared to proceed. The overall effects on ongoing operations would be minor and would not likely adversely affect the species if the BMGR is reauthorized. Noise and vehicle use associated with ongoing military activities would continue. Such disturbances would result in minor adverse effects. Ordnance use, grading of roads and target areas, and vehicle use could harm or kill individual Sonoran desert tortoise. Impacts are minimized by the implementation of conservation measures.
Ongoing operations that result in ground disturbance would continue to affect less than 9 percent of the vegetation and habitat on the range and less than 2 percent of the disturbance is at moderate to complete levels. The level of ground disturbance would likely increase under the No Action Alternative due to decontamination and decommissioning activities. Areas that are disturbed are more prone to the establishment of invasive plant species. Natural resources including wildlife, habitat, vegetation and invasive species are addressed through the adaptive management strategies identified in the Integrated Natural Resource Management Plan. Conservation programs would remain in place with the continuation of the land withdrawal.
The BMGR is prized for its cultural resources and rich cultural legacy. With human occupation of the land dating back 14,000 years, approximately 2,000 cultural resources sites have been identified, including prehistoric dwellings, artifacts, as well as historic structures. The land is also important to the Native American tribes of the region, and some Traditional Cultural Places occur. Historic military use such as constructing roads and establishing high-impact target areas likely affected cultural resources that are lost because of the ground disturbance. Now, cultural resource surveys are conducted in advance of military developments on the range. However, training operations continue to have the potential to inadvertently impact cultural resources from activities such as off-target bomb drops, dispersed ground troop exercises, or off-road vehicle use needed to respond to an aircraft crash. Ongoing comprehensive cultural management programs and protection strategies are included in the Integrated Cultural Resources Management plans prepared for BMGR East and BMGR West.
Eighteen Native American groups claim affiliation with the BMGR. Government-to-government outreach and involvement helps guide the management of the cultural resources and promotes tribal participation. For this undertaking, tribal outreach began prior to the scoping phase of the project and continues with the review of the LEIS.
The intensity of sound is measured in decibels, with sound level of zero decibels approximating the threshold of human hearing and a typical conversation at 3 feet is usually about 60 to 65 decibels. Noise exposure is generally categorized as having low or no impact for noise less than 65 decibels, moderate impact for 65 to 75 decibels,

and high impact for more than 75 decibels. Noise from aircraft operations is reported in annual average values. Noise is generated by aircraft subsonic and supersonic operations conducted in restricted areas, training at auxiliary airfields within the range, and delivery of live ordnance within the tactical ranges. Operations at the BMGR have been modeled and illustrated by noise contours. With the exception of operations at the Gila Bend Air Force Auxiliary Field, no noise contour at 65 decibels or higher extend beyond the range boundary. With the introduction of the F-35"A" aircraft, military operations at the Gila Bend Auxiliary Field near the BMGR East boundary are projected to affect off-range land north and east of the airfield with average noise levels up to 74 decibels under all action alternatives. If the no action alternative is selected, some aircraft noise would continue as use of the airspace and low-level flight corridors would be expected to continue. Noise would occur during decommissioning activities. Future noise levels from aircraft operations over the former BMGR would depend on the uses, that cannot be forecasted at this time.
The BMGR is withdrawn to provide a secure location in which military training activities can be conducted without endangering the safety of military personnel or civilians, and without interference or interruption. The airspace is divided into subranges to facilitate multiple concurrent training events and to keep non-participants out of active training areas. Even though vast areas of the range surface have a negligible military surface footprint, positive control of the land underlying a restricted area is intended to avoid loss of life or damage to property if there is a malfunction of an aircraft, weapons system, or a student error. If the BMGR withdrawal is extended, Air Force and Marine Corps would continue to adhere to the safety guidance and procedures. Training is not anticipated to change so no new public safety risks would be introduced. Public access protocols would continue to minimize conflict between visitors and military operations. Under the No Action Alternative, following decommissioning, military hazards to public safety would be reduced. Non-military risks to public safety such as border-related safety would not change. Future public safety risks are unknown as the disposition of the land under BLM's control is undetermined at this time.
The BMGR and other military installations contribute to the economies of the communities around the range and the home installations that use the range. The installations that regularly rely on the BMGR for training create more than 45,000 jobs and contribute an estimated 11.5 billion dollars into the local economy through direct military spending and the dollars recirculated by the people spending their earnings on goods and services. Given the income and jobs that are generated by the installations that regularly use BMGR, the continued withdrawal of the range would result in an ongoing beneficial impact on the local communities that host these installations.

In contrast, the loss of jobs and income to the perimeter areas and the communities that host primary users of the BMGR would be a substantial adverse impact to the workforce and the local economies if the land withdrawal is not extended.
While the Gila Bend Addition has no trails or scenic qualities that would attract visitors, the land has been available for recreation. With the abundance of other recreational opportunities in the area, the adverse impact of withdrawing the land and closing it to recreational use would be negligible. Authorization for other public uses such as mining and grazing would also end. Of the two grazing allotments that overlap with the proposed withdrawal, one allotment was last grazed in 1989 and the other grazing permit is inactive. Existing grazing permits would continue until they expire, at which point they would not be renewed. No development is planned for the Gila Bend Addition, so no impact to cultural or biological resources is anticipated. No new sources of noise would be introduced if the Gila Bend Addition is withdrawn, but the withdrawal would reduce the area outside of the range that is affected by noise. The Gila Bend Addition would increase safety of the range and help manage compatibility in the areas near Gila Bend Air Force Auxiliary Field. If withdrawn, the Gila Bend Addition would be subject to Air Force guidance and procedures. The preclusion of other uses within the withdrawn area would enhance the safety of flight operations at Gila Bend Air Force Auxiliary Field and create a safety buffer along a portion of the range perimeter and under restricted airspace. Finally, the Gila Bend Addition would not influence the economic impacts because of its small size and likelihood that it will remain undeveloped.
The BMGR is an essential resource for training our military forces. Extending the withdrawal would not result in the introduction of new adverse environmental impacts but would continue to create jobs and induce spending near the BMGR and around the bases that regularly use the BMGR. Finally, the withdrawal of the Gila Bend addition would improve the safety of the BMGR and the use of airspace to most effectively train within the BMGR.

PDF TRANSCRIPT COVER PAGE

BMG Public Hearing 2-2-2021

February 2, 2021

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Court Reporters **Videoconference** **Transcription**

VIDEOCONFERENCED PUBLIC HEARING OF THE
BARRY M. GOLDWATER RANGE DRAFT LEGISLATIVE
ENVIRONMENTAL IMPACT STATEMENT

February 2, 2021
3:00 p.m.

PREPARED FOR:
JACOBS ENGINEERING

(COPY)

REPORTED BY:
Cindy Bachman
Arizona CCR No. 50763
AZ Registered Reporting Firm No. R1008

BARRY M. GOLDWATER RANGE DRAFT LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT PUBLIC HEARINGS, taken on February 2, 2021, commencing at 3:00 p.m., by videoconference before CINDY BACHMAN, a Certified Reporter in the State of Arizona.

(Commencement of hearing at 3:00 p.m.)

* * * * *

LIEUTENANT COLONEL JAMES: Good afternoon. I'm Lieutenant Colonel Christopher James. I'm an Air Force judge and will be the presiding officer and moderator for today's public hearing in the Barry M. Goldwater Range Land Withdrawal Legislative Environmental Impact Statement.

For the record, today is the 2nd of February 2021. As the moderator, my role is to ensure that the Air Force and Marine Corps provide a fair, orderly, and impartial hearing where you have an opportunity to make comments on the proposal.

I do not work for anyone at the Air Force Civil Engineer Center, nor am I associated with the Marine Corps. I'm not involved in any way with the development of this draft, Legislative Environmental Impact Statement or LEIS, and I do not act as the legal advisor to the Air Force or Marine Corps representatives working on this proposal.

This hearing is held in accordance with the provisions of the National Environmental Policy Act, as implemented by the council on Environmental Quality Regulations and Air Force and Marine Corps regulations.

We are here to present information on the environmental impacts of the proposed extension of the Barry M. Goldwater Range, or BMGR, Land Withdrawal. This hearing is one of several opportunities for you to express your views and concerns about the adequacy of the environmental analysis or other issues related to the process established by the National Environmental Policy Act.

This hearing is not a debate or a question-and-answer session. In a formal hearing, we cannot take or answer project questions. Questions entered into the Chat box will not be answered, and any comments typed into the Chat box cannot be accepted and will not be included in the administrative record.

At the end of this presentation, I will share information on how to submit written comments, and then we will take oral comments.

If you would like to make an oral comment, please indicate this in one of three ways.

One, if you called in, you can press *9 to raise your hand.

Two, if you joined using the Zoom app, you can raise your hand by clicking on the Reactions button at the bottom of your screen and selecting Raise Hand, or you may find the Raise Hand feature by clicking on

Participants and then looking at the bottom of the Participants box.

Three, if you joined using the web version of Zoom or do not see a Raise Hand option, you can enter your first and last name in the Chat box.

Requests to comment will be acknowledged following the presentation and short recess.

Please be advised that the hearing is being recorded, and the audiovisual recording will be available soon on the project website. I will offer that website address in a moment for those listening by phone, so please be prepared to write that down.

Phone participants may download the PowerPoint presentation if you would like to follow along with the visual presentation. The slides can be found by going to the Documents page of the website.

Part of the presentation includes a short video clip on the history of the range. This video, as well as other videos, developed for the scoping phase of this project are also available on the Documents page of the website. The project website address is barry-m, as in Mike, -goldwater-range-leis.com.

We also have a court reporter from Ottmar & Associates who's preparing a transcript of this hearing, including your oral comments.

For written comments included in the final LEIS, the team intends to redact addresses, telephone numbers, or other personal information other than your name, but we cannot guarantee that such information will be completely omitted from the public record.

During these introductory remarks and throughout the presentation, all participants have been muted to avoid background noise and other distractions. When we open this hearing for public comments, we will provide additional direction on how to unmute your microphone or telephone.

Several members of our elite team are engaged in this hearing and are listening to your comments. I would like to introduce four of the key team members listening to your comments today.

The draft LEIS was prepared under a contract with the Air Force Civil Engineer Center with Ms. Jean Reynolds serving as the project manager, and Mr. Jonathan Haliscak serving as the technical advisor.

The BMGR is predominately used by the Air Force and Marine Corps. BMGR East is scheduled and operated by Luke Air Force Base under the direction of Mr. Chas Buchanan. And BMGR West is scheduled and operated by Marine Corps Air Station-Yuma under the direction of Mr. Bill Sellars.

These individuals, along with several other staff members, involved in the preparation and review of the environmental analysis are participating in this hearing.

Our agenda for this hearing is to start with a prerecorded presentation that will last approximately 25 minutes and provides information that may help you formulate comments.

When the presentation is complete, I will provide directions on how to offer comments. And then we will take a five-minute recess to allow you time to organize your thoughts for offering a comment.

When it appears that we have no more comments, I will provide some closing remarks on how to provide written comments, and then we will adjourn.

A second public hearing will be offered tomorrow at 6:00 p.m. Mountain time and will be identical in format. There is no need for you to participate in both hearings unless you have additional oral comments to share or if you want to listen to the comments offered by others.

Our presentation begins with a short welcome from the commanding officers at Luke Air Force Base and Marine Air Corps Station-Yuma. Our narrator for most of this presentation is Lieutenant Brett

Vannier stationed at MCAS-Yuma. We will now cue the prerecorded presentation.

(Video presentation.)

LIEUTENANT COLONEL JAMES: This concludes the presentation portion of tonight's meeting. If there are any public officials, please indicate in the Chat box or let the operator know so we may greet you first.

We will now take a five-minute recess and resume the hearing at approximately 1530 -- 1535, rather. Thank you.

(A recess was taken from 1530 to 1535.)

LIEUTENANT COLONEL JAMES: We are now entering the comment portion of our meeting.

In just a moment, we will discuss how to make a live comment. But first, if you would like to provide a written comment, you can by emailing it to BMGR_LEIS@Jacobs.com.

If you prefer to mail comments to BMGR LEIS, PO Box 2324, Phoenix, Arizona 85003 or post a comment on the project website using the comment form at www.barry-m, as in Mike, -goldwater-leis.com.

Comments must be submitted by March 1, 2021, to be included in the project record and addressed in the final LEIS.

If you need more information, you can contact the Luke Air Force Base, 56 Fighter Wing Public Affairs Office at 623-856-5853 or by emailing 56fw.pa@us.af.mil or by emailing the Marine Corps Air Station-Yuma Public Affairs at MCASYuma_Media@usmc.mil.

We will now start taking live comments. Commenters will be called on in turn. Public officials will be called on first.

If you have not yet registered and would like to make a comment, please raise your hand. If you are on the telephone, press *9 to raise your hand.

If you are on Zoom, click on the Raise Hand icon. If you do not have Raise Hand option, enter your first and last name in the Chat box. When you are called on, you can unmute yourself by pressing the microphone icon on Zoom or by pressing *6 on your telephone.

Each comment will be limited to three minutes. Please begin by clearly stating and spelling your full name, affiliation if you are representing an agency or an organization, and the community in which you live for the record, and then the three minutes will begin.

And once again, this hearing is not a debate or a question-and-answer session. In a formal

hearing, we cannot take or answer project questions. Questions entered into the Chat box will not be answered and any comments typed in the Chat box cannot be accepted and will not be included in the administrative record. Your comments will be addressed in the final LEIS.

MS. DEFEND: At this time, nobody has registered to make a comment. You're welcome to raise your hand or type your name in the Chat box if you'd like to make a comment.

(No response from the public.)

MS. DEFEND: We're going to continue to keep this meeting open for a little while longer. After 10 minutes has passed and there's been no comments, we will close the meeting. But if you'd like to make a comment, please raise your hand.

Thank you.

(No response from the public.)

LIEUTENANT COLONEL JAMES: This concludes our public hearing. Thank you for joining us.

A link to the recorded presentation and all project information is available on the BMGR project website at www.barry-m, as in Mike, -goldwater-leis.com.

In addition, if you would like to be added

to the project mailing list, please go to the website and provide your contact information on the Contact Us tab.

We will keep the hearing open for 10 minutes in case someone calls in to make a comment. If no other commenters speak during that 10 minutes, we will adjourn the hearing and record that time of adjournment in the record.

Thank you again and have a good evening.

(No response from the public.)

LIEUTENANT COLONEL JAMES: Let the record show that the time is now 1555 and no comments have been recorded in the last 10 minutes.

This hearing for the Draft Barry M. Goldwater Range Land Withdrawal Legislative Environmental Impact Statement is now adjourned.

(The hearing concluded at 3:55 p.m.)

* * * * * *

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

BE IT KNOWN that the foregoing proceedings were taken before me; that the witness before testifying was duly sworn by me to testify to the whole truth; that the foregoing pages are a full, true, and accurate record of the proceedings, all done to the best of my skill and ability; that the proceedings were taken down by voice shorthand and thereafter reduced to print under my direction.

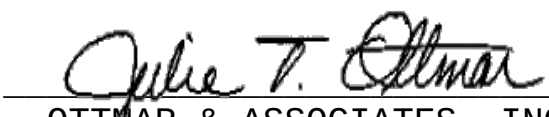
I CERTIFY that I am in no way related to any of the parties hereto nor am I in any way interested in the outcome hereof.

[ ] Review and signature was requested.
[ ] Review and signature was waived.
[X] Review and signature not requested/required.

I CERTIFY that I have complied with the ethical obligations set forth in ACJA 7-206(F)(3) and ACJA 7-206(J)(1)(g)(1) and (2). Dated in Phoenix, Arizona, this 11th day of February 2021.

Cindy Bachman
AZ Certified Reporter No. 50763

I CERTIFY that OTTMAR & ASSOCIATES, INC., has complied with the ethical obligations set forth in ACJA 7-206(J)(1)(g)(1) through (6).



OTTMAR & ASSOCIATES, INC.
AZ Registered Reporting Firm No. R1008

PDF TRANSCRIPT COVER PAGE

BMG Public Hearing 2-3-2021

February 2, 2021

OTTMAR

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scheduling@ottmarassoc.com

Court Reporters **Videoconference** **Transcription**

VIDEOCONFERENCED PUBLIC HEARING OF THE BARRY M. GOLDWATER RANGE DRAFT LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT

February 3, 2021
6:00 p.m.

PREPARED FOR:
JACOBS ENGINEERING

(COPY)

REPORTED BY:
Cindy Bachman
Arizona CCR No. 50763
AZ Registered Reporting Firm No. R1008

BARRY M. GOLDWATER RANGE DRAFT LEGISLATIVE ENVIRONMENTAL IMPACT STATEMENT PUBLIC HEARINGS, taken on February 3, 2021, commencing at 6:00 p.m., by videoconference before CINDY BACHMAN, a Certified Reporter in the State of Arizona.

(Commencement of hearing at 6:00 p.m.)

* * * * *

LIEUTENANT COLONEL JAMES: Good evening. I'm Lieutenant Colonel Christopher James. I'm an Air Force judge and will be the presiding officer and moderator for today's public hearing on the Barry M. Goldwater Range Land Withdrawal Legislative Environmental Impact Statement.

For the record, today is the 3rd of February 2021. As the moderator, my role is to ensure the Air Force and Marine Corps provide a fair, orderly, and impartial hearing where you have an opportunity to make comments on the proposal.

I do not work for anyone at the Air Force Civil Engineer Center, nor am I associated with the Marine Corps. I'm not involved in any way with the development of this draft, Legislative Environmental Impact Statement or LEIS, and I do not act as a legal advisor to the Air Force or Marine Corps representatives working on this proposal.

This hearing is held in accordance with the provisions of the National Environmental Policy Act, as implemented by the council on Environmental Quality Regulations and Air Force and Marine Corps regulations.

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At the end of the presentation, I will share information on how to submit written comments, and then we will take oral comments.

If you would like to make an oral comment, please indicate this in one of three ways.

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Requests to comment will be acknowledged following the presentation and a short recess.

Please be advised that the hearing is being recorded, and the audiovisual recording will be available soon on the project website. I will offer that website address in a moment for those listening by phone, so please be prepared to write that down.

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We also have a court reporter from Ottmar & Associates who's preparing a transcript of this hearing, including your oral comments.

For any comments included in the final LEIS, the team intends to redact addresses, telephone numbers, or other personal information other than your name, but we cannot guarantee that such information won't be completely omitted from the public record.

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These individuals, along with several other staff, involved in the preparation and review of the environmental analysis are now participating in this hearing.

Our agenda for this hearing is to start with a prerecorded presentation that lasts approximately 25 minutes and provides information that may help you formulate comments.

When the presentation is complete, I will provide directions on how to offer comments. And we will take a five-minute recess to allow you time to organize your thoughts for offering a comment.

When it appears that we have no more comments, I will provide some closing remarks on how to provide written comments, and then we will adjourn.

Our presentation begins with a short welcome from the commanding officers at Luke Air Force Base and Marine Air Corps Station-Yuma. Our narrator for most of this presentation is Lieutenant Brett Vannier stationed at MCAS-Yuma. We will now cue the prerecorded presentation.

(Video presentation.)

LIEUTENANT COLONEL JAMES: This concludes the presentation portion of tonight's meeting. If there are any public officials, please indicate in the

Chat box or let the operator know so we may greet you first.

We will now take a five-minute recess and resume the hearing at 1830. Thank you.

(A recess was taken from 1825 to 1830.)

LIEUTENANT COLONEL JAMES: We are now entering the comment portion of our meeting.

In just a moment, we will discuss how to make a live comment. But first, if you would like to provide a written comment, you can by emailing it to BMGR_LEIS@Jacobs.com.

If you prefer, you can mail comments to BMGR LEIS, PO Box 2324, Phoenix, Arizona 85003 or post a comment on the project website using the comment form at www.barry-m, as in Mike, -goldwater-leis.com.

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And once again, this hearing is not a debate or a question-and-answer session. In a formal hearing, we cannot take or answer project questions. Questions entered into the Chat box will not be answered and any comments typed in the Chat box cannot be accepted and will not be included in the administrative record. Your comments will be addressed in the final LEIS.

MS. DEFEND: At this time, we have no

raised hands, but if anybody would like to make a comment, please raise your hand or put your name in the Chat box. Thank you.

(No response from the public.)

MS. DEFEND: Once again, if you'd like to make a comment, please raise your hand or type your name in the Chat box. Thank you.

(No response from the public.)

LIEUTENANT COLONEL JAMES: If there are no other commenters, this concludes our public hearing. Thank you for joining us.

Let the record show that the time is now 1852 and no comments have been recorded in the last 10 minutes.

This hearing for the Draft Barry M. Goldwater Range Land Withdrawal Legislative Environmental Impact Statement is now adjourned.

Thank you and have a good evening.

(The hearing concluded at 6:52 p.m.)

* * * * * *

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

BE IT KNOWN that the foregoing proceedings were taken before me; that the witness before testifying was duly sworn by me to testify to the whole truth; that the foregoing pages are a full, true, and accurate record of the proceedings, all done to the best of my skill and ability; that the proceedings were taken down by voice shorthand and thereafter reduced to print under my direction.

I CERTIFY that I am in no way related to any of the parties hereto nor am I in any way interested in the outcome hereof.

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[ ] Review and signature was waived.
[X] Review and signature not requested/required.

I CERTIFY that I have complied with the ethical obligations set forth in ACJA 7-206(F)(3) and ACJA 7-206(J)(1)(g)(1) and (2). Dated in Phoenix, Arizona, this 11th day of February 2021.

Cindy Bachman
AZ Certified Reporter No. 50763

I CERTIFY that OTTMAR & ASSOCIATES, INC., has complied with the ethical obligations set forth in ACJA 7-206(J)(1)(g)(1) through (6).

OTTMAR & ASSOCIATES, INC.
AZ Registered Reporting Firm No. R1008

Appendix L – List of Preparers

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Appendix L
List of Preparers, Contributors, and Reviewers

Table L-1. List of Preparers

Name	Organization	Role
Mark Bastasch	Jacobs Engineering Group Inc.	Noise
Kyle Benne	Jacobs Engineering Group Inc.	Geographic Information System Analysis and Mapping
Sabra Bushey	Jacobs Engineering Group Inc.	Public Access and Recreation Resources, Public Health and Safety, Visual Resources
Beth Defend	Jacobs Engineering Group Inc.	Project Management
Joe D'Onofrio	Jacobs Engineering Group Inc.	Ground Transportation, Transportation and Traffic Circulation
Jill Harris	Jacobs Engineering Group Inc.	Biological Resources
Glennda Luhnow	Jacobs Engineering Group Inc.	Cultural Resources
Kristina Nygaard	Jacobs Engineering Group Inc.	Technical Editing
Bruce Palmer	Jacobs Engineering Group Inc.	Biological Resources
Julie Philippon	Jacobs Engineering Group Inc.	Noise
Karen Rhea	Jacobs Engineering Group Inc.	Graphics Support
Carl Rykaczewski	Jacobs Engineering Group Inc.	Earth Resources, Hazardous Materials and Waste, Water Resources
Katie Schwartz	Jacobs Engineering Group Inc.	Accessibility/508 Compliance, Technical Editing
Nancy Shelton	Jacobs Engineering Group Inc.	Quality Control
Brock Tunnicliff	Jacobs Engineering Group Inc.	Lead on the Description of the Proposed Action and Alternatives, Civil Air Transportation, Military Range and Airspace Operations
Pamela Vanderbilt	Jacobs Engineering Group Inc.	Air Quality, Climate Change Support
Mary Wilkosz	Jacobs Engineering Group Inc.	Climate Change, Environmental Justice, Non-Military Land Use, Perimeter Land Use, Socioeconomics, Utilities
Michelle York	Jacobs Engineering Group Inc.	Air Quality Modeling

Table L-2. List of Reviewers

Name	Agency	Role
Cindy Allen	Air Force, 56 FW/Judge Advocate	Environmental Law, Land Use, and General Law Attorney
Aaron Alvidrez	Air Force, 56 RMO/Environmental Science Management (ESM), Luke AFB	Biological Resource Specialist
Chas Buchanan	Air Force, 56 RMO, Luke AFB	Director, 56 RMO
Jim Cannizzo	Air Force, Environmental Law and Litigation Division, Operations and International Law Directorate, Office of The Judge Advocate General	Legal Counsel, Mission Sustainment and Planning
Jonathan Haliscak	Air Force, AFCEC	Military Range Specialist
Carol Heathington	56 RMO/Air Range Operations, Luke AFB	Chief, Air Range Operations
Maj. Melina Hill	Air Force, Environmental Law and Litigation Division, Operations and International Law Directorate, Office of The Judge Advocate General	Environmental Liaison Officer
Maj. Edwin Kisiel, III	Air Force, Headquarters Air Force, Environmental Law and Litigation Division, Operations and International Law Directorate, Office of The Judge Advocate General, Field Support Center	Environmental Law Attorney
Brad Marcum	Air Education Training Command (AETC) Range Operations	Military Range Specialist
Lisa McCarrick	Air Force, 56 RMO/ESM, Luke AFB	Chief, Environmental Science Management
John Nash, Jr.	Air Force, Headquarters Air Force	NEPA Support Contractor
Adrianne Rankin	Air Force, 56 RMO/ESM, Luke AFB	Archaeologist
Jean Reynolds	AFCEC	Contracting Officer's Representative
Devin Scherer	Air Force	Office of the Deputy Assistant Secretary (Installations)
Tiffany Shepherd	Air Force, 56 RMO/ESM, Luke AFB	Biological Resource Specialist
Alicia Treece	Air Force, 56 RMO/ESM, Luke AFB	Natural Resources Planner, NEPA Specialist
Dan Cecchini	Navy, Assistant Secretary of the Navy (Energy, Installations, and Environment)	Director, Environmental Planning and Terrestrial Resources
Lonie Cyr	Navy, NAVFAC Southwest	Realty Specialist
Greg Magnuson	Navy, NAVFAC Southwest	Supervisory Realty Specialist
Jim Omans	Navy, Assistant Secretary of the Navy (Energy, Installations, and Environment)	Director, Real Estate

Name	Agency	Role
Dany Saliba	Navy, NAVFAC Southwest	Southwest Realty Specialist
Jennifer Scarborough	Navy, Assistant Secretary of the Navy (Energy, Installations, and Environment), Pacific Programs Office	Environmental Lead
Brad Adams	Marine Corps, Marine Corps Installations Command (MCICOM)	Range Training Area Management
Mustafa Almuslimawi	Marine Corps, MCAS Yuma	Project Management Support Contractor
Mike Caras	Marine Corps, Training and Education Command – Range and Training Programs Division	Sustainable Ranges Specialist
Rukia Dahir	Marine Corps, MCAS Yuma	NEPA Specialist Support Contractor
George Ellis	Marine Corps, Marine Corps Installations (MCI) West (MCIWEST)	Regional Range & Training Area Planner
Randy English	Marine Corps, MCAS Yuma	Range Management, Conservation Program Director
Mary Ellen Finch	Marine Corps, MCAS Yuma	Community Planning and Liaison Office
Ken Harris	Marine Corps, MCICOM	Realty Specialist
Karla James	Marine Corps, MCAS Yuma	Cultural Resources
Ron Kruse	Marine Corps, MCAS Yuma	Public Works
Ron Lamb	Marine Corps, MCICOM	NEPA Specialist
Robert Law	Marine Corps, MCAS Yuma	Natural Resources Specialist
Zak Likins	Marine Corps, MCIWEST	Environmental Coordination and Compliance
Reid Merrill	Marine Corps, MCIWEST	Regional Real Estate Manager
Cdr. Gareth Montgomery	Marine Corps, MCAS Yuma	Director, Installation and Logistics
Jordan Myers	Marine Corps, MCAS Yuma	Cultural Resources
Ana Navejar	Marine Corps, MCAS Yuma	Realty Specialist
Sergio Obregon	Marine Corps, MCAS Yuma	NEPA Specialist
Jeremy Pennell	Marine Corps, MCAS Yuma	Natural Resource Specialist
Jo'El Santa Teresa	Marine Corps, Western Area Counsel Office	Legal Counsel
Bill Sellars	Marine Corps, MCAS Yuma	Range Operations Director
Pat Uetz	Marine Corps, Western Area Counsel Office	Land Use and Environmental Law
Steve Wenderoth	U.S. Marine Corps, MCICOM	Associate Counsel (Environment and Land Use)

Name	Agency	Role
Ryan Wing	Marine Corps, MCICOM	Real Estate Support
Brian Wottowa	Marine Corps, MCICOM	Aviation Facilities and Environmental DC AVN (ASL)
Tyler Williford	AZGFD	Habitat Evaluation, and Lands Program Supervisor – Region IV
Eddie Arreola	BLM, Arizona State Office	Supervisory Project Manager, Renewable Energy Coordination Office
Nancy Favour	BLM, Arizona State Office	Planning and Environmental Specialist
Sara Ferreira	BLM, Arizona State Office	Land Law Examiner
Brenda Wilhight	BLM, Washington Office	National Withdrawal Program Lead
Elizabeth Carls	DOI, Office of the Solicitor	Solicitor, Division of Land Resources
Sid Slone	USFWS, CPNWR	Manager, CPNWR

Appendix M – Comments on the Draft LEIS and Responses to Comments

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Appendix M
Comments on the Draft LEIS and Responses to Comments

During the Draft LEIS comment period (15 January 2021 through 1 March 2021) written comments from the LEIS process were accepted by mail, email, and via the BMGR project website. An opportunity for oral public comments was also provided during the virtual public hearings; however, no comments were provided.

The Air Force and Marine Corps received 74 comments on the Draft LEIS from 67 individuals, five non-governmental organizations, as well as the EPA and BLM. The comments from BLM were offered as minor corrections from a cooperating agency with subject matter expertise rather than formal public comments for publication. The five non-governmental organizations that submitted comments included: Network for Arizona Trails, the Southern Arizona Hiking Club, Friends of the Sonoran Desert, and a letter submitted jointly by the Sierra Club and Western Watersheds Project. Twenty of these comments were submitted via email, 27 comments via the project website comment form, and 28 comments via mail. Two individuals submitted comments via both email and the website comment form and one individual submitted comments via both email and mail. The comments submitted via two different media were the same so the duplicate submissions are not included in this appendix.

Comments were determined to be either substantive or non-substantive in nature. Substantive comments are specific, such as those that challenge the analysis, identify factual inaccuracies, identify impacts not analyzed, or suggest reasonable alternatives not considered. Non-substantive comments are comments that offered only opinions, provide information not directly related to project issues or the impact analyses, or showed general opposition to or support of the proposed action. Non-substantive comments were considered by the project team, but no response was deemed to be necessary other than to note the comment in the project record. All substantive comments were reviewed by appropriate resource specialists and provided a response. While infrequent, some comments prompted corrections, additions, or other clarifications to the LEIS analysis.

The commenters are listed in Table M-1 with the comment submissions organized in the following order:

- Federal agency comments
- Nongovernmental organization comments
- Individual comments

Following Table M-1, each of the public comment letters and web submissions received on the Draft LEIS is published in its original form. Each individual comment in each submission has been identified with a bracket and a comment number in the margin of the submission. The bracketed comments have been copied into Table M-2, which follows the letters received, and a response to each individual comment is included in Table M-2 in a separate column.

Table M-1. Draft LEIS Comment and Response Index

Letter Number	Commenter
1.	U.S. Environmental Protection Agency
2.	Friends of the Sonoran Desert
3.	Network for Arizona Trails
4.	Sierra Club and Western Watersheds Project
5.	Southern Arizona Hiking Club
6.	William Adamson
7.	Joann Alexander
8.	Dennis Astroth
9.	Beryl Baker
10.	Peter Bengston
11.	Evelyn Billo
12.	Donald Bird
13.	Bill Borchert
14.	Bill Broyles and Gayle Hartmann
15.	Lois Bunn
16.	Martha Burgess
17.	Carianne Campbell
18.	Sylvia Clevenger
19.	Sidney Coon
20.	Janice Cootz
21.	Jay Cravath
22.	Daniel Davis
23.	Donald Davis
24.	Jan Dowking
25.	Susanne Durling
26.	Jack Dykinga
27.	Michele Frisella
28.	Stephanie Grant

Letter Number	Commenter
29.	Susi Hauser
30.	Douglas Helber
31.	Sally Hills
32.	Michael Ingram
33.	Wendy Isner
34.	Don Jones
35.	Verlon Jose
36.	Mark Kasunicd
37.	Diane Kelly
38.	Diane Kelly
39.	Kristine Klewin
40.	Kristine Klewin
41.	Gisela Kluwin
42.	Diana Lancaster
43.	Carolyn Leigh
44.	Lainie Levick
45.	Marilyn Loveless
46.	Robert Luce
47.	Pat Madea
48.	Warren May
49.	Gail McDonald
50.	Linda Miller
51.	Rod Mondt
52.	Mary Myers
53.	Marian O'Reilly
54.	Logan Phillips
55.	Bruce Plenk
56.	Jeffrey Rein

Letter Number	Commenter
57.	Bruce Robinson
58.	Sherri Schamel
59.	Priscilla Scott
60.	Roger Shanley
61.	Cheryl Shearer
62.	Jon Sirkis
63.	Thomas Smithson
64.	Darlene Smyth
65.	Tim Tilton
66.	Bruce Tremper
67.	Jim Truitt
68.	Dale Turner
69.	Cathy Waterman
70.	Mark Ziska
71.	Edward Zukoski

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

March 1, 2021

Jon Haliscak
Air Force Civil Engineer Center
P.O. Box 2324
Phoenix, Arizona 85003

Subject: Draft Legislative Environmental Impact Statement for the Reauthorization of the Barry M. Goldwater Range Land Withdrawal and Proposed Gila Bend Addition Land Withdrawal, Yuma, Pima, and Maricopa Counties, Arizona (EIS No. 20210001)

Dear Jon Haliscak:

The U.S. Environmental Protection Agency has reviewed the above-referenced document pursuant to the National Environmental Policy Act, Council on Environmental Quality regulations (40 CFR Parts 1500-1508), and our NEPA review authority under Section 309 of the Clean Air Act.

This draft Legislative Environmental Impact Statement (DLEIS) evaluates the proposed extension of the military land withdrawal and reservation for the approximately 1.7-million-acre Barry M. Goldwater Range in southwestern Arizona. The Air Force is proposing withdrawal of an additional 2,366 acres of public land adjacent to the Gila Bend Air Force Auxiliary Airfield, referred to as the Gila Bend Addition. The EPA submitted scoping comments to the Air Force on May 14, 2020.

We appreciate the Air Force addressing some of the suggestions in our scoping comments such as the inclusion of ecological receptors in the Operational Range Assessments, which evaluate the potential for off-range migration of munitions constituents, and we request additional information in the Final LEIS to support its conclusions. We also recommend the Final LEIS discuss the potential for using existing land use control mechanisms, rather than withdrawal, to achieve the purpose and need for acquiring the southern-most parcels in the Gila Bend Addition. The EPA also provides comments related to the consideration of a 25-year extension as opposed to a 50-year or indefinite one, and continuation of existing administrative jurisdiction to maintain the current collaborative land management partnership with the Bureau of Land Management and U.S. Fish and Wildlife Service into the future. Finally, the EPA provides recommendations for coordination with the U.S. Fish and Wildlife Service to assess, disclose, and mitigate for impacts to large wildlife, including the endangered Sonoran pronghorn, in the context of the current affected environment that includes a newly impassible international border barrier. Our detailed comments are attached.

The EPA appreciates the opportunity to review this DLEIS. When the FLEIS is released for public review, please send one electronic copy to Karen Vitulano, the lead reviewer for this project, at

vitulano.karen@epa.gov. If you have any questions, please contact me at (415) 947-4167, or contact Karen at 415-947-4178 or via email.

Sincerely,

CONNELL DUNNING

Digitally signed by CONNELL DUNNING
Date: 2021.03.01 12:03:27 -08'00'

For Jean Prijatel, Manager
Environmental Review Branch

Enclosures: The EPA's Detailed Comments

cc: Ronald Lamb, U.S. Marine Corps
Mike Ouellett, Bureau of Land Management
Erin Fernandez, U.S. Fish and Wildlife Service
Sidney Slone, Cabeza Prieta National Wildlife Refuge
Paul Enriquez, Customs of Border Protection

Potential for Off-Range Contamination from Munitions Constituents (MC)

In our scoping comments, we recommended the DLEIS include a summary and discussion of the most recent Operational Range Assessment and Range Environmental Vulnerability Assessment, which address the potential for off-range migration of MC, and that the reports be appended to the DLEIS. We appreciate reference to ecological receptors as we suggested in our scoping comments, but the DLEIS did not append the reports and lacked sufficient discussion of their conclusions. The DLEIS states only that, for BMGR East, "a potentially complete pathway to ecological receptors was identified via surface water/sediment; however, based on the weight of evidence, no potential risk to ecological receptors was identified" (p. 3-98). Since there was no further discussion or presentation of the evidence, the conclusion is not supported. The DLEIS further states: "All other mechanisms to transport MC through soil and groundwater to off-range areas were deemed unlikely" without indicating how likeliness was determined. 1-1

> ***Recommendation:*** In the FLEIS, provide the evidence referenced that supports the statements that there is no potential risk to ecological receptors via surface water or sediment, and the scientific support that MC are unlikely to be transported off-range via groundwater. Indicate whether ORA/REVA modeling results exceeded any screening level values/thresholds. Specify whether any field sampling and analysis for surface water, sediment, or groundwater has occurred at the range boundaries and, if so, summarize the results. Identify the closest off-range downstream potable water wells.

Withdrawal of Southern Gila Bend Parcels

The proposed action would extend the existing withdrawal of 1,659,365 acres of federal public land for military training and testing. In addition, the Air Force is proposing to withdraw 2,366 acres of additional public land referred to as the Gila Bend Addition. For the northern parcels in this addition (southwest quarter of Section 19 adjacent to Gila Bend Air Force Auxiliary Field (AFAF) and northwest quarter of Section 31), the DLEIS describes a need for enhanced security and safety of flight operations at Gila Bend AFAF. The DLEIS also states that the northwest quarter of Section 31 is needed because a portion is within Accident Potential Zone-1 for Runway 17/35 at Gila Bend AFAF.

In contrast, the rationale for withdrawing the remaining southern parcels of the proposed Gila Bend Addition is not as supported. The DLEIS states that these parcels underlie the R-2305 restricted airspace and therefore the Air Force needs to control the surface land use in this area so it continues to be compatible with training operations in the overlying air space (p. 1-17). However, the DLEIS identifies large areas of restricted airspace that extend beyond the BMGR land boundaries including all of the adjacent Cabeza Prieta National Wildlife Refuge (which comprises approximately 31 percent of the restricted airspace at the BMGR), portions of the Tohono O'odham Nation of Arizona adjacent to the range, and other smaller areas (p. 1-14). Unlike other recent land withdrawal additions such as that for the Nevada Testing and Training, the DLEIS does not identify these southern parcels as being in a weapons safety footprint or accident potential zone. The Bureau of Land Management's Lower Sonoran Field Office manages the public lands comprising the Gila Bend Addition in accordance with the *Lower Sonoran Resource Management Plan* and the DLEIS indicates that the land is in a relatively natural state, contains no existing utilities, is not part of a formalized or designated recreational area (p. 3-42), has no unique features or through-road travel to attract people to the land (p. 3-93), has not been grazed 1-2

in decades (p. 3-107), and has no mineral deposits such that it is likely to be mined (p. 4-10). The DLEIS does not indicate whether the Air Force considered land use control mechanisms rather than withdrawal to control surface land use for these southern parcels. The DLEIS notes that each jurisdiction for perimeter lands surrounding the BMGR has processes in place to coordinate land use activities directly with the BMGR managers and/or through regional planning efforts (p. 3-27).

> ***Recommendation***: In the FLEIS, discuss the feasibility of using land use control mechanisms to control surface land use on the southern parcels of the Gila Bend Addition that are not associated with Gila Bend AFAF safety. Consult with the BLM to determine whether land use restrictions and/or permitting could be implemented on these parcels in lieu of withdrawal. We note that visitors to portions of the adjacent BLM Sonoran Desert National Monument are required to obtain a Barry M. Goldwater Range permit[1]; therefore, it appears existing permitting mechanisms may be available that could be used or modified to meet the Air Force purpose and need while avoiding further loss of public land.

1-2

Administrative Jurisdiction and Withdrawal Period Alternatives

Alternatives 1A, 1B, 2A, and 2B propose to extend the land withdrawal for periods greater than 25 years; 1A and 2A would extend it to 50 years; 1B and 2B would extend the land withdrawal indefinitely. While the DLEIS identifies certain efficiencies in a longer or an indefinite withdrawal period, there are also disadvantages. According to the DLEIS, the decision to reauthorize the BMGR would be a landscape-scale, land-use decision with long-term implications for the BMGR and associated affected environments (p. 80). The Integrated Natural Resource Management Plan (INRMP) states that significant changes in climate in this region will have broad impacts on ecosystems and consequences for biodiversity. The process for updating future land use and sustainability planning, as well as project-level analyses that may be tiered to the LEIS, would benefit from the periodic re-evaluation of the withdrawal as climate change and effects of land use decisions are better understood over time. While the DLEIS indicates that the DoD reviews the continuing need for its installations and other facilities to some degree with every budgeting cycle, and the periodic INRMP updates will still occur regularly, the NEPA process associated with land withdrawal renewals is more comprehensive, covers more resources than the natural resources addressed in an INRMP, and offers the public an additional opportunity for involvement.

1-3

Alternatives 1C and 2C address whether to continue the existing administrative jurisdiction that consults with the Department of Interior or permanently transfer administrative jurisdiction of the public lands to the DoD to become a permanent military facility. Transferring jurisdiction would deprive the BLM and the U.S. Fish and Wildlife Service of important preparation and consultation roles when updating the INRMP (p. 2-8), which could affect resource management. We agree with the U.S. Customs and Border Protection[2] that the existing administrative jurisdiction at BMGR has value.

> ***Recommendation:*** We recommend continuing with 25-year withdrawal periods to facilitate informed future decision-making based on the most up to date conditions, and to provide the public with an additional opportunity for involvement, especially for those resources that are not included in the INRMP. We also recommend the Secretary of the Interior retain underlying administrative jurisdiction for the withdrawal lands to continue the coordinated interagency land management approach.

[1] https://www.recreation.gov/camping/gateways/3110#
[2] Scoping Report Vol 3 p. G1

Affected Environment and Impacts Related to Large Wildlife Species and Sonoran Pronghorn

The DLEIS does not present updated information in the Affected Environment sections and does not fully assess impacts of the proposed action on large mammal species, including the endangered Sonoran pronghorn, in the context of the newly built international border fence (i.e. wall). As the DLEIS notes, the Department of Homeland Security and Army Corps of Engineers have recently constructed a 31-mile border barrier in BMGR West along the U.S.-Mexico international border, as well as a new 400 foot border barrier in the Roosevelt Reservation within BMGR West to close an existing gap near Border Monument 198 (p. 5-6). These DoD-funded projects utilized a waiver from the Department of Homeland security to waive several environmental and cultural resource protection laws including NEPA and the Endangered Species Act; therefore, the impacts of the border barrier on large mammal species, including the endangered Sonoran pronghorn, were not assessed and disclosed through the NEPA process. Because of DoD's involvement in these projects, it is important that the LEIS fully capture the cumulative impacts to these species and identify potential mitigation that would reduce these impacts.

With regard to the pronghorn, the DLEIS states only that "the border fence and wall, as well as Mexico Highway 2, isolate the Arizona population from the larger Mexican population" (p. 3-70); however, the DLEIS also references the benefit of exchanges of animals across the border to bolster genetic diversity (p. 5-3) indicating the DLEIS has not been updated to reflect current conditions. Elsewhere, the document acknowledges generically that barriers of any kind (highways, fences, railroads, and irrigation canals) on or adjacent to the BMGR are partial or complete barriers to some wildlife movement and limit wildlife access to historic water sources adjacent to the BMGR (p. 3-68), but the implications of this loss for large wildlife species are not presented. It is important to recognize that the land on the Mexico side of the border is protected as the El Pinacate y Gran Desierto de Altar Biosphere Reserve, a biosphere reserve and UNESCO World Heritage Site, and that fourteen wildlife underpasses were constructed on Mexico Highway 2 to facilitate transboundary wildlife movement[3]. 1-4

The DLEIS states that the Air Force and Marine Corps are members of the Sonoran Pronghorn Recovery Team and provide funding and support for Sonoran Pronghorn Recovery Plan efforts such as placing artificial water sources and feed stations, and other management programs beneficial to pronghorn (p. 3-70). If the Air Force intends to obtain administrative jurisdiction for the range from the Secretary of the Interior as proposed for some alternatives, additional actions to support these efforts as well as to promote cross-border connectivity would help mitigate impacts for those alternatives. The Recovery Plan states that Sonoran pronghorn require vast areas of unencumbered open range and this includes the ability to freely travel long distances between localized, seasonally sporadic rainfall in search of sustenance. The ability of such species to migrate to meet their annual needs for survival and reproduction will be vital for their capacity to adapt to climate change effects.

> ***Recommendations:*** We recommend the FLEIS include a more comprehensive impact assessment for large wildlife species, including the Sonoran pronghorn, in the context of the current affected environment which includes an impassible international border barrier. Consult with the USFWS, as appropriate, regarding these changes to the affected environment in which this renewal action will occur. If DoD assumes full administrative jurisdiction (Alternatives 1C and 2C), we recommend DoD coordinate with USFWS to establish additional protective measures, such as increasing funding for high priority recovery actions for the Sonoran pronghorn. Consult with the CBP to explore opportunities to mitigate the loss of cross-border connectivity for large wildlife, such as providing openings in key wildlife corridors along the

[3] *Recovery Plan for the Sonoran Pronghorn*, USFWS, November 2016, p. 89

border, especially ones that correspond with the Highway 2 wildlife underpasses. Ensure the presence of the barrier is accurately portrayed in the FLEIS (updates to Sections 3.1.1, 4.8.1.1, Table 5.1-1, etc. are needed). 1-4

Minor comments:

- Presentation of effects in the Executive Summary: Table ES-1 - Summary of Impacts, provides a brief description of the potential impacts associated with each alternative. Because Alternative 2 is additive to Alternative 1, all impacts that would occur under Alternative 1 are also applicable to Alternative 2; however, the table's contents for Alternative 2 include only the impacts associated with the withdrawal of the Gila Bend Addition and makes Alternative 2 appear less impacting. Revise Table ES-1 to indicate that Alternative 2 includes all the impacts listed under Alternatives 1 plus the impacts identified for Alternative 2. 1-5

- Executive Order update: Page 3-55 references Executive Order 13834 - *Efficient Federal Operations* stating that federal agencies address GHG emissions through efficient operations, energy and water savings, emission reductions, and renewable energy projects. The referenced portions of this EO were revoked by President Biden on January 20, 2021 via EO 13990 (except for Sections 6,7, and 11 regarding designation of a Chief Sustainability Office which are not referenced in the DLEIS statement). We recommend removing reference to EO 13834. 1-6

- Update of National Ambient Air Quality Standards designations: Please note that Ajo is now a designated particulate matter less than 10 microns (PM_{10}) maintenance area,[4] and West Pinal is now designated as serious nonattainment for PM_{10}.[5] 1-7

[4] See https://www.govinfo.gov/content/pkg/FR-2020-06-04/pdf/2020-11930.pdf#page=1
[5] See https://www.govinfo.gov/content/pkg/FR-2020-06-24/pdf/2020-12827.pdf#page=1

From: Roger McManus [redacted]
Sent: Wednesday, February 24, 2021 3:43 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] Comments by the Friends of the Sonoran Desert for the Barry M. Goldwater Range Land Withdrawal Draft Legislative Environmental Impact Statement

The Friends of the Sonoran Desert welcomes the opportunity to comment on the proposed extension of the Barry M. Goldwater Range withdrawal.

Our general support is limited to selection of Alternative 1 - an extension of the withdrawal for 25 years. We support that Alternative given our experience and degree of satisfaction with the DoD management of the region and its natural resources. We commend and express appreciation for the efforts of the many fine professionals who have contributed to the stewardship of our nation's natural and cultural resources on the BMGR.

However, we do so guardedly knowing that despite the degree of trust we have in the Department's management, the region's environment and wildlife have suffered significantly over the last several years. There is limited basis for not assuming such damages will not increase with time without greater focused effort by the DoD in cooperation with the Department of Homeland Security, and other Federal land management agencies responsible for public lands adjacent to the BMGR. Based on recent resource trends, 25 years is in reality too long a time period within our normal political frameworks for ensuring needed opportunities for substantive and policy reviews. We are opposed to any further expansion.

In particular, we are concerned with the ongoing, seemingly unbridled activities of the Department of Homeland Security (DHS) and the U.S. Army Corps of Engineers to modify historic and natural sites within the region. There is little information or evidence to suggest that DHS will adopt or implement any policies that will limit their damages to public lands in the region in their ongoing efforts to apprehend suspected illegal immigrants. We assume they are essentially operating with a relatively free rein in the BMGR, excepting with regard to DoD facilities and operations, and would appreciate a presentation on their policies and cooperation with the BMGR at the next Intergovernmental Executive Committee Meeting. 2-1

Recognizing that a key issue in the management of the BMGR is the estimated land use altered for the purposes of the withdrawal, FSD suggests that a satellite view analysis be initiated to document the area currently impacted by DoD activities in the BMGR that can serve as a benchmark for future assessments, whether disturbances are the results of DoD activities or otherwise. We understand that the presentation of such an analysis may have to be modified to safeguard issues of military concern; however, that should not interfere with a review basically to establish land impacts that would be important relative to BMGR lands management. 2-2

Regarding Water Resources, FSD suggests special consideration be given to identification and restriction to public access to standing water in the BMGR. With increasing temperatures and megadrought in the region, wildlife will become increasingly dependent on standing water resources and vulnerable to disturbance and interference from unmanaged human activity. 2-3

Regarding Earth Resources, FSD believes management with respect to cryptobiotic soil crusts is an important issue for the BMGR, particularly as it pertains to vehicle management on the BMGR and DHS operations, and public access. For all practical purposes loss of these resources is permanent. We support research, planning and monitoring of disturbance of soil surfaces in the BMGR from this perspective. 2-4

Regarding Public Access and Recreational Opportunities, FSD supports provision for these opportunities in the BMGR, although we are sceptical that current controls will be adequate for restricting ongoing and increased damages to the Sonoran Desert ecosystem within the area open to the public in the BMGR, and adjacent public lands. We request the preparation of a review regarding the efficacy of current management for public recreation, and that review be presented at an Intergovernmental Executive Committee as possible this year. We strongly suggest that an overall management plan for the BMGR public access areas be developed subject to public review. We suggest that the plan include procedures for identifying and implementing needed stewardship of areas damaged by recreational use or requiring special protection or recovery efforts for cryptobiotic soil crusts, and of species of concern. We suggest that the plan provide specific procedures for identifying and restricting public access for recreational use. 2-5

Regarding Climate Change, FSD supports continued meteorological research in the BMGR, in cooperation with other such efforts in the region. We suggest the status and results of the research be presented at a IEC meeting at least annually. Moreover, as the status of global change for resource management in the BMGR and public lands in the region is of particular importance given its impact on human activity and wildlife, we suggest this research activity be given high priority for ongoing support. 2-6

Regarding BMGR Biological Resources, FSD supports ongoing and enhanced efforts to provide needed stewardship efforts for BMGR biological resources, particularly with respect to animal and plant species protected under the U.S. Endangered Species Act, and the control of invasive species. 2-7

Sincerely,

Roger E. McManus
Chair of the Board of Directors
Friends of the Sonoran Desert

From: Kirk Astroth [redacted]
Sent: Friday, February 19, 2021 8:37 AM
To: BMGR LW LEIS
Subject: [EXTERNAL] Draft input on LEIS

Dear BMGR,

I am writing to urge adoption of Alternative 2 of the draft LEIS now under consideration. I have spent many days and hours recreating out on the reserve and hope to continue to do so in the future. Renew the lease for 25 years and keep this area open to the public to enjoy for the future. 3-1

Kirk

--
Kirk A. Astroth, Steering Committee Member
Network for Arizona Trails
[redacted]

The Network for Arizona Trails (NAzT) is a broad collaborative of non-motorized and motorized trail builders, planners, managers, advocates and supporters that seeks to elevate trail recreation throughout our state.

SIERRA CLUB

Grand Canyon Chapter ● 514 W. Roosevelt St. ● Phoenix, AZ 85003

Phone: (602) 253-8633 ● Email: grand.canyon.chapter@sierraclub.org

March 1, 2021

BMGR Land Withdrawal LEIS
P.O. Box 2324
Phoenix, AZ 85003
BMGR_LEIS@jacobs.com

To Whom It May Concern:

Please accept these comments on behalf of the Grand Canyon Chapter of the Sierra Club and Western Watershed Project regarding the Draft Legislative Environmental Impact Statement (LEIS) on the Barry M. Goldwater Range.

The Sierra Club is one of the largest and most influential grassroots environmental organizations in the U.S., with more than 3.5 million members and supporters. In addition to protecting every person's right to get outdoors and access the healing power of nature, the Sierra Club works to promote clean energy, safeguard the health of our communities, protect wildlife, and preserve our remaining wild places through grassroots activism, public education, lobbying, and legal action. The Grand Canyon Chapter of the Sierra Club, representing 60,000 members and supporters, has a long history of public education and advocacy to protect the lands that are the subject of this legislative environmental impact statement (LEIS). Further, our members and supporters do utilize the areas that open to the public for quiet recreation, including hiking, backpacking, and camping.

Western Watersheds Project (WWP) is a nonprofit organization dedicated to protecting and restoring western watersheds and wildlife through education, public policy initiatives, and legal advocacy. With over 15,000 members and supporters throughout the United States, including Arizona, WWP actively works to protect and improve upland and riparian areas, water quality, fisheries, wildlife, and other natural resources and ecological values. We work throughout the West, advocating for watersheds, wildlife, and ecological integrity. WWP's staff and members are concerned with the management of public lands throughout Arizona, including in the area managed by the Barry M. Goldwater Bombing Range.

Proposed Action and Alternatives

As you know, in 1999, Congress authorized continued military use of the Barry M. Goldwater Range (BMGR). Since then, we have seen an alarming rate of loss of Sonoran Desert habitat throughout Arizona -- development, overgrazing, mining, border militarization, and other activities have taken their toll. We have also seen continued loss of cultural sites, including those destroyed by erection of the border wall. That makes the habitat and cultural resources of the BMGR area more precious than ever and the importance of protecting them and ensuring adequate oversight critical.

The ranges of alternatives in the Draft LEIS includes alternatives that are far from reasonable and excludes examination of reasonable alternatives. The permanent withdrawal for military purposes is unreasonable as it assumes the military actions needed today will be needed tomorrow. Further, it fails to consider the needed oversight and periodic review of civilian entities to ensure that resources are protected and harm is mitigated. The LEIS also leaves out reasonable alternatives, including a sunset of withdrawal that include actions such as repatriation of the land to Indigenous people, expansion of the Sonoran Desert National Monument, Cabeza Prieta National Wildlife Refuge, or even consideration of a new designation for the area, all with consultation with the 24 affected Tribes. 4-1 4-2 4-3

At least a portion of the Goldwater Range within the Bureau of Land Management-administered portions that are not used directly by the military should be considered for special status such as National Conservation Area, National Park, or National Wildlife Refuge. An NGO-sponsored plan to do this should be seriously considered in the Final LEIS. This means limiting off-road vehicle use, no driving in washes or off designated roads, and elimination of unneeded roads. The No Action alternative does not address this as it assumes that if the land is not withdrawn that it would have a multiple use mandate. The land needs and deserves more protection. Protection of cultural sites and the biological resources should be a high priority. All of this should be considered in close consultation with the Tohono O'odham, Hia Ced O'odham, Quechan, and other Tribes and should be centered on the trust responsibility the US Government has to Indigenous people. 4-4

The Draft LEIS alternatives to permanently transfer administrative jurisdiction for the BMGR from the Secretary of the Department of Interior to the Secretaries of the Air Force and Navy (Alternative 1C and 2C) are completely unacceptable and should be dropped from further consideration. The indefinite withdrawals (Alternative 1B and 2B) are also unacceptable as they would not include the much-needed review by the public in the near term and could be 20, 50, or longer depending on who is at the helm of the respective Department of Defense entities. The 50-year withdrawal term (Alternative 1A and 2A) are also unacceptable as they, like the alternatives above, fail to address the changing nature of military operations or the need to better protect these lands and resources, especially in light of the impacts of climate change.

The Draft LEIS argues that all resource protections and applicable laws will be in place should the lands be transferred permanently or for longer periods of time, but that is incorrect as it ignores an essential periodic review by the public, which is already very difficult. Much of area being considered for withdrawal is off limits to the public and independent assessments of impacts to cultural and natural resources. Frequently, it is via these actions that the failure of land management agencies to adequately follow procedures for protection and/or mitigation is identified. For example, recently a Non-Governmental Organization (NGO) found that old growth trees were being logged on the North Kaibab despite the national forest plans that indicated otherwise. 4-5

While not unreasonable as noted for the permanent, indefinite, and 50-year terms, the 25-year term also seems like too long of period before there is review of withdrawal. We think a term of less than 25 years should have also been considered in the Final LEIS, perhaps 10-15 years. 4-6

Sierra Club does recognize that there are aspects of the land, natural, and cultural resources that may be better protected with limited access, but we also know that there can be significant harm that can go unreported and unmitigated without needed public oversight.

The Final LEIS should drop from consideration the permanent and indefinite withdrawal of the BMGR for the military and consider an alternative that includes a shorter withdrawal time frame such as 1-15 years. Further, it should include alternatives that consider repatriation of lands to Tribal nations and/or as national parks, national monuments, national wildlife refuges, or other special land designation.

Environmental Impacts of the Proposed Action

The Draft LEIS appears to neglect any current assessment of cultural sites and fails to adequately address impacts on wildlife. Has all ground disturbance on the BMGR been identified and adequately surveyed relative to potential damage to cultural sites, plants and animals, harm to soils, including cryptogrammic soils, and any potential spread of invasive nonnative species of plants. If those impacts have been documented, has any actual mitigation been implemented? 4-7

Wildlife

The LEIS recognizes the diversity and richness of biological resources on the BMGR. "An estimated 60 species of mammals, over 200 species of birds, and about 50 reptile species are present within the BMGR." (Draft LEIS 3-1). The LEIS recognizes that "[o]ngoing military activities may directly affect wildlife through disturbance resulting in changes in behavior or physical damage and indirectly through degradation of habitat (Larkin et al. 1996)." (Draft LEIS 4-17). It fails to acknowledge the potential cumulative negative impacts that would be associated with a permanent or indefinite withdrawal of the land with limited opportunities for public scrutiny of what is occurring with the resources and the potential for unmitigated harm to continue indefinitely. 4-8

The Draft LEIS acknowledges that "[n]atural and man-made barriers to wildlife movement (such as fences, highways) may prevent animals from reaching important resources and/or limit the availability of habitats that may otherwise become occupied." (Draft LEIS 3-68). It then fails to adequately address the negative cumulative impacts on wildlife and wildlife movement of border wall or "fence" that is impenetrable by most species of wildlife, including many avian species that fly low. 4-9

The LEIS mentions invasive nonnative plant species but does not address how those species are being addressed to minimize negative impacts on native vegetation and wildlife and the risks associated with wildland fires.

"However, most land on the BMGR is undisturbed; military-related-disturbances have little influence on the biotic communities at a landscape level, and natural ecological processes are the primary influence on native biological communities across the expanse of the BMGR with similar processes represented at the CPNWR and OPCNM." (Draft LEIS 3-67). This assertion is not supported by the contents of the Draft LEIS and appears to not consider the landscape scale of impacts such as the potential unmitigated 4-10

spread of invasive plant species and the potential associated wildland fires in areas that are not fire-adapted. 4-10

The Draft LEIS states, “Military activities may disturb, startle, and injure, or kill Sonoran pronghorn; however, conservation measures developed with USFWS and the Recovery Team continue to reduce the potential for affecting this species. The overall effects on ongoing operations would be minor and would not likely adversely affect the species.” (LEIS 4-18). It fails to address the specific and cumulative impacts, including if there was a permanent withdrawal of this area for the military and it fails to outline the conservation measures and how it knows that they are reducing negative impacts on this species. 4-11

Cultural Resources

The LEIS indicates that the BMGR West has “[n]o established Arizona Site Steward monitoring program” (Draft LEIS 3-82) but fails to indicate why or if there has been an attempt to establish one. It acknowledges the limited resources – four full time conservation law enforcement officers for the Marine Corps (Draft LEIS 3-82), so clearly additional assistance would be useful. Considering the significant harm that has been done to cultural resources in the Tinajas Altas Mountains, it would be wise to ensure better monitoring, protection, consultation, and mitigation.

The Draft LEIS recognizes the ongoing damage to cultural resources in BMGR West “… resulting from CBP vehicles, vehicle staging, and border fence construction. The Quechan Cultural Committee has held training sessions for CBP administration and field staff to emphasize the importance of staying within approved areas and travelling on approved roads. However, damage to sensitive cultural areas is ongoing. The Marine Corps does not ask for, collect, or retain any information specific to TCPs or sacred sites.” (Draft LEIS 3-81 to 3-82) Again, these seems to point for the need for better assessments and monitoring of the region. 4-12

The LEIS acknowledges that the Customs and Border Protection (CBP) wall “…has a high-to-moderate potential to impact cultural resources and could contribute to negative cumulative effects.” (Draft LEIS 5-16). It fails to include this in the analysis of cumulative impacts, however. 4-13

The LEIS fails to adequately address the impacts to the Sonoran desert tortoise and does not acknowledge or consider the recent (2020) decision by the U.S. Fish and Wildlife Service to list the tortoise as "warranted but precluded" for protection under the Endangered Species Act. The U.S. Fish and Wildlife Service initiated a Species Status Assessment in early 2021 and is currently accepting comments from the public and agencies regarding potential impacts, new threats, or population information regarding the tortoise. This information should be included in the analysis of the impacts for this project. 4-14

General Comments

We are concerned that most of this process has proceeded during a time that the nation and the world are dealing with a global pandemic. That has meant limited scrutiny of the proposal or discussions about alternatives. Many people missed scoping, public meetings, and have had limited opportunity to 4-15

evaluation the Draft LEIS. Because of COVID-19, the Air Force and Marines should have made even more effort to engage the public, Tribal nations, and other affected parties, plus ensured extensive public comment opportunities. We encourage you to consider extending the comment period and holding additional public meetings. 4-15

Why have the areas that were relinquished during the last LEIS renewal process not yet been relinquished? Certainly 25 years is time enough to do that. 4-16

Thank you for considering our comments.

Sincerely,

Sandy Bahr
Chapter Director
Sierra Club - Grand Canyon Chapter
sandy.bahr@sierraclub.org

/s/
Cyndi Tuell
Arizona and New Mexico Director
Western Watersheds Project
cyndi@westernwatersheds.org

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Sunday, February 21, 2021 1:45 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - James Terlep

Message from BMGR LEIS Contact Us Form:

21/02/2021 at 13:44

Submission Number: 28 since 3/24/2020

Name: James Terlep (IP Address: [redacted])
Email: [redacted]
City: Tucson
State: AZ

Message:

21 February 2021

To
BMGR LEIS
P.O. Box 2324
Phoenix, AZ 85003

Re: Barry Goldwater Range Lease Renewal
The Southern Arizona Hiking Club is a 600 member non-profit group dedicated to recreational hiking, and for enjoyment of the outdoors. Our club is over 60 years old and its members have historically hiked in the Goldwater Range.

We support Alternative 2 of the Proposed Range Agreement which renews the Goldwater Range for 25 years and keeps this magnificent desert region as open to the public. . In their wisdom, officials 25 years ago saw the need for public recreation which does not interfere with valuable military use. The recreational need has only increased over those 25 years with increased population and most recently, COVID disease.

In addition, we support the addition of three land parcels called “the Gila Bend addition.” 5-1

Sincerely,

James Terlep
Access Trail Coordinator/SAHC
[redacted]

How did you hear about this website?

Word-of-Mouth

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Friday, February 19, 2021 7:31 AM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - William Adamson

Message from BMGR LEIS Contact Us Form:

19/02/2021 at 07:30

Submission Number: 20 since 3/24/2020

Name: William Adamson (IP Address: [redacted])
Email: [redacted]
City: Green Valley
State: AZ

Message:

The Camino de Diablo area is an important recreation asset for AZ. I recommend plan #2 for continued recreation use. 6-1

How did you hear about this website?

News Article

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

BMGR LEIS
PO Box 2324
Phoenix, AZ 85003

Re: Public input on the Air Force and Marine Corps' proposal to extend the current land withdrawal and reservation of the BMGR and add about 2,366 acres of public land (a 0.14 percent land increase) to BMGR East

I urge you to support Alternative 2. Over the years, my husband and I have spent time on the BMGR in the public areas and we believe it is important to preserve the unique region for public use and enjoyment. 7-1

Thank you,

Joann Alexander

[redacted]

From: Dennis Astroth [redacted]
Sent: Friday, February 19, 2021 4:30 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] Reauthorization of Barry M Goldwater Range

My brother and I have enjoyed the remote recreation opportunities afforded in the Cabeza Prieta Wildlife Refuge and the Barry M Goldwater East and West ranges. I support adoption of Alternative #2 of the draft LEIS now under consideration.

Thank you,
Dennis Astroth
[redacted]

2.19.21

To Whom it might Concern

Keep the Goldwater Range open for recreation

Please support just Alternative 2. Renew the Goldwater Range for 25 years and keep this magnificent desert region as open to the public as it is today. 9-1

Also thank you for through your activities keeping this open space for wildlife.

Comments due before March 1 at BMGR LEIS, P.O. Box 2324, Phoenix AZ, 85003

Thank you,

Beryl Baker, Tucson AZ

Beryl Baker

From: Peter Bengtson [redacted]
Sent: Friday, February 19, 2021 10:50 AM
To: BMGR LW LEIS
Subject: [EXTERNAL] Comments on the BMGR_LEIS

Name - Peter Bengtson
email - [redacted]
City - Tucson
State - AZ
Heard about the project - Article in the Feb. 19 Arizona Daily Star

I'm writing to support Alternative 2. I've been in both the Goldwater Range and the Cabeza Prieta National Wildlife Range. My purpose was to climb some of the mountains in the area. I'm now 81 but in my 60s I was working on a number of Peak lists. Some of the mountains were in the Goldwater Range. I received my permits from the Ajo Cabeza Prieta Wildlife Range office.

I enjoyed being in a very remote area with hardly anyone around except for occasional Border Patrol vehicles. It's a great place to visit. The Goldwater Range should be renewed for 25 years to keep this magnificent desert region open to the public as it is today. 10-1

Peter Bengtson

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Sunday, February 21, 2021 8:24 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Evelyn Billo

Message from BMGR LEIS Contact Us Form:

22/02/2021 at 20:24

Submission Number: 29 since 3/24/2020

Name: Evelyn Billo (IP Address: [redacted])
Email: [redacted]
City: Flagstaff
State: AZ

Message:

Please approve Alternative 2 and continue the 25 year lease with joint management with the BLM that allows for occasional public use and access. I am especially interested in preserving and protecting the many archaeological sites and places important to Indigenous communities. There are many important studies and documentation that remain to be done. The petroglyphs, pictographs, and other features are key to understanding the history of this area. 11-1
Sincerely,
Evelyn Billo, former president of the American Rock Art Research Association
and owner of Rupestrian CyberServices

How did you hear about this website?

Social media

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Friday, February 19, 2021 9:33 AM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Donald Bird

Message from BMGR LEIS Contact Us Form:

19/02/2021 at 09:32

Submission Number: 21 since 3/24/2020

Name: Donald Bird (IP Address: [redacted])
Email: [redacted]
City: Tucson
State: AZ

Message:

I support option 2. The 25 year extension and keeping the Department of Interior as a partner seems best. 12-1

How did you hear about this website?

Newspaper Advertisement

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

(GOLDWATER RANGE)

We MUST Keep The GOLDWATER RANGE open TO TRAIN OUR PILOTS. IT Keeps Them SHARP, AND The BEST There is. I HAVE Seen over The YEARS How good OUR PILOTS ARE.

RET USAF
Bill Bouchet

2/20/2021

From: [redacted]
Sent: Thursday, February 25, 2021 11:36 AM
To: BMGR LW LEIS
Cc: [redacted]
Subject: [EXTERNAL] Goldwater Comments on Draft LEIS
Attachments: a DRAFT LEIS COMMENT LETTER 22feb2021.docx; Goldwater STAR opinion Broyles-Hartmann.docx

Hello,

Please find attached our comments on the Draft LEIS and an opinion-editorial that we wrote about the LEIS for the *Arizona Daily Star*.

Thank you.

Bill Broyles
Gayle H. Hartmann

GOLDWATER RANGE LEIS COMMENT LETTER

February 22, 2021

Dear Goldwater Range Renewal Staff and Deciders,

We all want a strong, beautiful America, and by working together we can ensure that the Goldwater Range remains a premier pilot training range, one open to the public while protecting the region's natural and cultural wonders.

You understand how important the Goldwater is, as do we. Its military training values are exceptional and obvious, but the Range's position among lands protected for their biological, scenic, and cultural values also is crucial, crucial to protecting and conserving North America's largest and most important tract of Sonoran Desert. The Goldwater, combined with the Cabeza Prieta and Kofa NWRs, with Organ Pipe Cactus and Sonoran Desert NMs, and with Mexico's splendid Pinacate and Upper Gulf biosphere reserves, comprise a special land and seascape of over 12,000 square miles: bighorn sheep, majestic purple mountains, fleet Sonoran pronghorn, crazy cactus, shifting sand dunes, and primordial campsites dating back thousands upon thousands of years. This ground is largely intact and pristine, but once fragmented it cannot be reassembled. Once bashed and broken, this natural patrimony cannot be healed in our lifetime, if ever.

It is an important watershed, a bioscape helping balance carbon with oxygen as best an arid land can, a wilderness antidote to overcrowded cities and faceless crowds, a grand landscape for families to camp and share the glory of a glowing sunset and the magic of the rising moon. Best yet, this land remains essentially natural. You tout the military's light footprint with only 8.6% of the land designated for surface use, leaving 91.4% essentially pristine.

The Range needs airspace to train pilots. By one estimate the Range comprises 57,000 cubic miles of airspace. We the public also need unfenced space to roam, clean air to breathe, and dark night skies to enjoy the heavens.

The Range is certainly essential to our state and our nation's national defense and economy. Tourism, camping, outdoor photography, wildlife viewing, and hunting are also major interests and crucial for local, state, and national economies and well-being. Places like Ajo, Gila Bend, Wellton, and Yuma depend on the range and recreation.

The Range and the Public have worked well together to share the Range.

The History

We participated in the range renewal discussions of 1998 and 1999, and we recall that the Key Points of the 1999 Withdrawal Language included (also see the 2021 Draft LEIS at 2-5):

1. 25-year duration of withdrawal with 5-year reviews

2. DoD has management authority with 'reverter clause' (reverts to DoI management if DoD fails to manage up to standards, and stands by to help if needed)
3. Does not withdraw CPNWR and clarifies Wilderness while still allowing overflights.
4. Lands are to be jointly managed in accordance with a plan by DoD / DoI using 'Sikes-plus.'
5. 'Sikes-plus' is the Sikes Act (wildlife conservation) plus cultural preservation and public comment.
6. 5-year review of the Range management plan jointly by DoD / DoI.
7. Formally establishes a BEC interagency council and IEC public open meetings at 4-month intervals.
8. Recognizes CPNWR's Wilderness and wildlife mission and laws.
9. The same integrated management plans (INRMP and ICRMP) were adopted by GR-E and GR-W and continue in effect, so that management of the whole Range is organic and not fragmented.

These points have proven successful and mutually beneficial to the Range, DoI, and other partners. They have served the public well.

Transfer of Jurisdiction Indefinitely

One renewal option is to transfer all management responsibility to DoD (see point 6 at LEIS chapter 2-5, or our point 2 above). We see this contingency as both an incentive for the military to do an excellent job and a backup in case range budgets come up short. Plus, we think that DoD should welcome and value partnerships with other federal agencies.

Your reasons for requesting permanent jurisdiction without future public hearings regarding renewal are these (LEIS Executive Summary at ES-7, para 2):

1. transfer would "provide sustained, operational support for aviation and training."

So will renewal Alternative 2, with a 25-year renewal and retention of the DoI partner. We see the 25-year renewal as comparable to a "sunset" legislative law, a chance to prove need, and keep the public informed and involved.

2. transfer would "Allow access to additional budgeting and administrative processes."

This makes it sound as if the military's own budget people don't sufficiently value the range or pilot training to adequately fund it. If so, this needs to be remedied in-house, even if the range were transferred. Your longer-term solution would not resolve this perennial problem.

3. transfer would "provide full accountability for the sustained management of the land."

More so than now? We haven't heard anyone at DoD blaming its DoI partners for shortcomings or problem areas. As a mater of fact, at the IEC meetings we have witnessed a number of instances of helpful cooperation between the DoD and DoI partners.

14-1

4. transfer would "eliminate the expensive and time-consuming process of extending the reservation in the future."

In your own words, the range would still be required to prepare and submit annual reports, five-year INRMP and ICRMP reports, and other reports that Congress may require.

And you cite the labor cost of 21,682 hours to prepare the LEIS (Draft LEIS at 2-6, paragraph 2). It is unclear if this includes time to prepare the 5-year INRMPs and ICRMPs and other reports, and it is not stated how much of this time was devoted to the addition of the Gila Bend Annex, a cost that wouldn't be needed at the next 25-year renewal.

Put another way, this time spent over 25 years on two ranges—GR-W and GR-E—averages 867 hours per year, or the equivalent of less than a half-time position within DoD, or a 1/5 position for each of the two ranges. Perhaps if renewal were treated as a continuing process, in-house, the number of hours could be reduced further.

If the Goldwater does rank in the top few training ranges, this labor cost would seem well spent and its effort could be put to good use.

Further, the LEIS cites renewal costs of $3,871,424, plus travel (Draft LEIS at 2-6, paragraph 2). In terms of the over all size of the military budget, the renewal budget must seem miniscule. Put another way, flying the F-35 is reported to cost $35,000 an hour ($44,000 per hour for one version of the aircraft). If four F-35s are flown one less hour per year in training over the next 25 years, the curtailment would have would leave at least $3.5 million in the DoD budget, which surely could cover the cost of a LEIS. Too, a portion of this total was expended to study and define the Gila Bend Annex proposal.

As we understand it, this money does not come out of RMO budgets. Over the years we have heard that DoD is a maze of budgets, and range managers sometimes may feel short changed. Perhaps it is time for DoD or Congress to reorganize the DoD budgeting process. And to recognize the full funding needs of range management. We are reminded of one prior range manager, a skilled fighter pilot, who wondered out loud why the military even needed an environmental or cultural office. Range management has greatly progressed from those days.

If this request for perpetual renewal is granted to DoD, we doubt that DoD will trim $3.8 million from its budget request to Congress. Nor will it add that $3.8 million to the Goldwater range-management budgets.

Amortized over 25 years, the LEIS expenditure is $155,000 annually. We appreciate you wishing to save money, but we ask that you find ways of applying this expense over time to better manage the range and prepare for periodic reviews, as well as saving money where possible. You note at ES-7, para 3, that regardless of the length of renewal or transfer of administration, DoD will be legally required to continue INRMP reports and range management activities.

14-1

DoI Partnerships

Page 2-5 of the Draft LEIS at 2.3.3 shows some of the ways that DoD and DoI partner. Perhaps you can expand or build on that partnership.

14-2

It is worth remembering that in 1999 during the last renewal, Arizona Senator John McCain was arguably the staunchest supporter of DoD in Congress. He was very active in the withdrawal process and presumably had sufficient clout to fashion the renewal however he wished. But he did not choose an indefinite renewal or DoD takeover, even though it was on the table then, too.

Instead, he said, "I am very pleased that the conferees approved language this year that renews the withdrawal of the Goldwater Range for military training purposes [for 25 years] and affirms the status of the Cabeza Prieta as one of our nation's crown jewels of wilderness areas" (Sen. John S. McCain, Press Release, August 6, 1999). He did not push for a military takeover of the ground. He saw that a strong DOI partner could help DoD cooperatively management the Range, reduce DoD's financial burden, handle public uses, and provide expertise. He also understood balancing military and public needs, so BLM remained as DoD's partner representing DoI. 14-2

A Worrisome Scenario

You have done a smart thing by being transparent about range management. Instead of relying just on your INRMP reports, you have left much of GR-W open to the public, and in GR-E, Area B is open and public highway 85 provides a visual corridor past several of the GR-E sub-ranges. This allows the pubic to literally see that you are taking care of the ground; that, and recreation on the range, gives you a constituency of supporters, like us. In effect, this ocular reconnaissance confirms what the public can read in your INRMPs.

Too, we know and trust the current range managers at Luke and Yuma, and they steadfastly declare their intentions to keep the range open to the public as it is today. But who knows what the next generation of range managers or military leadership will say? The renewal legislation needs to make this guarantee on paper, and retention of the DoI partners and 25-year term is an easy way to ensure this.

Yet in your Draft LEIS you propose that indefinite renewal and transfer of administrative jurisdiction can lead to making the range into a base, one with its own budget and status, like Luke AFB or Yuma MCAS or Nellis AFB.

In fact, the proposal at one juncture states that indefinite renewal without a DoI partner a training range is like creating a base (see ES-7): "Transferring administrative jurisdiction would make the BMGR a permanent DoD facility equivalent to the status of military bases."

We see that not as a grand idea but a very threatening step.

We have been following the request by Fallon to withdraw 800,000 acres of BLM land, and Nellis AFB's series of expansions that have closed, annexed, or asked to annex hundreds of thousands of acres of Desert National Wildlife Refuge. We have been watching mission creep on the Goldwater (such as the long-range cannon project), that ask for occasional closures of parts of the Cabeza Prieta NWR.

To us, your indefinite / transfer proposal looks like a long-range plan to make the Goldwater a base and extend its control over the Cabeza Prieta National Wildlife Refuge, as the

Air Force has done at Desert NWR. Bases like Luke, Davis-Monthan, MCAS Yuma, Nellis, Yuma Proving Ground, Twenty Nine Palms, and China Lake are closed to the public.

In a Nellis-like scenario, we can easily imagine a time when the Goldwater excludes the public and closes off travel to Cabeza Prieta NWR via the El Camino Diablo, the Wellton entrance, and the Tacna entrance. And with the military boxing in the refuge on two sides, the military could then nibble out portions of the refuge like it has Desert NWR. Currently, the public is excluded from more than half of the Desert NWR and the military is actively bombing and strafing within the refuge.

A number of conservation, hunting, hiking, wildlife, and wilderness groups have defended Desert NWR under the banner "Don't Bomb the Bighorn" and continue to fight the military's latest raid, but we in Arizona would like to look ahead and avoid such battles by ensuring that the Goldwater remains open to the public and that the Cabeza Prieta is never threatened.

If you choose an indefinite renewal and transfer of jurisdiction, we'll assume that our Nellis-like scenario is the military's actual long-range plan and that will become the public discussion.

From our perspective, if you had selected the ho-hum status quo renewal of 25-years and no transfer from DoI (see your election to not do so, Draft LEIS at p. 2-1), things would proceed smoothly. But if you pick indefinite renewal and administrative transfer for your preferred Final LEIS alternative, we foresee an immediate fuss in the press and Congress, as we have seen in Nevada. Further, we predict a series of contentious battles every time the new Goldwater Base tries to limit public access or ask to shut down parts of the Cabeza Prieta or train there, at the cost of political capital and public good will, much of it lost from your staunchest supporters.

For these many reasons, we cannot support an indefinite renewal or a transfer of administrative jurisdiction. We emphatically believe that the renewal should be for 25 years, no more, and remain under partnership with the Department of Interior.

Puzzlement

Considering DoD's repeated requests for additional land from Desert NWR and from BLM near Fallon NAS, we are puzzled why DoD does not at least consider relinquishing lands from the Goldwater.

The GR-E's Area B is not required for ground missions, and like Area A in 1999, it would make a splendid addition to Sonoran Desert National Monument. Airspace would remain under GR-E's control.

The Tinajas Altas area was once part of the Cabeza Prieta NWR and should be returned to the refuge. Back in 1975 some 79,000 acres were reassigned to the refuge with the understanding that air operations would continue overhead. Today's few emitter sites could be retained, and of course, airspace would remain available.

14-3

Why weren't these options considered? It is not too late to put them into the LEIS and Defense legislation. Is there a mission imperative for retaining Area B and the Tinajas Altas Annex within the Goldwater Range? 14-3

Praise for Your Work

The last renewal developed a framework for effective natural and cultural resource management. We do support renewal of the Range and make these suggestions and points for your consideration.

We appreciate the enormous effort that your RMOs have invested in studying, discussing, and developing a coherent and successful range management program as shown in the INRMP and its updates, which are available on your website. (We do wish that the ICRMP, with appropriate redactions, could be available for our review.) Many of your good deeds are tucked away in the IRMPs but deserve to be highlighted.

The INRMP and presumably the ICRMP are the keys to successful range management, and we appreciate your modifying them as needed.

We urge that both GR-E and GR-W RMOs receive larger staffs and sufficient long-term funding.

We applaud the CLEO range warden program and your involvement with other agencies and universities in monitoring, studying, and protecting range resources.

We admire your sponsorship of vegetation mapping, the breeding bird atlas, road mapping, and the weather station network.

We appreciate the information included in the full Draft LEIS and supplementary documents such as the "BMGR INRMP Annual Review and Update."

We have seen first-hand the expertise and care of both RMOs in the field over the past two decades, as well as the RMOs' effective leadership at public meetings, including the IEC.

GR-W has done a laudable job of providing a self-guided tour of the old mining community at Fortuna and the visitors overlook for Yodaville flight operations. The RMOs should increase public education in their mission statements.

Concerns and Suggestions

Still, we do have major concerns and suggestions about your renewal as observed in public meetings to date and the behavior of other federal agencies "going dark" in the past few years. We believe that the upcoming Goldwater Renewal should commit to the following principles:

1. Transparent management involving public education, involvement, and meetings. Continue both the BEC and IEC. Enhance and expand your websites. 14-4

2. Develop a forward-thinking plan to address and cope with climate change. 14-5

Where are we on actively addressing the questions and issues brought up in Karen E. Bagne and Deborah M. Finch's *Vulnerability of Species to Climate*

Change in the Southwest: Threatened, Endangered, and At-Risk Species at the Barry M. Goldwater Range, Arizona (2012)?

Why aren't other research reports sponsored by DoD available on GR-W or GR-E websites?

We enjoy presentations by Range staff at events like the Sonoran Symposium and are pleased to see Goldwater's role and place in the scientific and historical community.

3. Ensure that Native Nations remain involved and are kept up to date on range matters. We suggest that transfer of the range to DoD, away from DoI, is not in the best interest of our Native Nations.

Too, we ask, what special protections are places like Tinajas Altas, Raven Butte tinajas, and Baker Tanks being given under the Traditional Cultural Properties Act? 14-6

4. Develop a range-wide response to land degradation, especially that caused by illegal migration and smuggling activities, by border law enforcement, and most of all by DHS building and maintaining its wall. How can the range effectively fight invasive plant species? Prevent soil from becoming "moon dust"? How can DoD address water and wind erosion problems created by DHS road-blading? Ideally, DHS should fund much of this range-wide work and restoration. 14-7

5. From our perspective, the gravest threat to sound Range management over the past 25 years has not been the Public, but rather it has been DHS running unfettered and its claims for exemption from all Range policies, rules, laws, and attempts at sound management. This precedent is highly dangerous and has caused, and will continue to cause, inordinate damage to natural and cultural resources of the Range, Cabeza Prieta Refuge, and Organ Pipe Cactus National Monument. 14-8

6. DoD Range Managers should never seek or allow exemptions or waivers from the following laws as applied to the Goldwater Range or surrounding lands:

The National Environmental Policy Act,
the Endangered Species Act,
the Federal Water Pollution Control Act,
the National Historic Preservation Act,
the Migratory Bird Treaty Act,
the Migratory Bird Conservation Act,
the Clean Air Act,
the Archeological Resources Protection Act,
the Paleontological Resources Preservation Act,
the Federal Cave Resources Protection Act of 1988,
the National Trails System Act, 14-9

the Safe Drinking Water Act,
the Noise Control Act,
the Solid Waste Disposal Act,
the Comprehensive Environmental Response, Compensation, & LiabilityAct,
the Archaeological and Historic Preservation Act,
the Antiquities Act,
the Wild and Scenic Rivers Act,
the Farmland Protection Policy Act,
the Coastal Zone Management Act,
the Wilderness Act,
the Federal Land Policy and Management Act,
the National Wildlife Refuge System Administration Act,
the National Wildlife Refuge System Improvement Act of 1997,
the National Fish and Wildlife Act of 1956,
the Fish and Wildlife Coordination Act,
the Wild Horse and Burro Act,
the Eagle Protection Act,
the Native American Graves Protection and Repatriation Act,
the American Indian Religious Freedom Act, and
the Religious Freedom Restoration Act.

14-9

7. Public access must continue wherever and whenever possible without jeopardizing the training mission, endangering the public, or compromising natural or cultural resources. We believe that wider access is possible and reasonable.

14-10

8. “Mission creep” is a serious threat to range resources. Battle tank maneuvers, fleet testing, cannon tests, and mega-bomb drops that harm wildlife and habitat or greatly disturb the ground should be forbidden on the Goldwater. This is a pilot training range.

14-11

9. Likewise, highways, mining, and subleases should be banned, as well as utility pipelines and power lines not directly required by the Range.

14-12

And your new EIS must analyze how the border wall, its construction, its deployment, and its maintenance may or may not affect the Range’s management and mission.

14-13

10. We are seeing DoD disrespect the Cabeza Prieta NWR. The U.S. Army and its Yuma Proving Ground is asking for special waivers to access Cabeza Prieta Wilderness and to shoot long-range cannon munitions that may impact within the refuge. These requests would roll-back hard-earned refuge standards and expose the land and visitors to danger or to the inconvenience of having to leave the refuge during testing. These cannon tests

14-14

are sanctioned by the Goldwater Range West and East, and the tests are launched from within the Goldwater Range. Please do not ask to bypass or roll-back refuge and Wilderness protections. 14-14

11. We ask you to consider special-use management areas, such as once applied to the Tinajas Altas ACEC (Area of Critical Environmental Concern). We further ask that you study places such as Vopoki Ridge and the Aguila Mountains as potential ACECs or even Wilderness Areas. One stumbling block to Wilderness Areas has been Border Patrol's need access to remote areas along the border corridor, but if the new wall works as advertised, this should no longer be necessary. 14-15

12. We ask you to look at additional DoI partnerships and collaboration at the landscape scale that might help the range. Considering urban and suburban growth on the western and northern boundaries of the range as well as under flight paths to the range, might alliances with US Fish and Wildlife Service, national Park Service, Bureau of Land Management, and US Department of Agriculture be helpful?

For example, the 2018 National Defense Authorization Act introduced language that formally recognized the **Sentinel Landscapes Partnership**. The purpose is to streamline programs that fund land protection and natural resource restoration projects involving DoD, DoI, and USDA. Its core values include protecting vital military test and training missions, conserving habitat and wildlife restoration, and helping farms and ranches to protect soils, provide conservation easements, and boost conservation incentives. See https://sentinellandscapes.org/about/federal-programs/ 14-16

This may encourage dispersed recreation under airspace and flight corridors to the Range, provide wildlife corridors, and forestall or mitigate incompatible industrial, agricultural, or suburban development that might hinder pilot training.

13. We ask you to study range energy efficiency with a mind toward reducing atmospheric carbon and relying upon renewal energy. 14-17

14. We expect to see well-crafted and fully funded strategies and plans to heal the ground, using revegetation, restoration, and control of invasives. Actual written strategies would be helpful to inform the public as well as provide common ground for interagency work. At the moment we don't see a "playbook" or strategy sheet.

One area to address, perhaps with supplemental research, is the subject of landscape restoration, reclamation, or revegetation. What are its "best practices" and most effective methods for various types of terrain and plant communities? 14-18

This includes invasive plants, which in the long term endanger the composition of the desert plant community itself, and which bring a fire hazard that threatens the training mission itself. These are urgent priorities or action items.

15. Nature is not making more ground, so ground must serve multiple purposes. Here on the Goldwater Range, pilot training is one use, special and necessary to be sure, but only one.

The ground is also needed for public recreation. When the range was created in 1940, Arizona's population was just shy of 500,000, but in 2019 it is 7.3 million. The 1940 U.S. population was 132 million but today it's 328 million. Folks need places to camp, hike, watch wildlife, breathe fresh air, hunt, study history and see how and where previous generations lived. Because the military has been relatively gentle on the land, because mining and grazing have been small industries here due to poor forage and poor mineralization, Goldwater ground is relatively natural and healthy.

We already need more of the Goldwater Range open to the public than we have now. Why not open-up the eastern Mohawk Mountains to public visitation? Allow tours to the Aguila Mountains and Crater Range on designated public days? Thirty years ago these areas were open several weeks a year during "cold" range days, holidays, or range cleanups. And during the spring bloom, the public should be able to spend a few days in the Butler Mtns. Special areas are seasonally opened to hunters and their families and friends—why not to the general public? 14-19

16. We strongly support Withdrawal Alternative 2, which reauthorizes Goldwater Range withdrawal for 25 years, adds the Gila Bend addition, and continues shared administrative responsibilities by Secretary of the Interior (BLM), Secretary of the Air Force, and Secretary of the Navy. This is based on a clear and proven model. Longer periods of renewal or dropping DoI from administrative jurisdiction are not in the public's best interest, and we cannot endorse them.

In your words, "Each of the action alternatives would fulfill the basic continuing military needs for the BMGR identified by the Air Force and Marine Corps."

All things considered, we urge you to select Alternative 2. Just plain 2.

Respectfully yours,

s/ Bill Broyles [redacted]

s/ Gayle H. Hartmann [redacted]

Inc: We enclose a copy of an guest-editorial that we wrote supporting renewal (*Arizona Daily Star* (Feb. 19, 2021, p. A-4).

Tucson Opinion: Keep the Goldwater Range open for recreation

- By Bill Broyles and Gayle H. Hartmann Special to the Arizona Daily Star
- Feb 18, 2021 Updated 10 hrs ago

An A-10 soars over the Barry M. Goldwater Range-East. Davis-Monthan Air Force Base offers easy access to the range for training missions. U.S. Air Force

By Bill Broyles and Gayle H. Hartmann Special to the Arizona Daily Star

The following column is the opinion and analysis of the writers:

Where do Tucson's A-10 Warthogs and F-16 Fighting Falcons go when they take off and head west? More often than not, they head to the Goldwater Range to practice flying. Most Air Force and Marine Corps fighter pilots since WWII have trained there. The range serves pilots

from Davis-Monthan, the Air and Army National Guard, Luke Air Force Base in Phoenix, the Marine Corps in Yuma, and even aircraft carrier pilots out of San Diego.

The airspace over the range's 1.7 million acres is a constant swirl of activity, but those military flights really involve only about 9% of the ground which remains largely pristine, beautiful Sonoran Desert — currently 38% of it is open to the public for hiking and camping and more could be. It's a popular destination.

The land includes desert waterholes visited by Padre Kino three centuries ago, a famous historic trail called El Camino del Diablo used by forty-niners heading to California, Native American camps and sacred places, photogenic sand dunes, and mountain citadels inhabited by desert bighorn. Some of Arizona's prettiest places are there.

Our concern is not the pilot training — our military is the best in the world. But the land belongs to the American public and we want to ensure that the ground is kept in good condition until the military is done with it.

Every 25 years, the range comes up for renewal, a process that includes self-evaluation by the military, public comments and congressional approval. We urge you to back the renewal — Tucson, the state's economy and our nation's defense depend on it.

But, we believe it is critically important to support renewal Alternative 2: To continue operations for another 25 years, keep the range's Department of Interior partner and add a few sections of land near Gila Bend as a safety buffer. This will ensure seamless continuity of a successful system, so pilots won't miss a day of training.

A 25-year renewal will allow each generation to decide how to best manage the land — it's a fair and proven cycle for oversight and evaluation. A longer lease might save a little money, but at the cost of public oversight. What's the cost of a renewal report every 25 years compared to flying an F-35 at $35,000 an hour?

Under another alternative, the Goldwater's 1.7 million acres would be put forever under total military control, ditching its Interior Department partner. To us, that alternative sounds like a land grab, empire building or a way to sidestep oversight. Public recreation and tourism greatly benefit our economy, too.

The renewal requires good stewardship and periodic public reports on natural and cultural resources, all challenging work. Range managers certainly could use larger budgets and staffs. The problems they face are daunting and immediate: mission planning, monitoring the land's health, restoration of landscape damage, interagency coordination, and fuller attention to public visitors.

Support Alternative 2. Just plain 2. Renew the Goldwater Range for 25 years and keep this magnificent desert region as open to the public as it is today.

Your comments and ours are due before March 1 at BMGR LEIS, P.O. Box 2324, Phoenix AZ, 85003. Visit www.barry-m-goldwater-leis.com for full information. Don't delay. It's important to you, the wildlife and cactus and your nation.

Bill Broyles and Gayle Hartmann are co-authors of the book "Last Water on the Devil's Highway."

2/19/2021

Dear Sirs (or Madame):

12-1 This letter is written to support the renewal of Alternative 2 regarding the Goldwater Range in Arizona. Though it is positively used by the military of the U.S. it is also frequently visited by tourists. It should stay the protection of the Dept of the Interior.

Sincerely,

Lois Bunn

[redacted]

February 23, 2021

BMGR LEIS
PO Box 2324
Phoenix, AZ 85003

Hello Barry Goldwater LEIS Reviewers—

I write to you as not only an amateur botanist but also as an ethnobotanist and as an Adjunct Professor at Tohono O'odham Community College, to register my request that you endorse Alternative 2 in your upcoming plan. This area is so critical in our understanding of Sonoran Desert flora, and in our continued monitoring of many species as climate changes.

16-1 The public must have continued access, plus access to the additional proposed area near Gila Bend, as citizen scientists.

It is of deep importance to me, as an

(over)

16-2

instructor and mentor for Tohono O'odham youth, to know that they, too, will have continuing access to these lands (described in Alternative 2) which are their traditional homelands. Indigenous descendants of earlier residents should have continuing easy access to their forebears' lands, for their spiritual, communal, practical, and personal health.

For these important scientific and cultural reasons please endorse Alternative 2.

With appreciation for your work,

Marshall Burgess

Adjunct TOCC

BMGR LETS
PO Box 2324
Phoenix, AZ 85002

PHOENIX AZ 852
25 FEB 2021 PM 5 L

Postcard © 2006 The Museum of Modern Art, New York. Printed in China

17-1 I support Alternative #2 for organ pipe management of BMGR. Public access should be retained - this is one of the most beautiful examples of Sonoran Desert.

Thank you.

Carianne Campbell

[redacted]

The Museum of Modern Art
11 West 53 Street, New York, NY 10019
www.moma.org

John Rieben. American, born 1935. *Chicago Has 2 Great Zoos*. 1965–66. Photolithograph, 50 x 35". The Museum of Modern Art, New York. Gift of J.B. Neumann. 703.1966.

2. 24. 21

Dear Sirs:

Please do not allow DNAFB No to Alternative 2.

The DNAFB pilots have been harassing me for 3-4 yrs by flying directly and in close proximity to my property at [redacted].

They fly over whenever I go whether) grocery shopping, to the post office.

18-1 I have complained for the same number of years — to no avail - #, talks.

I used to love our Air force and now I have nothing but disdain for them the pilots / Commanders.

I would like DNAFB closed. Their pilots have no integrity - no humility. We pay their salaries.

Do not give them anything planes, use of land, airspace etc.

Sincerely,

Sylvia J. Clemens

[redacted]

BMGR LEIS, P. O. Box 2324, Phoenix, AZ 85003 **Feb 23, 2021**

Gentlepersons,

We appreciate the current use of the Barry M Goldwater Range and want to express our support for continuation of the present arrangement which has some portions of the range accessible to citizen use.

Therefore we endorse Alternative 2 for the upcoming 25 year renewal. To be clear we copy below the version of Alternative 2 we endorse:

Alternative 2: Extend the existing land withdrawal and reservation of the BMGR for 25 years, but the BMGR East boundary would be extended to include the Gila Bend Addition. Management of the withdrawn public lands in the BMGR would continue as described for Alternative 1.

Thank you for your consideration.

Sidney A Coon and Barbara L. Coon, [redacted]

Sidney A. Coon Barbara L Coon

Audubon

CHAMPAIGN IL 61

24 FEB 2021 PM 5 L

winterberry

Renewal of The Barry M. Goldwater Range. I endorse Alternative 2,

BMGR LEIS
P.O. Box 2324
Phoenix, AZ
85003

Photo by: John Eastcott / Yva Momatiuk

Green tree frogs
Louisiana's Atchafalaya Swamp, home to these two Green tree frogs, is also a nesting and feeding habitat for more than 170 bird species.

To find out how you can help save America's wildlife by becoming a member, call the **National Audubon Society**

©2003 National Audubon Society
Printed in the USA on Recycled Paper

Jay Cravath, Ph.D.
[redacted]

February 19, 2021

BMGR LEIS
PO Box 2324
Phoenix, AZ 85003

To Whom It May Concern:

Please register my strong support for Alternative 2 to renew the Goldwater Range for twenty five years.

Jay Cravath, Ph.D.

[redacted]

2.19.21

Dear Sirs,

I support Alternative 2 for The Barry M. Goldwater Range. I've lived in Arizona since 1957 and have been to The BMGR/Cabeza Prieta three times. It's an amazing place on so many levels, and should remain open to The citizens who want to make The effort to visit This remote, unique, historic environment. This use has been proven compatible with military uses, and hopefully The current plan will be maintained. Thank you for your time.

22-1

Sincerely,

Daniel C. Davis

DANIEL C. DAVIS

[redacted]

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Wednesday, February 24, 2021 10:44 AM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - DONALD R DAVIS

Message from BMGR LEIS Contact Us Form:

24/02/2021 at 10:43

Submission Number: 41 since 3/24/2020

Name: DONALD R DAVIS (IP Address: [redacted])
Email: [redacted]
City: TUCSON
State: AZ

Message:

I fully support only Alternative 2 for the BMGR LEIS and urge that this option be adopted. While the BMGR is an essential component for maintaining our military capabilities, this range is also land that belongs to the American people, just as other Federally owned land – National Parks, National Forests, and many others. As such, a 25 year review of the use of the BMGR allows for updating land usage to allow for changing times – who can predict what the needs of the military will be a quarter-century hence. And having external input every quarter century will serve to insure optimal land use in light of changing circumstances.

Donald R. Davis
[redacted]

How did you hear about this website?

Word-of-Mouth

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Sunday, February 21, 2021 12:47 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Jan Dowking

Message from BMGR LEIS Contact Us Form:

21/02/2021 at 12:46

Submission Number: 27 since 3/24/2020

Name: Jan Dowking (IP Address: [redacted])
Email: [redacted]
City: Tucson
State: Arizona

Message:

I am writing to support Alternative 2, which renews the Goldwater Range for 25 years so members of the public can continue to enjoy it for recreation. 24-1

How did you hear about this website?

News Article

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Friday, February 19, 2021 12:09 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - SUSANNE DURLING

Message from BMGR LEIS Contact Us Form:

19/02/2021 at 12:09

Submission Number: 23 since 3/24/2020

Name: SUSANNE DURLING (IP Address: [redacted])
Email: [redacted]
City: Green Valley
State: AZ

Message:

I support Renewal Alternative 2 which will continue cooperation with the Interior Department in operating the Goldwater Range. I have traversed the Camino del Diablo, surely one of the most compelling adventures of my life and believe such opportunities should remain for all. 25-1

How did you hear about this website?

News Article

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

---

From: Jack Dykinga [redacted]
Sent: Wednesday, February 10, 2021 8:41 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] Support of 2nd alternative

Follow Up Flag: Follow up
Flag Status: Flagged

We believe that the 25 year renewal period process is an way insure an on-going review process and it needs to continue.

Thank you.

Jack Dykinga

[redacted]
www.dykinga.com

https://www.facebook.com/Dykinga-Photography-124067900994926/

FINE ART
Etherton Gallery
info@ethertongallery.com

STOCK IMAGES
The Nature Library
http://www.naturepl.com/search?
s=dykinga

Minden Pictures
https://www.mindenpictures.com/search?s=jack+dykinga

NEW BOOK 2017

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Tuesday, February 23, 2021 3:51 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Michele Frisella

Message from BMGR LEIS Contact Us Form:

23/02/2021 at 15:51

Submission Number: 34 since 3/24/2020

Name: Michele Frisella (IP Address: [redacted])
Email: [redacted]
City: Tucson
State: Arizona

Message:

I ask that the Barry M Goldwater Range continue to be open for public recreation. I enjoy camping, hiking, and wildlife viewing. 27-1

I support ALTERNATIVE 2

It is important for Arizonans to continue to have public access to the Barry M Goldwater Range.

Thank you.

How did you hear about this website?

Word-of-Mouth

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Friday, February 19, 2021 7:15 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - stephanie grant

Message from BMGR LEIS Contact Us Form:

20/02/2021 at 19:15

Submission Number: 26 since 3/24/2020

Name: stephanie grant (IP Address: [redacted])
Email: [redacted]
City: Tequesta
State: Florida

Message:

Regarding the Barry M. Goldwater Range Impact. To me it seems vitally important to protect and preserve the wild lands we have left and to manage them for the wildlife and plants that are threatened by interference. For the sake of our descendants and their enjoyment of wild places lets take care of this land for us all.

How did you hear about this website?

Word-of-Mouth

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Thursday, February 25, 2021 9:07 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Susi Hauser

Message from BMGR LEIS Contact Us Form:

26/02/2021 at 21:06

Submission Number: 42 since 3/24/2020

Name: Susi Hauser (IP Address: [redacted])
Email: [redacted]
City: Salt Lake City
State: Utah

Message:

I had the incredible opportunity to visit the BMGR in January. I support the partnership that the military has with the Department of the Interior. I support Alternative 2 that simply renews the lease for 25 more years. Thank you. Sincerely, Susi hauser

How did you hear about this website?

Word-of-Mouth

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

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From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Friday, February 19, 2021 10:50 AM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Douglas Helber

Message from BMGR LEIS Contact Us Form:

19/02/2021 at 10:49

Submission Number: 22 since 3/24/2020

Name: Douglas Helber (IP Address: [redacted])
Email: [redacted]
City: Tucson
State: Arizona

Message:

Please keep public access available in the Barry Goldwater range. The area has valuable cultural resources and is utilized by many. 30-1

How did you hear about this website?

Social media

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

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From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Friday, February 19, 2021 1:27 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Sally Hills

Message from BMGR LEIS Contact Us Form:

19/02/2021 at 13:27

Submission Number: 24 since 3/24/2020

Name: Sally Hills (IP Address: [redacted])
Email: [redacted]
City: Tucson
State: Arizona

Message:

I support Lease Alternative 2.

How did you hear about this website?

News Article

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Friday, February 19, 2021 6:00 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Michael Ingram

Message from BMGR LEIS Contact Us Form:

20/02/2021 at 17:59

Submission Number: 25 since 3/24/2020

Name: Michael Ingram (IP Address: [redacted])
Email: [redacted]
City: Tucson
State: AZ

Message:

I am opposed to any changes in the management of the Goldwater Range from it's current situation. The Department of Interior absolutely needs to have a say in the resources of the range which include things other than military uses. (Recreational uses, wildlife conservation, etc) 32-1

This important parcel of land is too important to the people of Southern Arizona to be permanently removed from Public Use. It is a part of our Public Lands. I've been on the Range (with my permit), enjoyed it and plan to come back. 32-2

Don't change the management. Period.

How did you hear about this website?

News Article

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Wednesday, February 24, 2021 7:49 AM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - wendy isner

Message from BMGR LEIS Contact Us Form:

24/02/2021 at 07:48

Submission Number: 40 since 3/24/2020

Name: wendy isner (IP Address: [redacted])
Email: [redacted]
City: TUCSON
State: AZ

Message:

Sending my endorsement of Alternative 2 plan. This piece of desert is too beautiful to be kept from the public. 33-1

How did you hear about this website?

Social media,Internet Website,Radio,Newsletter

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

In regards to the Goldwater Range 25 YEAR renewal I cast my vote for ALTERNATIVE 2

34-1 Please maintain the current limited access to this beautiful Sonoran Desert with the addition of the Gila Bend buffer.

Thank you

Don W Jones

From:	Sandy Bahr <sandy.bahr@sierraclub.org>
Sent:	Monday, March 1, 2021 2:32 PM
To:	BMGR LW LEIS
Subject:	[EXTERNAL] BMGR Draft LEIS comments from Verlon Jose
Attachments:	Opinion.Barry M Goldwater Range.vmj022821.FINAL.pdf

Please see attached comments from Verlon Jose. He is copied on this message.

--

Sandy Bahr

Chapter Director

Sierra Club - Grand Canyon Chapter

514 W Roosevelt St.

Phoenix, AZ 85003

Phone (602) 253-8633

Mobile (602) 999-5790

sandy.bahr@sierraclub.org

http://www.sierraclub.org/arizona

Facebook.

Pronouns she, her, hers

DEPARTMENTS OF THE AIR FORCE AND THE NAVY'S APPLICATION TO EXTEND AND EXPAND MILITARY WITHDRAWAL FOR BARRY M. GOLDWATER RANGE

I hereby submit on the 'Reauthorization of the Barry M. Goldwater Range Land Withdrawal and Proposed Gila Bend Addition Land Withdrawal'.

Opposition to Alternatives: 1A, 1B, 1C, 2A, 2B and 2C, of the proposed preliminary alternatives.

Recommend and Support: Alternative 2 with the Gila Bend Addition (25 years) of the proposed preliminary alternatives.

The Tohono O'odham / Hia Ced O'odham have lived in these areas since time immemorial. From the Colorado River to the San Pedro River of Arizona, from Phoenix, AZ to Hermosillo, Sonora, Mexico, the O'odham have called these lands home. The lands where the Creator has placed us to live in harmony.

It is our basic human responsibility to care for the people, the land and the animals, everything the Creator has bestowed upon us. There is archaeological, anthropological, and physical evidence of our existence in these areas, therefore we are highly concerned about the future of these lands.

We understand the importance of the U.S. Military and the need for continuous training and exercises in areas designated for said purposes. The respective parties have enjoyed positive collaboration of federal government entities to ensure proper care, functions, and operations of reserved lands in the aboriginal footprint lands of our people. Upon non-use of these lands for military purposes the care thereof is paramount. Any lands within the aboriginal geographical area should be repatriated back to the original people of those lands.

The Department of the Interior (DOI) conserves and manages the Nation's natural resources and cultural heritage for the benefit and enjoyment of the American people, provides scientific and other information about natural resources and natural hazards to address societal challenges and create opportunities for the American people, and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities to help them prosper. (*DOI Website*)

Therefore, it is requested that the U.S. Military and the Department of Interior continue the lease of said lands for another 25 years on behalf of the American people and to honor trust responsibility and commitments to the American Indians, (namely the Tohono O'odham / Hia Ced O'odham).

35-1

Option 2 is strongly suggested. To renew the lease for another 25 years for use of lands within the Barry M. Goldwater Range to include the addition of the Gila Bend Land addition.

We do not own the land but are born of the land. It is our basic human responsibility to care for the land and the animals.

Verlon M, Jose, Governor
Traditional O'odham Leaders
Former Vice-Chairman, Tohono O'odham Nation

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Friday, February 19, 2021 4:39 AM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Mark Kasunicd

Message from BMGR LEIS Contact Us Form:

19/02/2021 at 04:39

Submission Number: 19 since 3/24/2020

Name: Mark Kasunicd (IP Address: [redacted])
Email: [redacted]
City: Tucson
State: AZ

Message:

I support AIternative 2. Please consider.

How did you hear about this website?

News Article

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Tuesday, February 23, 2021 4:23 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Diane Kelly

Message from BMGR LEIS Contact Us Form:

23/02/2021 at 16:23

Submission Number: 35 since 3/24/2020

Name: Diane Kelly (IP Address: [redacted])
Email: [redacted]
City: Oro valley
State: Az

Message:

Alternative 2

How did you hear about this website?

News Article

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

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From: Diane Kelly [redacted]
Sent: Tuesday, February 23, 2021 4:32 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] Barry Goldwater Range

I support Alternative 2.

Diane Kelly
[redacted]

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Wednesday, February 24, 2021 7:06 AM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - KRISTINE M KLEWIN

Message from BMGR LEIS Contact Us Form:

24/02/2021 at 07:06

Submission Number: 39 since 3/24/2020

Name: KRISTINE M KLEWIN (IP Address: [redacted])
Email: [redacted]
City: VAIL
State: AZ

Message:

I support Alternative 2

How did you hear about this website?

Internet Website

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

From: Kristine Klewin [redacted]
Sent: Wednesday, February 24, 2021 7:06 AM
To: BMGR LW LEIS
Subject: [EXTERNAL] Alternative 2

I support Alternative 2

Kristine Klewin
[redacted]

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Tuesday, February 23, 2021 7:03 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Gisela Kluwin

Message from BMGR LEIS Contact Us Form:

24/02/2021 at 19:02

Submission Number: 38 since 3/24/2020

Name: Gisela Kluwin (IP Address: [redacted])
Email: [redacted]
City: Flagstaff
State: Arizona

Message:

I have personal knowledge of the uniqueness of the BMGR from several visits and camping there. I appreciate the relatively unspoiled nature of the areas open to visitors, free from many motorized activities, where the visitor can appreciate the wonders of the desert - as home to many animals and as a delightful palette of desert vegertation, the clear star studded skies and the profound silence It is an exceptional refuge that people should be allowed to experience. I strongly urge you to adopt ALTERNATIVE 2 41-1
Thank you.

How did you hear about this website?

Newsletter,Internet Website

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

[redacted]

2/19/2021

I'm WRITING TO RECORD MY SUPPORT OF RENEWAL OF ALTERNATIVE 2 TO KEEP THE GOLDWATER RANGE OPEN FOR RECREATION AND CONSERVATION OF OUR PRECIOUS SONORAN DESERT. THE PRESERVATION OF THIS LAND & NATURAL LIFE IN ALL FORMS SO ESSENTIAL. 42-1

SINCERELY
DIANA LANCASTER
D. Lancaster

19 Feb 2021

43

Dear Sir or Madam,

We support Alternative 2 to review the Goldwater Range for 25 years — and to keep it open for public access.

43-1

Thanks for your consideration

Carolyn Leigh & Ron Perry

[redacted]

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Tuesday, February 23, 2021 4:28 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Lainie Levick

Message from BMGR LEIS Contact Us Form:

23/02/2021 at 16:28

Submission Number: 36 since 3/24/2020

Name: Lainie Levick (IP Address: [redacted])
Email: [redacted]
City: Tucson
State: Arizona

Message:

I have hiked, camped, and travelled through the BMGR, and consider it to be among the most beautiful land in Arizona and the Southwest. It is one of my favorite places to visit, and I fully appreciate the opportunity to comment on this LEIS.

I support Alterative 2 (the original, not the variations), to add the Gila Bend addition, to continue public access to this special place, to maintain the 25 year review period, and to continue the existing management scenario. 44-1

Please notify me of future actions concerning this project. Thank you.

How did you hear about this website?

News Article

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

February 23, 2021

Barry M. Goldwater Range
LEIS
P.O. Box 2324
Phoenix AZ 85003

Dear Sir or Madam:

I am writing to you as an interested and concerned Arizona citizen to urge your adoption of LEIS **Alternative 2** in your upcoming renewal.

I value the natural and human capital that is a part of the 1.7 million acres of land within the Barry M. Goldwater Range. As an outdoor advocate and ecologist, I also value the fact that a large part of that landscape is accessible to the public for recreation under permitting processes. I support your efforts to add the land near Gila Bend, and a 25-year renewal alternative. I also STRONGLY ENDORSE the shared management that currently exists between the military and the Department of Interior. Making these landscapes accessible ensures that hikers, campers, and recreationalists can appreciate this wonderful habitat.

45-1

45-2

Sincerely yours,

Marilyn D. Loveless

MARILYN D. LOVELESS ◆ [redacted]

February 22, 2021

[redacted]

BMGR LEIS
P.O. Box 2324
Phoenix, AZ 85003

I am writing regarding management of our public lands within the Barry M. Goldwater Range. Although I live in southeastern Arizona, I often travel to the Cabeza Prieta National Wildlife Refuge and the part of the Barry Goldwater Range open to the public for camping, photography, and wildlife viewing.

I favor a 25-year renewal of the range for military use under Alternative 2, which will continue to retain the Department of the Interior as a partner in management of these lands. 46-1

Our public lands are important to Arizonans and all Americans. Military use of the area and retention of the public lands for public use are compatible under Alternative 2.

Thanks you for the opportunity to comment.

Sincerely,

Robert J. Luce

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Tuesday, February 23, 2021 5:27 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Pat Madea

Message from BMGR LEIS Contact Us Form:

24/02/2021 at 17:26

Submission Number: 37 since 3/24/2020

Name: Pat Madea (IP Address: [redacted])
Email: [redacted]
City: TUCSON
State: AZ

Message:

I support Alternative 2. It reauthorizes the existing
BMGR land withdrawal for another 25 years, but
the BMGR East boundary would be extended
to include the 2,366-acre Gila Bend Addition.

How did you hear about this website?

News Article

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Saturday, February 27, 2021 12:00 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Warren May

Message from BMGR LEIS Contact Us Form:

27/02/2021 at 11:59

Submission Number: 45 since 3/24/2020

Name: Warren May (IP Address: [redacted])
Email: [redacted]
City: Tucson
State: Arizona

Message:

Having traveled and camped in the territory of El Camino del Diablo, I value its historical significance. To this end, I strongly support Alternative 1, oppose Alternatives 1A, 1B, 2A and 2B, and strongly oppose Alternatives 1C and 2C.

How did you hear about this website?

News Article

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2/22/21

Dear BMGR:

Regarding the upcoming lease renewal:

I request that you choose Alternative 2:

Extend the existing land withdrawal and reservation of the BMGR for 25 years, but the BMGR East boundary would be extended to include the Gila Bend Addition. Management of the withdrawn public lands in the BMGR would continue as described for Alternative 1.

Since 1976 I have appreciated camping and hiking in the Barry Goldwater Range. I love the spaciousness, stillness, stark mountains, silence. I actually enjoy seeing the different planes and flying objects as well. It is a fragile desert and I am grateful for your stewardship.

Please keep this Arizona gem open so our children and grandchildren can visit it, as did we. 49-1

Thanks so much,

Gail McDonald

Gail McDonald M.D.

[redacted]

Bushey, Sabra

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Monday, February 22, 2021 8:54 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Linda Miller

Message from BMGR LEIS Contact Us Form:

23/02/2021 at 20:53

Submission Number: 32 since 3/24/2020

Name: Linda Miller (IP Address: [redacted])
Email: [redacted]
City: Tucson
State: Arizona

Message:

I support Alternative 2. Just plain 2. Renew the Goldwater Range for 25 years and keep this magnificent desert region as open to the public as it is today. I do not want the military to have total control with no Interior Department partner. 50-1
The public and wildlife need access to this area. 50-2

How did you hear about this website?

News Article

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

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"Where Eagles Soar"
Red Mesozoic Cliffs of the Dolores River Canyon
West Slope, Colorado

PHOENIX AZ 852
23FEB2021 PM3 L

As a long time supporter of the BMGR I would ask that you consider Alternative 2 as your future management Plans. This is a very special land and one that needs access as well good Management

Sincerely,

BMGR LEIS
PO Box 2324
Phoenix AZ
85002

85002-2324

Watercolor by M.A. Burgess© 2001 Flor de Mayo 520.907.9471

THE UNIVERSITY OF ARIZONA
POETRY CENTER

Since 1962 the University of Arizona Reading and Lecture Series has brought poets and writers to Tucson. James Tate last read on November 1996. Listen to his readings and more at *voca.arizona.edu*.

PHOENIX AZ 852
19 FEB 2021 PM6 L

Galdwater Range:
I support renewal
alternative #2

Mary Myers
Tucson
resident
Voter

BMGR LEIS
P.O. Box 2324
Phoenix AZ
85003

85002-232424

Comment on Barry M
Goldwater-LEIS-Renewal

I fully support
Alternative 2.
NOT 2A, 2B, or 2C.

Marian O'Reilly
[redacted]

PHOENIX AZ 852
20 FEB 2021 PM 5 L

POSTCARD

BMGR LEIS
PO Box 2324
Phoenix AZ 85003

BIRD WATCHER'S DIGEST, Box 110, Marietta, Ohio 45750

Printed on recycled paper

EASTERN BLUEBIRDS by Julie Zickefoose #735.

85002-232424

Bushey, Sabra

From: Logan Phillips <logan@dirtyverbs.com>
Sent: Friday, February 26, 2021 8:37 AM
To: BMGR LW LEIS
Subject: [EXTERNAL] Public comment

To Whom It May Concern:

I am a resident of Tucson, Arizona and a graduate student at the University of Arizona.

In regards to the Barry M. Goldwater Range Land Withdrawal Legislative Environmental Impact Statement, I strongly endorse Alternative 2.

Maintaining some public access (by permit) to the range is essential, given the size and biological, cultural and tribal resources it holds. While that sky can wholly belong to the jets and helicopters, the ground should continue to be shared use with citizens. 54-1

Thank you for your attention to this important matter.

Logan Phillips

From: bruce plenk [redacted]
Sent: Monday, March 1, 2021 6:35 AM
To: BMGR LW LEIS
Subject: [EXTERNAL] Goldwater Range Options-Prefer Alternative 2

Please adopt Alternative 2 to preserve public access and review to a wonderful desert resource for Arizonans and all others. Restricting or limiting access to this area to defense uses prevents "normal" people from learning about and enjoying a remote experience. The minor land expansion seems OK. This alternative would continue the 25 year review period which seems appropriate. 55-1

Thanks

Bruce Plenk

[redacted]

From: Jeffrey Rein [redacted]
Sent: Saturday, February 20, 2021 2:04 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] Goldwater Range

Hello,

I tried using the form on the site, but after I hit submit, it became stuck and I don't know if it was sent or not.
****

Please go with alternative #2---25 years with the addition of Gila Bend land. I would like the Interior Department to stay involved so not only are humans protected but so are the flora and fauna. And of course, the land itself. 56-1

Thank you,

Jeffrey Rein

Bruce Robinson

@[redacted] [redacted]

February 21, 2021

BMGR LEIS
PO Box 2324
Phoenix, AZ 85003

Dear Madam or Sir,

I am writing to express my support for Alternative 2 regarding the renewal of usage for the Goldwater Range.

I'm quite happy to see the military using the Range for training. It has given me confidence, in fact, to see aircraft in action, using the Range.

This wilderness is a treasure for our society that the Interior Department also should oversee. I urge you to adopt Alternative 2. 57-1

Sincerely,

Bruce Robinson

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Friday, February 26, 2021 9:18 AM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Sherri Schamel

Message from BMGR LEIS Contact Us Form:

26/02/2021 at 09:17

Submission Number: 43 since 3/24/2020

Name: Sherri Schamel (IP Address: [redacted])
Email: [redacted]
City: Tucson
State: Arizona

Message:

I am herein noting my support for alternative 2 for continuing the BMGR for 25 years.

Alternative 2: Extend the existing land withdrawal and reservation of the BMGR for 25 years, but the BMGR East boundary would be extended to include the Gila Bend Addition. Management of the withdrawn public lands in the BMGR would continue as described for Alternative 1.

Thank you,
Sherri Schamel

How did you hear about this website?

News Article

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

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From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Saturday, February 27, 2021 1:05 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Priscilla G. Scott

Message from BMGR LEIS Contact Us Form:

27/02/2021 at 13:04

Submission Number: 46 since 3/24/2020

Name: Priscilla G. Scott (IP Address: [redacted])
Email: [redacted]
City: Tucson
State: AZ

Message:

I would like to submit a comment on the Reauthorization of the Barry M. Goldwater Range Land Withdrawal and Proposed Gila Bend Addition Land Withdrawal.

I would like to support Alternative #2 as the best option for the government and the public as stated below:
Alternative 2: Extend the existing land withdrawal and reservation of the BMGR for 25 years, but the BMGR East boundary would be extended to include the Gila Bend Addition. Management of the withdrawn public lands in the BMGR would continue as described for Alternative 1.

Priscilla G. Scott

How did you hear about this website?

News Article

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

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From: Roger Shanley [redacted]
Sent: Friday, February 19, 2021 10:18 AM
To: BMGR LW LEIS
Subject: [EXTERNAL] Goldstein range

I support Alternative 2 for the Barry Goldwater Range to allow public use of this land. 60-1
Roger

Public comment

I support

Alt #2

for mgmt. of

BMGR

Cheryl Shearer

[redacted]

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Sunday, February 21, 2021 9:10 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - jon sirkis

Message from BMGR LEIS Contact Us Form:

22/02/2021 at 21:09

Submission Number: 30 since 3/24/2020

Name: jon sirkis (IP Address: [redacted])
Email: [redacted]
City: boulder
State: co

Message:

I urge you to leave all of the BMGR in its natural state, to allow non-motorized public access to the maximum area possible, and the maximum possible amount of area dedicated to protection of endangered species 62-1 62-2

How did you hear about this website?

Newspaper Advertisement

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

Thomas Smithson, Ph.D.

[redacted]

February 20, 2021
BMGR LEIS
P. O. Box 2324
Phoenix, AZ 85003
RE: Goldwater Range Lease Renewal

Gentlemen,
After reading through the documents associated with this renewal I would support Alternative #2 . This proposal not only serves the needs of the military, but also adds further environmental protection to the Gila Bend addition. The long term used of the military of this training area should be continued, it would be difficult to find another area which has the same properties.

Thank you for your consideration of my input on this important question.

Sincerely yours,

Thomas Smithson

February 19, 2021

RE: The Barry M. Goldwater Range Renewal
My personal comment regarding this issue.

I support Alternative 2 as I feel it is the best for all concerned.

Sincerely,

Darlene Smyth
[redacted]

BMGR LEIS
PO Box 2324
Phoenix, AZ 85003

Re: Public input on the Air Force and Marine Corps' proposal to extend the current land withdrawal and reservation of the BMGR and add about 2,366 acres of public land (a 0.14 percent land increase) to BMGR East

I urge you to support Alternative 2. Over the years, my wife and I have spent time on the BMGR in the public areas and we believe it is important to preserve the unique region for public use and enjoyment. 65-1

Thank you,

Tim Tilton

[redacted]

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Friday, February 26, 2021 11:50 AM
To: BMGR LW LEIS
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Bruce Tremper

Message from BMGR LEIS Contact Us Form:

26/02/2021 at 11:49

Submission Number: 44 since 3/24/2020

Name: Bruce Tremper (IP Address: [redacted])
Email: [redacted]
City: Salt Lake City
State: UT

Message:

I love to visit the Barry Goldwater Range in the sections open to the public. I support Alternative 2. No change to the present system, which seems to work well.

Thanks,

Bruce

How did you hear about this website?

News Article

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

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To: BMGR LW LEIS
Subject: RE: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Jim Truitt

From: Barry M Goldwater Range LEIS <barrymgoldwaterLEIS@gmail.com>
Sent: Monday, February 22, 2021 10:46 AM
To: BMGR LW LEIS <BMGR_LEIS@jacobs.com>
Subject: [EXTERNAL] New message from BMGR LEIS Website Contact Form - Jim Truitt

Message from BMGR LEIS Contact Us Form:

22/02/2021 at 10:45

Submission Number: 31 since 3/24/2020

Name: Jim Truitt (IP Address: [redacted])
Email: [redacted]
City: Oro Valley
State: AZ

Message:

I support Alternative 2. Please renew the Goldwater Range for 25 years.

How did you hear about this website?

Newspaper Advertisement

Content Form submission from BMGR LEIS Contact form (found here: https://barry-m-goldwater-leis.com/contact/)

You are receiving this email because you are on the forwarding list for the BMGR LEIS Project Team. For questions or concerns, contact Ryan.Nespodzany@jacobs.com

From: [redacted]
Sent: Sunday, February 28, 2021 8:27 PM
To: BMGR LW LEIS
Subject: [EXTERNAL] BMGR Land Withdrawal LEIS comments
Attachments: BMGR Land Withdrawal LEIS comments-Turner.docx

Attached please find my comments on the Draft Legislative Environmental Impact Statement for the Reauthorization of the Barry M. Goldwater Range Land Withdrawal and Proposed Gila Bend Addition Land Withdrawal. Please address these in preparing the final EIS.

--Dale Turner

This email has been checked for viruses by Avast antivirus software.
www.avast.com

February 28, 2021

BMGR Land Withdrawal LEIS
P.O. Box 2324
Phoenix, Arizona 85003

To whom it may concern,

I write to comment on the Draft Legislative Environmental Impact Statement for the Reauthorization of the Barry M. Goldwater Range Land Withdrawal and Proposed Gila Bend Addition Land Withdrawal. I am a wildlife biologist with more than 30 years of experience in the Sonoran Desert and many trips to the Goldwater Range, including several DOD-funded studies[1] I conducted on the Mohawk Dunes during 1994-1998. My father conducted training flights over the Goldwater Range, early in his 25-year Air Force career, so I also have a personal appreciation for the value that training range provides for military safety and effectiveness.

I support Alternative 2. Renew the Goldwater Range for 25 years, and include the Gila Bend addition. The current arrangement, with DOI land management overlaid by a DOD withdrawal, maintains a strong partner with public land management expertise. A 25-year renewal period supports public oversight for this valuable land resource, and provides accountability on the part of DOD for their ground activities.

There is no clear military mission that requires indefinite withdrawal or permanent transfer of management authorities. The 25 year renewal cycle has worked well and should be continued, with reports every 5 years on status and trends.

The landscape covered by the Goldwater Range has a long and deep well of public interest. This includes scientific research on Sonoran Desert ecology and archeology, conservation of rare plants and animals, and public recreation. The range should remain open to those pursuits, subject to reasonable closures for safety, security, and good land management. 68-1

While DOD direct impacts cover a small portion of the range, DOD should develop a range-wide response to land degradation, especially that caused by illegal migration and smuggling activities, by border law enforcement, and most of all by DHS building and maintaining its wall. There is a large and growing area where natural and cultural resources have been damaged, largely by border enforcement actions and projects. These impacts are widespread and long-lasting, and should be addressed through 68-2

[1] Turner, D.S., C.R. Schwalbe, and P.L. Warren. 1997. Reptile and plant inventory of the Mohawk Dunes, Barry M. Goldwater Air Force Range, Arizona. Contract report to Luke Air Force Base, Legacy Resource Management Program, Project #95-1009. 46 pp.

Turner, D.S., C.R. Schwalbe, and P.L. Warren. 1997. Reptile and plant monitoring plan; inventory and monitoring of unique sand dune ecosystems, Barry M. Goldwater Air Force Range, Arizona. Contract report to Luke Air Force Base, Legacy Resource Management Program, Project #95-1009. 63 pp.

Felger, R.S., D. Turner, and M. Wilson. 1998. Survey of plants on the Mohawk Dunes on the Barry M. Goldwater Range. Report to Luke Air Force Base, Arizona, Contract #F0260497MS130. 137 pp.

changes in permitted behavior and restoration of damaged lands. Ideally, DHS should fund much of this range-wide work and restoration. 68-2

The withdrawal should clarify that the Goldwater Range is not open to new civilian developments that fragment its desert ecosystem. The siting of Arizona State Route 195 through the western edge of the range was completely unnecessary and served no military function, but it reduced the buffer between military and civilian activities, and created a lethal barrier for desert wildlife through what had previously been good habitat. It is easy to imagine future proposals for additional paved roads, pipelines, and electrical transmission lines to run east/west or north/south across the vast spaces of the Goldwater Range, selected for the convenience and profit of project developers. Such projects would not serve the military mission and would permanently degrade the natural and cultural values that currently exist. 68-3

The withdrawal should revive and codify special management areas on the Goldwater Range, similar to the previous Gran Desierto Dunes, Tinajas Altas, and Mohawk Mountains/Sand Dunes Areas of Critical Environmental Concern. Those former BLM designations provided an important overlay by highlighting areas with sensitive natural or cultural resources where there was no critical need for ground-disturbing military activity. The Goldwater Range provides some of the best remaining habitat for several rare and protected wildlife species, and establishing clear areas like ACECs for those species is the most efficient path to achieving their conservation. 68-4

In particular, note that the Mohawk Dunes Fringe-toed Lizard has been identified as a distinct species, Uma thurmanae, separate from all related populations of the genus[2]. To the best available scientific knowledge, the entire distribution of the species occurs within the boundaries of the Goldwater Range, and its survival is dependent on DOD management. That is clearly deserving of a special management area. 68-5

Sincerely,

Dale S. Turner

[redacted]

[2] Derycke, E.G., Gottscho, A.D. and Mulcahy, D.G. 2020. A new cryptic species of fringe-toed lizards from southwestern Arizona with a revised taxonomy of the Uma notata species complex (Squamata: Phrynosomatidae). Zootaxa, 4778(1)

2-20-21

To Whom it May Concern:

I wholeheartedly support Alternative 2.
Please continue operations of the Goldwater Range for another 25 years.
I have driven, hiked and camped this glorious and historic region numerous times and I would like to be able to do it many more times.
Please keep this beautiful desert region open to the public as it is today. Public recreation and tourism also benefit our economy. 69-1

Thank you

Sincerely,

Cathy L. Waterman

[redacted]

PLEASE BE AWARE OF MY OPINION ON THE RENEWAL OF THE MILITARY LEASE ON BMGR.

I SUPPORT OPTION #2.

I AM A TUCSON RESIDENT AN UNDERSTAND HOW IMPORTANT BMGR IS TO OUR MILITARY & THE ECONOMY OF TUCSON.

Mark D Ziska

MARK D. ZISKA
[redacted]

Edward B. Zukoski
[redacted]

BMGR Legislative EIS
P.O. Box 2324
Phoenix, AZ 85003
Via Email: BMGR_LEIS@jacobs.com

Re: Comments on Legislative EIS for Withdrawal of Barry M. Goldwater Range

To the Air Force:

I write in my personal capacity to oppose an alternative in the Legislative EIS that would permit the Air Force to indefinitely withdraw the lands that comprise the Barry M. Goldwater Range.

I visited the Range a couple of times in the late 1990s and early 2000s, traveling on the Camino del Diablo and accessing the Cabeza Prieta National Wildlife Refuge from the north and west. The lands of the BMGR, the Refuge and Organ Pipe Cactus National Monument, together comprise a huge chunk of relatively undisturbed Sonoran desert. The natural resource, recreational, and scientific values of these areas deserve the highest level of protection.

I associate myself with the letter from Bill Broyles and Gayle Hartmann printed in the Arizona Daily Star last month:

> Under another alternative, the Goldwater's 1.7 million acres would be put forever under total military control, ditching its Interior Department partner. To us, that alternative sounds like a land grab, empire building or a way to sidestep oversight. Public recreation and tourism greatly benefit our economy, too.
>
> The renewal requires good stewardship and periodic public reports on natural and cultural resources, all challenging work. Range managers certainly could use larger budgets and staffs. The problems they face are daunting and immediate: mission planning, monitoring the land's health, restoration of landscape damage, interagency coordination, and fuller attention to public visitors.

See Broyles and Hartmann, Keep the Goldwater Range open for recreation, Az. Daily Start (Feb. 18, 2021), attached.

Given complete control to DOD would indeed be a land grab, and would largely insulate the military from public oversight or accountability when it comes to management of the precious resources there, which include sand dunes and mountain ranges, archeological treasures, iconic bighorn sheep and the Sonoran pronghorn, one of North America's most endangered mammals, and one of the driest places in the United States. Protecting these resources and managing recreation are not a key component of the US Air Force's mission. Ceding all control to DOD

would not be in the interest of the public who recreate there, who carry out research there, and who love the desert there.

Further, an indefinite withdrawal would appear to conflict with President Biden's "30 by 30" initiative as outlined in Executive Order 14,008, which requires federal agencies to take initial steps "to achieve the goal of conserving at least 30 percent of our lands and waters by 2030." E.O. 14,008 at Sec. 216, 86 Fed. Reg. 7619, 7,627 (Jan. 27, 2021). Taking over a million acres out of the hands of the Interior Department appears to move the nation in exactly the opposite direction of the Commander in Chief's initiative. Any subsequent NEPA document must explain and address this apparent conflict. 71-1

I urge DOD to reject the indefinite withdrawal of the BMGR.

Thank you for your attention to this matter.

Sincerely,

Cc: Rep. Raul Grijalva

https://tucson.com/opinion/local/tucson-opinion-keep-the-goldwater-range-open-for-recreation/article_768aa7d9-77be-5fa7-8615-6def89ceb47f.html

EDITOR'S PICK

Tucson Opinion: Keep the Goldwater Range open for recreation

By Bill Broyles and Gayle H. Hartmann Special to the Arizona Daily Star
Feb 18, 2021

An A-10 soars over the Barry M. Goldwater Range-East. Davis-Monthan Air Force Base offers easy access to the range for training missions.

U.S. Air Force

By Bill Broyles and Gayle H. Hartmann Special to the Arizona Daily Star

The following column is the opinion and analysis of the writers:

Where do Tucson's A-10 Warthogs and F-16 Fighting Falcons go when they take off and head west? More often than not, they head to the Goldwater Range to practice flying. Most Air Force and Marine Corps fighter pilots since WWII have trained there.

Tucson Opinion: Keep the Goldwater Range open for recreation

The range serves pilots from Davis-Monthan, the Air and Army National Guard, Luke Air Force Base in Phoenix, the Marine Corps in Yuma, and even aircraft carrier pilots out of San Diego.

The airspace over the range's 1.7 million acres is a constant swirl of activity, but those military flights really involve only about 9% of the ground which remains largely pristine, beautiful Sonoran Desert — currently 38% of it is open to the public for hiking and camping and more could be. It's a popular destination.

The land includes desert waterholes visited by Padre Kino three centuries ago, a famous historic trail called El Camino del Diablo used by forty-niners heading to California, Native American camps and sacred places, photogenic sand dunes, and mountain citadels inhabited by desert bighorn. Some of Arizona's prettiest places are there.

Our concern is not the pilot training — our military is the best in the world. But the land belongs to the American public and we want to ensure that the ground is kept in good condition until the military is done with it.

Every 25 years, the range comes up for renewal, a process that includes self-evaluation by the military, public comments and congressional approval. We urge you to back the renewal — Tucson, the state's economy and our nation's defense depend on it.

But, we believe it is critically important to support renewal Alternative 2: To continue operations for another 25 years, keep the range's Department of Interior partner and add a few sections of land near Gila Bend as a safety buffer. This will ensure seamless continuity of a successful system, so pilots won't miss a day of training.

A 25-year renewal will allow each generation to decide how to best manage the land — it's a fair and proven cycle for oversight and evaluation. A longer lease might save a little money, but at the cost of public oversight. What's the cost of a renewal report every 25 years compared to flying an F-35 at $35,000 an hour?

Under another alternative, the Goldwater's 1.7 million acres would be put forever under total military control, ditching its Interior Department partner. To us, that alternative sounds like a land grab, empire building or a way to sidestep oversight. Public recreation and tourism greatly benefit our economy, too.

The renewal requires good stewardship and periodic public reports on natural and cultural resources, all challenging work. Range managers certainly could use larger budgets and staffs. The problems they face are daunting and immediate: mission planning, monitoring the land's health, restoration of landscape damage, interagency coordination, and fuller attention to public visitors.

Support Alternative 2. Just plain 2. Renew the Goldwater Range for 25 years and keep this magnificent desert region as open to the public as it is today.

Your comments and ours are due before March 1 at BMGR LEIS, P.O. Box 2324, Phoenix AZ, 85003. Visit **www.barry-m-goldwater-leis.com** for full information. Don't delay. It's important to you, the wildlife and cactus and your nation.

Bill Broyles and Gayle Hartmann are co-authors of the book "Last Water on the Devil's Highway."

Table M-2. Draft LEIS Comments and Responses

Comment Number/ Commenter	Comment	Response
1-1 EPA	**Potential for Off-Range Contamination from Munitions Constituents (MC)** In our scoping comments, we recommended the DLEIS include a summary and discussion of the most recent Operational Range Assessment and Range Environmental Vulnerability Assessment, which address the potential for off-range migration of MC, and that the reports be appended to the DLEIS. We appreciate reference to ecological receptors as we suggested in our scoping comments, but the DLEIS did not append the reports and lacked sufficient discussion of their conclusions. The DLEIS states only that, for BMGR East, "a potentially complete pathway to ecological receptors was identified via surface water/sediment; however, based on the weight of evidence, no potential risk to ecological receptors was identified" (p. 3-98). Since there was no further discussion or presentation of the evidence, the conclusion is not supported. The DLEIS further states: "All other mechanisms to transport MC through soil and groundwater to off-range areas were deemed unlikely" without indicating how likeliness was determined. ***Recommendation:*** In the FLEIS, provide the evidence referenced that supports the statements that there is no potential risk to ecological receptors via surface water or sediment, and the scientific support that MC are unlikely to be transported off-range via groundwater. Indicate whether ORA/REVA modeling results exceeded any screening level values/thresholds. Specify whether any field sampling and analysis for surface water, sediment, or groundwater has occurred at the range boundaries and, if so, summarize the results. Identify the closest off-range downstream potable water wells.	LEIS Section 3.16 has been revised to provide additional information.
1-2 EPA	In contrast, the rationale for withdrawing the remaining southern parcels of the proposed Gila Bend Addition is not as supported. The DLEIS states that these parcels underlie the R-2305 restricted airspace and therefore the Air Force needs to control the surface land use in this area so it continues to be compatible with training operations in the overlying air space (p. 1-17). However, the DLEIS identifies large areas of restricted airspace that extend beyond the BMGR land boundaries including all of the adjacent Cabeza Prieta National Wildlife Refuge (which comprises approximately 31 percent of the restricted airspace at the BMGR), portions of the Tohono O'odham Nation of Arizona adjacent to the range, and other smaller areas (p. 1-14). Unlike other recent land withdrawal additions such as that for the Nevada Testing and Training, the DLEIS does not identify these southern parcels as being in a weapons safety footprint or accident potential zone. The Bureau of Land Management's Lower Sonoran Field Office manages the public lands comprising the Gila Bend Addition in accordance with the *Lower Sonoran Resource Management Plan* and the DLEIS indicates that the land is in a relatively natural state, contains no existing utilities, is not part of a formalized or designated recreational area (p. 3-42), has no unique features or through-road travel to attract people to the land (p. 3-93), has not been grazed in decades (p. 3-107), and has no mineral deposits such that it is likely to be mined (p. 4-10). The DLEIS does not indicate whether the Air Force considered land use control mechanisms rather than withdrawal to control surface land use for these southern parcels. The DLEIS notes that each jurisdiction for perimeter lands surrounding the BMGR has processes in place to coordinate land use activities directly with the BMGR managers and/or through regional planning efforts (p. 3-27). ***Recommendation***: In the FLEIS, discuss the feasibility of using land use control mechanisms to control surface land use on the southern parcels of the Gila Bend Addition that are not associated with Gila Bend AFAF safety. Consult with the BLM to determine whether land use restrictions and/or permitting could be implemented on these parcels in lieu of withdrawal. We note that visitors to portions of the adjacent BLM Sonoran Desert National Monument are required to obtain a Barry M. Goldwater Range permit1; therefore, it appears existing permitting mechanisms may be available that could be used or modified to meet the Air Force purpose and need while avoiding further loss of public land.	The suggested approach would not be a workable solution or reasonable alternative. An access permitting system such as that used for the BLM-administered Sonoran Desert National Monument and Sentinel Plain area could potentially control or exclude public access, but it would not eliminate the potential for settlement, sale, location, or entry of the area underlying R-2305 under some or all of the general land, mining, and mineral leasing laws. The purpose of the access permitting systems for the former BMGR Area A portion of SDNM and Sentinel Plain is to ensure that visitors are appropriately informed that they may encounter UXO in these former military range areas and that they must not disturb, handle, or collect these potentially dangerous munitions items. The Presidential Proclamation that established the SDNM also withdrew the public lands within the monument from the operation of the general land, mining, and mineral leasing laws in order to preserve the natural and cultural resource objects for which the monument was established. The former Area A permit system does not and could not prevent entry for those operating under these laws. In contrast, Sentinel Plain is no longer withdrawn from the operation of these laws and entry under these laws would be consistent with the purposes of these public lands in accordance with the *Lower Sonoran Resource Management Plan*. The Air Force uses R-2305 to support military aircraft maneuvers and live-fire weapons use at Range 3 and East Tactical Range that could be hazardous to nonparticipating aircraft or ground surface users. Abrupt maneuvers and high-performance flight by military aircraft are permissible in the portion of R-2305 that extends over BLM public lands to the north and east of BMGR East. However, the lack of positive control of the underlying land—through withdrawal and reservation, administrative jurisdiction, or formal agreement with the agency with administrative jurisdiction—preludes operating aircraft with armed weapons systems or incorporating this area in surface danger areas to support weapons use directed at targets within the current boundaries of BMGR East. The Air Force and Marine Corps do not operate aircraft with armed weapons systems in the areas of R-2301W, R-2301E, R-2304, or R-2305 that extend outside of the boundaries of the BMGR except over portions of the CPNWR where such use may be permitted in accordance with Section 3032 of the MLWA of 1999 to position aircraft for attacks on targets in the BMGR. Portions of R-2301W, R-2301E, and R-2304 extend beyond the boundaries of the BMGR, but, unlike the situation at R-2305, these areas are not needed to support flights with armed weapons systems, firing and release of aircraft weapons, of surface danger areas. The corner of R-2305 over BLM public lands, however, is an important maneuvering area for aircraft positioning to deliver weapons on nearby targets in Range 3 and East Tactical Range. Consequently, the Air Force proposes that Congress withdraw the affected BLM lands to preclude land uses that would be inconsistent with weapons training in tactical aircraft and reserve the area as part of the BMGR so that R-2305 may be more fully used to support the training mission of the range.

Comment Number/ Commenter	Comment	Response
1-3 EPA	**Administrative Jurisdiction and Withdrawal Period Alternatives** Alternatives 1A, 1B, 2A, and 2B propose to extend the land withdrawal for periods greater than 25 years; 1A and 2A would extend it to 50 years; 1B and 2B would extend the land withdrawal indefinitely. While the DLEIS identifies certain efficiencies in a longer or an indefinite withdrawal period, there are also disadvantages. According to the DLEIS, the decision to reauthorize the BMGR would be a landscape-scale, land-use decision with long-term implications for the BMGR and associated affected environments (p. 80). The Integrated Natural Resource Management Plan (INRMP) states that significant changes in climate in this region will have broad impacts on ecosystems and consequences for biodiversity. The process for updating future land use and sustainability planning, as well as project-level analyses that may be tiered to the LEIS, would benefit from the periodic re-evaluation of the withdrawal as climate change and effects of land use decisions are better understood over time. While the DLEIS indicates that the DoD reviews the continuing need for its installations and other facilities to some degree with every budgeting cycle, and the periodic INRMP updates will still occur regularly, the NEPA process associated with land withdrawal renewals is more comprehensive, covers more resources than the natural resources addressed in an INRMP, and offers the public an additional opportunity for involvement. Alternatives 1C and 2C address whether to continue the existing administrative jurisdiction that consults with the Department of Interior or permanently transfer administrative jurisdiction of the public lands to the DoD to become a permanent military facility. Transferring jurisdiction would deprive the BLM and the U.S. Fish and Wildlife Service of important preparation and consultation roles when updating the INRMP (p. 2-8), which could affect resource management. We agree with the U.S. Customs and Border Protection2 that the existing administrative jurisdiction at BMGR has value. ***Recommendation:*** We recommend continuing with 25-year withdrawal periods to facilitate informed future decision-making based on the most up to date conditions, and to provide the public with an additional opportunity for involvement, especially for those resources that are not included in the INRMP. We also recommend the Secretary of the Interior retain underlying administrative jurisdiction for the withdrawal lands to continue the coordinated interagency land management approach.	A number of processes and tools are in place at the BMGR that ensure that lands and resources are effectively managed, conserved, protected, and, when applicable, restored. Many of these include civilian agency and public participation and review, such as the INRMP update and Public Report preparation process. In addition, the interval between land withdrawal extensions (currently 25 years) is too long to be an effective tool for resource protection or for evaluating if mitigation measures are needed, particularly when periodically updated management plans already serve this purpose and offer the opportunity for public oversight. Legally mandated programs to meet resource protection and impact mitigation needs would continue uninterrupted under any of the withdrawal extension alternatives. These include: • Managing natural resources and public access in accordance with the Sikes Act and the Sikes Act mandated INRMP (LEIS Sections 2.2, 2.6, and 3.17) • Updating the INRMP as necessary with each annual budget cycle • Reviewing/updating the INRMP comprehensively, with interagency participation and public review, as necessary, but no less frequent than every five years—the INRMP includes a BMGR-wide section and separate detailed segments for BMGR West and BMGR East (LEIS Section 2.2) • Preparing a BMGR Public Report, with interagency participation and public review, to accompany each 5-year INRMP update (LEIS Section 2.2) • Preparing ICRMPs for BMGR West and BMGR East and updating these plans annually (LEIS Section 3.13) • Continuing the interagency BEC and IEC as collaborative forums that meet three times per year for supporting natural and cultural resource management and providing public outreach and involvement functions (LEIS Section 2.2) • Continuing interagency management collaboration on specific issues as necessary and productive, such as the ongoing Sonoran pronghorn recovery program (LEIS Section 3.12.1.3) • Preparing NEPA documentation as required for proposed actions (LEIS Sections 1.3 and 2.2) Collectively, these activities provide transparency and abundant and timely opportunities for civilian agency and public participation and involvement in the management, conservation, use, and protection of resources and development measures to mitigate adverse effects on resources. Regarding the concern that a transfer of administrative jurisdiction would diminish the ability of the BLM and USFWS to contribute meaningfully when the BMGR INRMP is updated, please note that both of these agencies would continue to serve as members of the Sonoran pronghorn Recovery Team, BEC, and IEC. Although the BLM performs certain standby administrative functions pertaining to resource management and participates in preparing INRMP Updates, as described in Section 2.3.3, other than its role as a recovery team member, this agency has no on-the-ground involvement with natural or cultural resource management at the BMGR. Similarly, the USFWS has no on-the-ground resource management role at the range other than its involvement with the recovery team. Primary federal jurisdiction and responsibility for natural and cultural resource management and protection at the BMGR is currently held solely by the Air Force and Marine Corps. The contributions that the BLM and USFWS currently bring to the INRMP update process stem from their roles as recovery team, BEC, and IEC members and as the managers of the CPNWR, SDNM, and other DOI public lands contiguous with the BMGR. In short, DOI retains its authority over other federal entities, as it would with any military installation.

Comment Number/ Commenter	Comment	Response
1-4 EPA	**Affected Environment and Impacts Related to Large Wildlife Species and Sonoran Pronghorn** The DLEIS does not present updated information in the Affected Environment sections and does not fully assess impacts of the proposed action on large mammal species, including the endangered Sonoran pronghorn, in the context of the newly built international border fence (i.e. wall). As the DLEIS notes, the Department of Homeland Security and Army Corps of Engineers have recently constructed a 31-mile border barrier in BMGR West along the U.S.-Mexico international border, as well as a new 400 foot border barrier in the Roosevelt Reservation within BMGR West to close an existing gap near Border Monument 198 (p. 5-6). These DoD-funded projects utilized a waiver from the Department of Homeland security to waive several environmental and cultural resource protection laws including NEPA and the Endangered Species Act; therefore, the impacts of the border barrier on large mammal species, including the endangered Sonoran pronghorn, were not assessed and disclosed through the NEPA process. Because of DoD's involvement in these projects, it is important that the LEIS fully capture the cumulative impacts to these species and identify potential mitigation that would reduce these impacts. With regard to the pronghorn, the DLEIS states only that "the border fence and wall, as well as Mexico Highway 2, isolate the Arizona population from the larger Mexican population" (p. 3-70); however, the DLEIS also references the benefit of exchanges of animals across the border to bolster genetic diversity (p. 5-3) indicating the DLEIS has not been updated to reflect current conditions. Elsewhere, the document acknowledges generically that barriers of any kind (highways, fences, railroads, and irrigation canals) on or adjacent to the BMGR are partial or complete barriers to some wildlife movement and limit wildlife access to historic water sources adjacent to the BMGR (p. 3-68), but the implications of this loss for large wildlife species are not presented. It is important to recognize that the land on the Mexico side of the border is protected as the El Pinacate y Gran Desierto de Altar Biosphere Reserve, a biosphere reserve and UNESCO World Heritage Site, and that fourteen wildlife underpasses were constructed on Mexico Highway 2 to facilitate transboundary wildlife movement3. The DLEIS states that the Air Force and Marine Corps are members of the Sonoran Pronghorn Recovery Team and provide funding and support for Sonoran Pronghorn Recovery Plan efforts such as placing artificial water sources and feed stations, and other management programs beneficial to pronghorn (p. 3-70). If the Air Force intends to obtain administrative jurisdiction for the range from the Secretary of the Interior as proposed for some alternatives, additional actions to support these efforts as well as to promote cross-border connectivity would help mitigate impacts for those alternatives. The Recovery Plan states that Sonoran pronghorn require vast areas of unencumbered open range and this includes the ability to freely travel long distances between localized, seasonally sporadic rainfall in search of sustenance. The ability of such species to migrate to meet their annual needs for survival and reproduction will be vital for their capacity to adapt to climate change effects. ***Recommendations:*** We recommend the FLEIS include a more comprehensive impact assessment for large wildlife species, including the Sonoran pronghorn, in the context of the current affected environment which includes an impassible international border barrier. Consult with the USFWS, as appropriate, regarding these changes to the affected environment in which this renewal action will occur. If DoD assumes full administrative jurisdiction (Alternatives 1C and 2C), we recommend DoD coordinate with USFWS to establish additional protective measures, such as increasing funding for high priority recovery actions for the Sonoran pronghorn. Consult with the CBP to explore opportunities to mitigate the loss of cross-border connectivity for large wildlife, such as providing openings in key wildlife corridors along the border, especially ones that correspond with the Highway 2 wildlife underpasses. Ensure the presence of the barrier is accurately portrayed in the FLEIS (updates to Sections 3.1.1, 4.8.1.1, Table 5.1-1, etc. are needed).	The border barrier, including the referenced 400-foot-long segment, is located in the Roosevelt Reservation, which is a narrow land withdrawal and reservation that includes all federal public land along the length of the U.S. border with Mexico. Construction of the border barrier was a Department of Homeland Security project managed by the U.S. Army Corps of Engineers. Neither the Air Force nor Marine Corps has any administrative jurisdiction for or management discretion over the construction of the border barrier, which was a project that was completely independent and separate from the process to extend the BMGR land withdrawal. The border barrier is identified in the Draft LEIS in Table 5.1-1 and is included in the cumulative effects assessment. Section 5.2.12 addresses the cumulative impacts to wildlife resulting from the proposed actions when considered together with other actions, including the border barrier. Movements of Sonoran pronghorn have not been recorded in BMGR West or the CPNWR west of a north-south line running roughly to the east of the Baker Peaks, Copper Mountains, and Cabeza Prieta Mountains for many decades. There are no natural or human-made barriers that would prevent Sonoran pronghorn from moving further to the west, but the habitat is not believed to be suitable. At this time, there is no indication that the border barrier adjacent to BMGR West and western CPNWR would curtail current or foreseeable future Sonoran pronghorn movements between the populations of these animals in the U.S. and Mexico. The active presence of Sonoran pronghorn in eastern CPNWR, OPCNM, and closely adjacent areas of Mexico indicates that the border barrier would likely complicate, if not curtail, hope to reestablish free movements between the U.S. and Mexico populations. Significant free movement and breeding between the populations of Sonoran pronghorn in the United States and Mexico has been absent for many decades. Mexico Highway 2, which closely parallels the border between Sonoyta and San Luis Rio Colorado, Mexico, has long been considered to be the major barrier impeding free movement between these populations, although a group of five Sonoran pronghorn were observed crossing the highway in 1999 and one individual was tracked crossing the road several times in 2008 (USFWS 2016b). Two wildlife underpasses of Highway 2 were constructed in 2013 in the area occupied by Sonoran pronghorn to encourage safe movement of these animals between the U.S. and Mexico populations. Sonoran pronghorn use of the underpasses has not been documented. Research on the American pronghorn indicates that pronghorn will use overpasses much more readily than underpasses. The Recovery Team continues to consider highways without overpasses to be barriers to Sonoran pronghorn movement (USFWS 2016b). • As described in Sections 4.12.1.3, 4.12.2.1, and 6.1.2, the Air Force and Marine Corps coordinated with the USFWS regarding compliance with Section 7 of the ESA for the extension of the BMGR land withdrawal and withdrawal of the Gila Bend Addition. The Air Force and Marine Corps had previously fully consulted with the USFWS on all ongoing training, test, and support activities at the BMGR that would continue if the land withdrawal for the range is extended. An analysis was provided to the USFWS that found that since the BMGR land withdrawal extension and expansion (i.e., the Gila Bend Addition) would not alter military activities at the range, the types and magnitudes of impacts to the Sonoran pronghorn would not change from the effects characterized through the previous consultations with the USFWS. No Section 7 consultation with the USFWS is required for a legislative extension and expansion of the BMGR land withdrawal and the existing BOs for BMGR operations would remain in effect. Completion of the border barrier in the BMGR region does not change these findings. Natural movements and breeding between the U.S. and Mexico Sonoran pronghorn populations were almost nonexistent before the barrier was constructed despite recovery efforts to create suitable pathways for such interactions. Unlike the border barrier, however, extension and expansion of the BMGR land withdrawal would not contribute to further loss or fragmentation of Sonoran pronghorn habitat. Rather, extension and expansion of the land withdrawal would continue the significant benefit of helping to conserve about 42 percent of the suitable habitat (land with a slope of less than 20 percent) occupied by the endangered Sonoran pronghorn population in the U.S. The CPNWR and OPCNM contribute about 39 percent and 12 percent, respectively, of the occupied U.S. habitat and the remaining about 7 percent occurs on BLM, Arizona State Trust, and private lands (Marine Corps 2001).

Comment Number/ Commenter	Comment	Response
1-4 EPA (continued)	**Affected Environment and Impacts Related to Large Wildlife Species and Sonoran Pronghorn** (continued)	EPA notes the potential impacts of the border barrier project were not assessed or disclosed before it was built, and the actual effects of the structure have not yet been comprehensively assessed. The barrier will be a factor affecting the quality and function of the natural, cultural, and human environments, but any responses to adverse effects caused by the barrier will have to be addressed through management actions rather than by avoiding or mitigating impacts through pre-project assessments and planning. The decision to extend or not extend the land withdrawal would not affect the environmental impacts that the barrier has had or will cause in the future. An indefinite land withdrawal or a transfer of administrative jurisdiction (Alternatives 1C or 2C) would not change management commitments, relationships, priorities, or responsibilities in any way that would diminish the protection and recovery actions afforded to listed species. With the MLWA of 1999, resource management responsibilities were transferred from BLM to the Air Force and Marine Corps for BMGR East and BMGR West, respectively. The Air Force and Marine Corps were meeting their NEPA, Sikes Act, and cultural resource compliance responsibilities at the BMGR before the MLWA of 1999 was passed and have since further augmented staff capabilities since. From the passage of the MLWA of 1999 until the present, the Air Force and Marine Corps have held primary federal jurisdiction and responsibility for natural and cultural resource management and protection at the BMGR. The Air Force and Marine Corps have worked in close partnership with AZGFD, USFWS, and other Sonoran pronghorn Recovery Team members to protect ESA listed species and have provided significant funding and other resources for recovery actions. With all action alternatives, the Air Force and Marine Corps would continue to comply with the ESA and the effective working partnerships of the Sonoran pronghorn Recovery Team, BEC, and IEC
1-5 EPA	**Minor comments:** Presentation of effects in the Executive Summary: Table ES-1 - Summary of Impacts, provides a brief description of the potential impacts associated with each alternative. Because Alternative 2 is additive to Alternative 1, all impacts that would occur under Alternative 1 are also applicable to Alternative 2; however, the table's contents for Alternative 2 include only the impacts associated with the withdrawal of the Gila Bend Addition and makes Alternative 2 appear less impacting. Revise Table ES-1 to indicate that Alternative 2 includes all the impacts listed under Alternatives 1 plus the impacts identified for Alternative 2.	As stated in the Executive Summary, impacts that would occur under Alternatives 1, 1A, 1B, and 1C to the extension of the BMGR land withdrawal equally apply as a result of Alternatives 2, 2A, 2B, and 2C, respectively. Added a footnote to the column heading for Alternatives 2, 2A, 2B, and 2C to further clarify this.
1-6 EPA	**Minor comments:** Executive Order update: Page 3-55 references Executive Order 13834 - *Efficient Federal Operations* stating that federal agencies address GHG emissions through efficient operations, energy and water savings, emission reductions, and renewable energy projects. The referenced portions of this EO were revoked by President Biden on January 20, 2021 via EO 13990 (except for Sections 6,7, and 11 regarding designation of a Chief Sustainability Office which are not referenced in the DLEIS statement). We recommend removing reference to EO 13834.	Reference to Executive Order 13834, Efficient Federal Operations, has been removed.
1-7 EPA	**Minor comments:** Update of National Ambient Air Quality Standards designations: Please note that Ajo is now a designated particulate matter less than 10 microns (PM10) maintenance area,[4] and West Pinal is now designated as serious nonattainment for PM10.[5] [4] See https://www.govinfo.gov/content/pkg/FR-2020-06-04/pdf/2020-11930.pdf#page=1 [5] See https://www.govinfo.gov/content/pkg/FR-2020-06-24/pdf/2020-12827.pdf#page=1	Section 3.10.6 of the LEIS has been revised to reflect Ajo is now a PM_{10} maintenance area and West Pinal County is a serious PM_{10} nonattainment area. Figure 3.10-1 has been updated to reflect the change.

Comment Number/ Commenter	Comment	Response
2-1 Friends of the Sonoran Desert	In particular, we are concerned with the ongoing, seemingly unbridled activities of the Department of Homeland Security (DHS) and the U.S. Army Corps of Engineers to modify historic and natural sites within the region. There is little information or evidence to suggest that DHS will adopt or implement any policies that will limit their damages to public lands in the region in their ongoing efforts to apprehend suspected illegal immigrants. We assume they are essentially operating with a relatively free rein in the BMGR, excepting with regard to DoD facilities and operations, and would appreciate a presentation on their policies and cooperation with the BMGR at the next Intergovernmental Executive Committee Meeting.	While the Air Force and Marine Corps have no authority over DHS and U.S. Army Corps of Engineer missions and activities, the agencies operating in the BMGR region meet regularly through the BEC and IEC to collaboratively resolve regional issues, including discussions of studies and activities to protect resources and minimize environmental damage. The Air Force and Marine Corps accept invitations to serve as cooperating agencies, as applicable, for actions proposed on BMGR East and BMGR West, and to provide feedback on NEPA documents developed by other agencies for actions proposed on the range.
2-2 Friends of the Sonoran Desert	Recognizing that a key issue in the management of the BMGR is the estimated land use altered for the purposes of the withdrawal, FSD suggests that a satellite view analysis be initiated to document the area currently impacted by DoD activities in the BMGR that can serve as a benchmark for future assessments, whether disturbances are the results of DoD activities or otherwise. We understand that the presentation of such an analysis may have to be modified to safeguard issues of military concern; however, that should not interfere with a review basically to establish land impacts that would be important relative to BMGR lands management.	The Air Force and Marine Corps prepared an inventory of all operations areas within the BMGR and assessed the extent and distribution of the military use footprint that physically affected the range surface in 1998 before the current withdrawal period began. The military surface use footprint was determined using on-the-ground GPS survey of operations areas, high resolution aerial photography flown specifically for the inventory, and satellite imagery. The inventory of operations areas is updated with the 5-year updates of the INRMP and Public Report.
2-3 Friends of the Sonoran Desert	Regarding Water Resources, FSD suggests special consideration be given to identification and restriction to public access to standing water in the BMGR. With increasing temperatures and megadrought in the region, wildlife will become increasingly dependent on standing water resources and vulnerable to disturbance and interference from unmanaged human activity.	Sections 3.9, 3.11.1.1, and 3.12.1.2 of the LEIS generally describe the scarcity and highly ephemeral nature of surface water in the BMGR and its importance to wildlife. Surface waters and the relationship of surface waters to wildlife are considered in more detail in Sections 2.2.4 and 7.5 of the 2018 INRMP, which is incorporated in the LEIS by reference. The LEIS does not consider public access to surface waters areas or the management of these resources because those issues are appropriately addressed through the INRMP update process and ongoing management guided by the INRMP. The issues of public access to water and wildlife water management are not relevant to the forthcoming Congressional decision regarding the proposed extension of the range land withdrawal.
2-4 Friends of the Sonoran Desert	Regarding Earth Resources, FSD believes management with respect to cryptobiotic soil crusts is an important issue for the BMGR, particularly as it pertains to vehicle management on the BMGR and DHS operations, and public access. For all practical purposes loss of these resources is permanent. We support research, planning and monitoring of disturbance of soil surfaces in the BMGR from this perspective.	Management of cryptobiotic soil crusts is an issue that is addressed through the INRMP Update process; a decision to extend the BMGR land withdrawal would leave soil surfaces unchanged from current conditions. The presence of cryptobiotic soil crusts in the proposed Gila Bend Addition are acknowledged in Section 3.12.2.1. However, because no ground disturbing activities are proposed within the Gila Bend Addition parcel, existing soil crusts would be unaffected by Alternatives 2, 2A, 2B, and 2C.
2-5 Friends of the Sonoran Desert	Regarding Public Access and Recreational Opportunities, FSD supports provision for these opportunities in the BMGR, although we are sceptical that current controls will be adequate for restricting ongoing and increased damages to the Sonoran Desert ecosystem within the area open to the public in the BMGR, and adjacent public lands. We request the preparation of a review regarding the efficacy of current management for public recreation, and that review be presented at an Intergovernmental Executive Committee as possible this year. We strongly suggest that an overall management plan for the BMGR public access areas be developed subject to public review. We suggest that the plan include procedures for identifying and implementing needed stewardship of areas damaged by recreational use or requiring special protection or recovery efforts for cryptobiotic soil crusts, and of species of concern. We suggest that the plan provide specific procedures for identifying and restricting public access for recreational use.	Management strategies for recreation and public access are addressed in Section 7.2 of the INRMP. Because no changes to existing public access or recreation on the BMGR are proposed with any alternative, this issue is not relevant to the congressional decision regarding the proposed land withdrawal extension. Recreation and public access are evaluated during each review cycle of the INRMP, and adjustment to their management would be addressed through the INRMP update process.
2-6 Friends of the Sonoran Desert	Regarding Climate Change, FSD supports continued meteorological research in the BMGR, in cooperation with other such efforts in the region. We suggest the status and results of the research be presented at a IEC meeting at least annually. Moreover, as the status of global change for resource management in the BMGR and public lands in the region is of particular importance given its impact on human activity and wildlife, we suggest this research activity be given high priority for ongoing support.	The impacts of climate change on the BMGR environment and military operations under each alternative is discussed in Section 4.11 of the LEIS. The findings of previous meteorological research were considered during preparation of the current BMGR INRMP and new findings will continue to be evaluated as each new INRMP Update and Public Report is prepared. As stated in the 2018 INRMP Public Report, the BMGR is part of a regional climate monitoring effort. Colorado State University is preparing a comprehensive climate assessment of Air Force installations, including BMGR, which will include climate models and management recommendations for each installation.

Comment Number/ Commenter	Comment	Response
2-7 Friends of the Sonoran Desert	Regarding BMGR Biological Resources, FSD supports ongoing and enhanced efforts to provide needed stewardship efforts for BMGR biological resources, particularly with respect to animal and plant species protected under the U.S. Endangered Species Act, and the control of invasive species.	Thank you for your support for ongoing management efforts for biological resources on the BMGR. The INRMP will continue to guide management of biological resources on the BMGR.
3-1 Network for Arizona Trails	I am writing to urge adoption of Alternative 2 of the draft LEIS now under consideration. I have spent many days and hours recreating out on the reserve and hope to continue to do so in the future. Renew the lease for 25 years and keep this area open to the public to enjoy for the future.	Alternative preference is noted. As identified in LEIS Section 2.2, natural resources and public access are managed at the BMGR, as at all U.S. DoD installations, in accordance with the Sikes Act, which stipulates that, consistent with the use of military installations to ensure the preparedness of the Armed Forces, the installation INRMP will provide for: • *the sustainable multipurpose use of the resources, which shall include hunting, fishing, trapping, and nonconsumptive uses; and* • *subject to safety requirements and military security, public access to military installations to facilitate the use* The statutory provisions of the Sikes Act are applicable to all military installations regardless of whether its lands are administered by the DoD or withdrawn and reserved public land. The MLWA of 1999 is consistent with and reinforces the Sikes Act by providing that the Air Force or Marine Corps may close portions of the BMGR to support military operations, public safety, or national security, but that such closures shall be limited to the minimum areas and time periods required. None of the alternatives propose to change the public access provisions of the Sikes Act and MLWA of 1999 in a new MLWA. This theme is often repeated in comments and reflects a misunderstanding of the scope of the LEIS process. The LEIS contains a legislative proposal for extension of the land withdrawal with various alternatives on how to accomplish that and inclusion of a small area near the Gila Bend AFAF. Congress is the decision-maker on the issues within that scope; the Air Force and Marine Corps do not issue a Record of Decision. Tactical decisions such as public access or increasing or otherwise modifying training and test operations are not within the scope of this LEIS. The proper venue for any public access decisions would be the INRMP and a separate NEPA analysis would have to be accomplished as part of that effort. Therefore, comments to the effect that a longer withdrawal period would foreclose the ability to comment on future public access changes are missing the fact that this LEIS and any future LEISs for land withdrawal do not have decisions on public access in their scope. As stated in LEIS Section 4.7.1, public access with a valid range permit (and hunting license, if applicable) and recreational opportunities would continue unchanged under any action alternative. Changes in training or test activities at the BMGR could prompt temporary or full-time closures of specific portions of the range in the future, but no specific changes from current access conditions are foreseeable at this time.
4-1 Sierra Club and Western Watersheds Project	The permanent withdrawal for military purposes is unreasonable as it assumes the military actions needed today will be needed tomorrow.	The indefinite withdrawal or transfer alternatives assume the BMGR will be needed for the foreseeable future to train aircrews and associated ground-based combatants and to support certain test missions, but do not assume that the military training and test activities of the future will be the same as or even closely resemble contemporary military activities. As noted in the LEIS, the BMGR was established to train World War II aircrews but has since had the capacity and flexibility to support training for aircrews flying five successive generations of tactical jet aircraft, several evolutions of helicopters, and tiltrotor aircraft. The BMGR is expected to continue to be needed for similarly diverse and evolving air combat training missions and operational and other test purposes. The rationale supporting these findings are provided in LEIS Section 1.2.1. If the Secretary of the Air Force and/or Navy should determine at some date that all or part of the BMGR would no longer be required for military purposes, the Secretary of the Interior would be notified and the processes for relinquishing the range to DOI jurisdiction, administration, and management would be initiated. The same processes to ensure the continuing need for the range and relinquishment of the range in the event it was no longer needed applies equally under all proposed alternatives.
4-2 Sierra Club and Western Watersheds Project	Further, it fails to consider the needed oversight and periodic review of civilian entities to ensure that resources are protected and harm is mitigated.	Refer to the response to Comment 1-3.
4-3	The LEIS also leaves out reasonable alternatives, including a sunset of withdrawal that include actions such as repatriation of the land to Indigenous people, expansion of the Sonoran Desert National Monument, Cabeza	Ending the withdrawal with repatriation of the land to indigenous people, or incorporation of the land into one of the adjacent designated areas or a new designated use would not meet the Air Force and Marine Corps' purpose and need, as described in

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Sierra Club and Western Watersheds Project	Prieta National Wildlife Refuge, or even consideration of a new designation for the area, all with consultation with the 24 affected Tribes.	Section 1.2, to maintain the readiness of the nation's air forces for training tactical air combat aircrews into the foreseeable future. A sunset provision is part of the action alternatives in that the duration of the legislative withdrawal would be for 25 years or longer, or until the Secretary of the Air Force or the Navy determines that there is no longer a military need for a portion or all of the range. Once there is no longer a military need, military services would notify the Secretary of the Interior and initiate the relinquishment process. Unless Congress elects to establish an alternative management scheme for the land no longer needed for military purpose, the Secretary of the Interior would determine whether the relinquished land was suitable for restoration to public land status, or should be withdrawn for other specific public purpose, or should be disposed of out of federal ownership through the General Services Administration. Should the land be restored to public land status, the BLM would manage the land in accordance with the FLPMA or other applicable authorities.
4-4 Sierra Club and Western Watersheds Project	At least a portion of the Goldwater Range within the Bureau of Land Management-administered portions that are not used directly by the military should be considered for special status such as National Conservation Area, National Park, or National Wildlife Refuge. An NGO-sponsored plan to do this should be seriously considered in the Final LEIS. This means limiting off-road vehicle use, no driving in washes or off designated roads, and elimination of unneeded roads. The No Action alternative does not address this as it assumes that if the land is not withdrawn that it would have a multiple use mandate. The land needs and deserves more protection. Protection of cultural sites and the biological resources should be a high priority. All of this should be considered in close consultation with the Tohono O'odham, Hia Ced O'odham, Quechan, and other Tribes and should be centered on the trust responsibility the US Government has to Indigenous people.	No portion of the BMGR is currently managed by the BLM. As stated in Section 2.3.3 of the LEIS, Section 3031(a)(1) of the MLWA of 1999 transferred jurisdiction over the withdrawn lands that comprise the range from the Secretary of the Interior to the Secretaries of the Air Force and Navy. As a result, the Air Force and Marine Corps are solely responsible for managing the land and resources of BMGR East and BMGR West in accordance with the Sikes Act and other applicable law and regulations. The role of the Secretary of the Interior, acting locally through BLM, is limited primarily to ensuring that the Air Force and Marine Corps manage the BMGR in accordance with the Sikes Act INRMP for the range. Although the BLM is an active member of the IEC and BEC, it has no on-the-ground management authority or role at the range. Although the military footprint assessment shows that less than 9 percent of the BMGR surface is currently directly used on an ongoing basis as target impact areas, developed infrastructure, roads, ground troop training areas, and other purposes, a much larger area is needed as safety buffer due to the dynamics of an active range. The LEIS analysis documents that the entire range land area is needed to support military training and test activities and to provide the flexibility and capacities to support these activities over the long term (LEIS Section 3.2.1.2). The special-status, land-use designations proposed by Comment 4-4 would be inconsistent with current military operations as well as the need to preserve the flexible capacity of the BMGR to support current and future training or test needs. In these regards, the suggested special-status designations would not meet the purpose of and need for extending the BMGR land withdrawal and would not be reasonable alternatives to carry forward for detailed analysis in the Final LEIS. The No Action alternative would not require that land that is not withdrawn would have a multiple use mandate. Future use would be subject to a planning process, with public input, prior to a decision on how the public land would be used. The description of the No Action Alternative in Section 2.11 has been revised to indicate the BLM public lands likely would be managed pursuant to the FLPMA and other applicable laws and regulations until a planning process could be completed to decide the future use of the land. Protection of cultural sites and biological resources would continue in accordance with the current INRMP and ICRMP until BLM could complete its own resource management plan for the use decided through the planning process.

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4-5 Sierra Club and Western Watersheds Project	The Draft LEIS alternatives to permanently transfer administrative jurisdiction for the BMGR from the Secretary of the Department of Interior to the Secretaries of the Air Force and Navy (Alternative 1C and 2C) are completely unacceptable and should be dropped from further consideration. The indefinite withdrawals (Alternative 1B and 2B) are also unacceptable as they would not include the much-needed review by the public in the near term and could be 20, 50, or longer depending on who is at the helm of the respective Department of Defense entities. The 50-year withdrawal term (Alternative 1A and 2A) are also unacceptable as they, like the alternatives above, fail to address the changing nature of military operations or the need to better protect these lands and resources, especially in light of the impacts of climate change. The Draft LEIS argues that all resource protections and applicable laws will be in place should the lands be transferred permanently or for longer periods of time, but that is incorrect as it ignores an essential periodic review by the public, which is already very difficult. Much of area being considered for withdrawal is off limits to the public and independent assessments of impacts to cultural and natural resources. Frequently, it is via these actions that the failure of land management agencies to adequately follow procedures for protection and/or mitigation is identified. For example, recently a Non-Governmental Organization (NGO) found that old growth trees were being logged on the North Kaibab despite the national forest plans that indicated otherwise.	Refer to the response to Comment 1-3 for a list of ongoing actions that provide the public with oversight of and input in resource protection and management. As explained in the response to Comment 4-1, the continuing military need for a military range is assessed on an ongoing basis and is not exclusively dependent on the land withdrawal extension process. Further, emerging military threats and changes in weapons or combat tactics needed to counter and defeat new threats are assessed on a real time and ongoing basis. Adjustments in training methods and scenarios required to prepare the armed forces for new defense are implemented as needed. Withdrawal extension processes do not contribute to the Nation's ability to assess or address changes in military affairs, but instead evaluate the need for the range to support the training and test missions to prepare the armed forces. Therefore, BMGR land withdrawals of 50-year or indefinite durations or a transfer of administrative jurisdiction are reasonable alternatives. Most of the land that comprises the BMGR land withdrawal is not accessible to general public access in order to protect public safety in areas where military training incorporates live-fire weapons and laser use, where secure areas are required because of sensitive military activities and equipment or expended UXO, and where high-tempo training schedules cannot be disrupted by public access intrusions. Restrictions on public access at the range are consistent with the MLWA of 1999 and the Sikes Act, operationally assessed on an ongoing basis for consistency with these Acts, shared and discussed with the public as needed at the tri-annual IEC meetings, and reviewed and explained with each five-year update of the INRMP and Public Report. A military range, such as the BMGR, cannot operate without the authority to restrict public access as necessary, as discussed in Section 1.2.2.2. Nevertheless, and as explained in further detail in response to Comment 4-7, the BMGR cannot be operated without adherence to the Nation's applicable environmental protection and stewardship laws such as the ESA, NHPA, and NEPA, which, together with the IEC, INRMP, and Public Report processes, support public disclosure and review of military activities at the range on a timely and ongoing basis. Further, the conditions of natural and cultural resources at the range, including in areas not open to general public access, are periodically scrutinized by the USFWS, CPNWR, and AZGFD partners for preparing the INRMP and Public Report updates; Sonoran Pronghorn Recovery Team partners; and IEC partners. Many documented cultural resource sites in areas restricted to public access are monitored by the Arizona Site Steward program. Scientific research, data collection, and monitoring programs are conducted by universities and contractors in restricted and open areas of the BMGR. The Air Force and Marine Corps also provide range tours to tribal representatives, government agencies, elected politicians, and others, which may include non-governmental organizations, to review military use activities, resource conditions, and resource stewardship practices.
4-6 Sierra Club and Western Watersheds Project	While not unreasonable as noted for the permanent, indefinite, and 50-year terms, the 25-year term also seems like too long of period before there is review of withdrawal. We think a term of less than 25 years should have also been considered in the Final LEIS, perhaps 10-15 years.	The MLWA of 1999 provided 25 years as the duration of the successive and current withdrawal. Since there is a demonstrated continuing military need for the BMGR beyond 75 years (LEIS Section 1.2.1), an alternative of 10-15 years would not meet the military's longer term need to maintain the readiness of the nation's air forces for training tactical air combat aircrews into the foreseeable future. The environmental impacts of a 10- to 15-year withdrawal would likely be indistinguishable from a 25-year withdrawal. In addition, as described in Section 1.1.1, Congress may authorize continued use of the BMGR for either a defined or indefinite period of time and would not be bound by the timeframes considered in the Final LEIS.

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4-7 Sierra Club and Western Watersheds Project	The Draft LEIS appears to neglect any current assessment of cultural sites and fails to adequately address impacts on wildlife. Has all ground disturbance on the BMGR been identified and adequately surveyed relative to potential damage to cultural sites, plants and animals, harm to soils, including cryptogrammic soils, and any potential spread of invasive nonnative species of plants. If those impacts have been documented, has any actual mitigation been implemented?	The environmental effects of all ongoing military operations at the BMGR (including, among others, impacts on cultural sites, wildlife, wildlife habitat, vegetation communities, soils, and invasive species) have been assessed through many previous NEPA documents, ESA compliance studies and processes, and cultural resource compliance and research processes and studies. Mitigation was considered and included in those previous documents, processes and studies. All military operations areas with direct use of, or effects on, the ground surface have been inventoried, surveyed at various appropriate levels of resolution, and assessed in previous compliance processes and documentation. The 2007 INRMP and accompanying environmental compliance documentation assessed the impacts of public access and use of the BMGR. The effects of resource management activities, such as the construction and maintenance of wildlife waters, have been similarly reviewed and assessed. The impacts of undocumented immigrant and smuggler crossings through the BMGR and CPB law enforcement responses have not been fully apprised, although resource managers at the BMGR, CPNWR, and OPCNM continue to work on finding ways to assess and mitigate damages. The BEC and IEC processes at the BMGR keep Air Force and Marine Corps environmental managers informed of ongoing activities on the range and actions by their BEC and IEC member counterparts, emerging environmental problems, public observations and concerns, and management progress updates. The five-year INRMP and Public Report updates provide up-to-date inventories of military operations and public access and environmental conditions at the range, assessments of how those operations and conditions had changed during the previous five years, reports on ongoing resource management progress, and plans for resource management and public access for the subsequent five years. This is an LEIS and has to follow the requirements for preparing such document; and this is not an EIS. A decision by Congress to extend the BMGR land withdrawal and to possibly also expand BMGR East to include the Gila Bend Addition would neither change the environmental conditions within the range nor affect the validity or continuing applicability of previous environmental compliance study findings, decisions, or implementation practices. The LEIS does not need to replicate or reassess the extensive standing body of environmental compliance and management work at the BMGR in order to provide Congress with an adequate review of the potential environmental consequences of the proposed land withdrawal extension for the range. The LEIS provides appropriate accounts of ongoing military operations, prevailing environmental and public access conditions, and environmental management programs and activities at the range. The case file for the proposed land withdrawal extension that will be submitted to Congress will not only include the LEIS, but also the current INRMP Update and Public Report and other studies and reports listed in LEIS Section 1.1.2.
4-8 Sierra Club and Western Watersheds Project	It fails to acknowledge the potential cumulative negative impacts that would be associated with a permanent or indefinite withdrawal of the land with limited opportunities for public scrutiny of what is occurring with the resources and the potential for unmitigated harm to continue indefinitely.	Refer to the response to Comment 3-1 regarding opportunities for public scrutiny of military operations, resource management, and environmental quality at the BMGR under all action alternatives, including a transfer of administrative jurisdiction or a withdrawal of indefinite duration.
4-9 Sierra Club and Western Watersheds Project	It then fails to adequately address the negative cumulative impacts on wildlife and wildlife movement of border wall or “fence” that is impenetrable by most species of wildlife, including many avian species that fly low.	Refer to the response to Comment 4-1.
4-10 Sierra Club and Western Watersheds Project	The LEIS mentions invasive nonnative plant species but does not address how those species are being addressed to minimize negative impacts on native vegetation and wildlife and the risks associated with wildland fires. “However, most land on the BMGR is undisturbed; military-related-disturbances have little influence on the biotic communities at a landscape level, and natural ecological processes are the primary influence on native biological communities across the expanse of the BMGR with similar processes represented at the CPNWR and OPCNM.” (Draft LEIS 3-67). This assertion is not supported by the contents of the Draft LEIS and appears to not consider the landscape scale of impacts such as the potential unmitigated spread of invasive plant species and the potential associated wildland fires in areas that are not fire-adapted.	Invasive species management at the range would not change with any of the land withdrawal alternatives and are addressed through the BMGR INRMP. The presence of invasive non-native plants at the BMGR and the relationship of these plants to wildfires is briefly described in Section 3.11.3.2 of the LEIS. The 2018 BMGR Public Report (Section 3.3.2) published with the INRMP provides a more comprehensive review of the status of invasive non-native plants on the range, their effects on the frequency and severity of wildfires, and management actions underway to address invasive species problems. The INRMP and Public Report are incorporated in the LEIS by reference and will be submitted to Congress along with the LEIS and other documentation as part of the case file for the proposed extension of the BMGR land withdrawal. Section 3.2.1.2 of the LEIS substantiates that most land on the BMGR is undisturbed; the military surface use footprint is a small percentage of the land and other appropriative land uses such as mining and grazing are not allowed.

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4-11 Sierra Club and Western Watersheds Project	The Draft LEIS states, "Military activities may disturb, startle, and injure, or kill Sonoran pronghorn; however, conservation measures developed with USFWS and the Recovery Team continue to reduce the potential for affecting this species. The overall effects on ongoing operations would be minor and would not likely adversely affect the species." (LEIS 4-18). It fails to address the specific and cumulative impacts, including if there was a permanent withdrawal of this area for the military and it fails to outline the conservation measures and how it knows that they are reducing negative impacts on this species.	LEIS Section 4.12.1.3 addressed effects to Sonoran pronghorn associated with ongoing military operations; these effects would not increase or decrease with any of the action alternatives. The Air Force and Marine Corps have previously consulted with USFWS on the effects of military operations, which is noted in the subheading Special Status Species Consultation Status for Alternative 1, 1A, 1B, and 1C. As also noted in this subsection, conservation measures from the Biological Opinions are provided in LEIS Appendix G. Refer to the response to Comment 1-4 regarding cumulative effects on Sonoran pronghorn.
4-12 Sierra Club and Western Watersheds Project	The LEIS indicates that the BMGR West has "[n]o established Arizona Site Steward monitoring program" (Draft LEIS 3-82) but fails to indicate why or if there has been an attempt to establish one. It acknowledges the limited resources – four full time conservation law enforcement officers for the Marine Corps (Draft LEIS 3-82), so clearly additional assistance would be useful. Considering the significant harm that has been done to cultural resources in the Tinajas Altas Mountains, it would be wise to ensure better monitoring, protection, consultation, and mitigation. The Draft LEIS recognizes the ongoing damage to cultural resources in BMGR West "… resulting from CBP vehicles, vehicle staging, and border fence construction. The Quechan Cultural Committee has held training sessions for CBP administration and field staff to emphasize the importance of staying within approved areas and travelling on approved roads. However, damage to sensitive cultural areas is ongoing. The Marine Corps does not ask for, collect, or retain any information specific to TCPs or sacred sites." (Draft LEIS 3-81 to 3-82) Again, these seems to point for the need for better assessments and monitoring of the region.	The MCAS Yuma Range Management Department has recently approved the use of the Arizona Site Stewards on BMGR West. MCAS Yuma is currently working on the protocols that need to be in place prior to implementing the program and will be working with the newly hired Site Steward Program Coordinator regarding updates to the standard agreement. Site Stewards will work to document effects to cultural sites and will complement the conservation law enforcement officers who have the authority to issue citations and make arrests for criminal activity, such as negligent vandalism of cultural sites. Implementation of the Arizona Site Steward monitoring program will also be addressed in the ICRMP planning process, which identifies management guidelines for cultural resources to mitigate current and previous impacts and minimize future effects.
4-13 Sierra Club and Western Watersheds Project	The LEIS acknowledges that the Customs and Border Protection (CBP) wall "…has a high-to-moderate potential to impact cultural resources and could contribute to negative cumulative effects." (Draft LEIS 5-16). It fails to include this in the analysis of cumulative impacts, however.	The border barrier is described in Table 5.1-1 as a recently completed action and is considered in the cumulative effects assessment. The cumulative effects to cultural resources are discussed in Section 5.2.13. As acknowledged in the LEIS, construction of the border barrier could have adverse cumulative effects on cultural resources. However, the entire secondary border wall covers the States of California, Arizona, New Mexico, and Texas; the wall bordering BMGR on the southwest covers only a partial section of the entire barrier wall. A more definitive assessment of the impacts that construction of the border barrier has had on cultural resources is not possible at this time. No reports have been released that provide a compendium of the direct effects of the construction activities on cultural resources in the construction zone, staging areas, and transportation routes.
4-14 Sierra Club and Western Watersheds Project	The LEIS fails to adequately address the impacts to the Sonoran desert tortoise and does not acknowledge or consider the recent (2020) decision by the U.S. Fish and Wildlife Service to list the tortoise as "warranted but precluded" for protection under the Endangered Species Act. The U.S. Fish and Wildlife Service initiated a Species Status Assessment in early 2021 and is currently accepting comments from the public and agencies regarding potential impacts, new threats, or population information regarding the tortoise. This information should be included in the analysis of the impacts for this project.	As stated in Section 3.12.1.3 of the LEIS, the Sonoran desert tortoise is managed at the BMGR in accordance with a Candidate Conservation Agreement. The Air Force and Marine Corps coordinate with USFWS and AZGFD utilizing the most up-to-date information to address the conservation needs of the Sonoran desert tortoise. Conservation actions include habitat improvements, management of suitable habitat, and data collection of tortoises (surveys every 3 years) to evaluate the populations on the range. Additional information regarding Sonoran desert tortoise management may be found in Section 7.4.2 of the INRMP, which the LEIS incorporates by reference. The types of effects identified in LEIS Section 4.12.1 appropriately identify potential impacts to the Sonoran desert tortoise from continuing ongoing military operations.

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4-15 Sierra Club and Western Watersheds Project	We are concerned that most of this process has proceeded during a time that the nation and the world are dealing with a global pandemic. That has meant limited scrutiny of the proposal or discussions about alternatives. Many people missed scoping, public meetings, and have had limited opportunity to evaluation the Draft LEIS. Because of COVID-19, the Air Force and Marines should have made even more effort to engage the public, Tribal nations, and other affected parties, plus ensured extensive public comment opportunities. We encourage you to consider extending the comment period and holding additional public meetings.	As stated in Section 6.2.2 in the LEIS, pursuant to 40 CFR Part 1506.8(b)(1), this is an LEIS and not an EIS, thus preparation of an LEIS does not require a scoping process. However, the Air Force and Marine Corps elected to provide for a public scoping period and announced this in the NOI to prepare an LEIS that was published in the Federal Register on 18 March 2020 (85 Federal Register 15438). Because the five scoping meetings were cancelled due to the COVID-19 National Emergency, an amended NOI was published on 30 March 2020 (85 Federal Register 17544) to announce cancellation of the in-person scoping meetings and extension of the scoping comment period to 3 June 2020. Also, the Air Force and Marine Corps supported the BLM, which is required to formally notify the public about the proposed land withdrawal applications and to solicit public comment as part of its application review process. As described in Section 6.3.3 of the LEIS, the BLM hosted two virtual public meetings regarding the two BMGR land withdrawal applications on 26 May and 28 May 2020. As noted in Section 6.2.4 in the LEIS, a project website has been maintained since the publication of the NOI to prepare an LEIS to provide background information about the project, information related to public meetings, public notification announcements, and project documents and maps, including the Draft LEIS. Newsletters and other public outreach and notification materials refer the public to this website. The public was notified of the availability of the Draft LEIS, the comment period, and the virtual public hearings via the project website, advertisements published in ten community newspapers in the BMGR region (including two Spanish-language newspapers), a project newsletter, and community flyers posted in local businesses in Gila Bend and Ajo. The Air Force and Marine Corps hosted two virtual public hearings on the Draft LEIS on the afternoon of 2 February and the evening of 3 February 2021 to provide a summary of the Draft LEIS findings and allow participants an opportunity to provide public comments on the Draft LEIS. Few members of the public participated, and none offered oral comments; no need for additional public meetings is warranted based on minimal participation and considering the robust efforts for public notification.
4-16 Sierra Club and Western Watersheds Project	Why have the areas that were relinquished during the last LEIS renewal process not yet been relinquished? Certainly 25 years is time enough to do that.	The MLWA of 1999 did not extend the land withdrawal for the CPNWR (about 820,000 acres), Sand Tank Mountains/Area A (about 83,554 acres), Sentinel Plain area (about 24,756 acres), properties adjacent to the Ajo Airport (about 2,779 acres), and properties north of Interstate 8 (about 1,090 acres). All of these lands have been removed from the BMGR, and neither the Air Force nor Marine Corps retain any jurisdiction over or interests in them. The Air Force and Marine Corps are going through a formal relinquishment process, which BLM requires before it will consider whether to accept the subject lands.
5-1 Southern Arizona Hiking Club	We support Alternative 2 of the Proposed Range Agreement which renews the Goldwater Range for 25 years and keeps this magnificent desert region as open to the public. In their wisdom, officials 25 years ago saw the need for public recreation which does not interfere with valuable military use. The recreational need has only increased over those 25 years with increased population and most recently, COVID disease. In addition, we support the addition of three land parcels called “the Gila Bend addition.”	Refer to the response to Comment 3-1.
6-1 William Adamson	The Camino de Diablo area is an important recreation asset for AZ. I recommend plan #2 for continued recreation use.	Refer to the response to Comment 3-1.
7-1 Joann Alexander	I urge you to support Alternative 2. Over the years, my husband and I have spent time on the BMGR in the public areas and we believe it is important to preserve the unique region for public use and enjoyment.	Refer to the response to Comment 3-1.
8 Dennis Astroth	My brother and I have enjoyed the remote recreation opportunities afforded in the Cabeza Prieta Wildlife Refuge and the Barry M Goldwater East and West ranges. I support adoption of Alternative #2 of the draft LEIS now under consideration.	Thank you for your comment.

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9-1 Beryl Baker	2.19.21 To whom it might concern Keep the Goldwater Range open for recreation Please support just Alternative 2. Renew the Goldwater Range for 25 years and keep this magnificent desert region as open to the public as it is today. Also thank you for through your activities keeping this open space for wildlife. Comments due before March 1 at BMGR LEIS, P.O. Box 2324, Phoenix, AZ 85003 Thank you, Beryl Baker, Tucson AZ	Refer to the response to Comment 3-1.
10-1 Peter Bengtson	The Goldwater Range should be renewed for 25 years to keep this magnificent desert region open to the public as it is today.	Refer to the response to Comment 3-1.
11-1 Evelyn Billo	Please approve Alternative 2 and continue the 25 year lease with joint management with the BLM that allows for occasional public use and access. I am especially interested in preserving and protecting the many archaeological sites and places important to Indigenous communities. There are many important studies and documentation that remain to be done. The petroglyphs, pictographs, and other features are key to understanding the history of this area.	Alternative preference is noted. Cultural resources are managed pursuant to the ICRMPs for BMGR West and BMGR East, which guide protection and management of cultural resources and are prepared in accordance with the numerous federal laws, regulations, Executive Memoranda and Orders, and DoD requirements listed in Appendix I of the LEIS, as well as through Tribal consultation. ICRMPs are updated annually and revised and approved at least every five years. Current cultural resource protection requirements and procedures would continue without change under all of the action alternatives.
12-1 Donald Bird	I support option 2. The 25 year extension and keeping the Department of Interior as a partner seems best.	The preference for Alternative 2 and continuing current DOI/BLM involvement in BMGR land and resource management is noted. As described in Section 2.3.3, the Air Force and Marine Corps currently hold primary responsibility for managing the land and natural and cultural resources of BMGR East and BMGR West, respectively. Although the MLWA of 1999 transferred the DOI/BLM's on-the-ground management responsibilities to the Air Force and Marine Corps, the DOI/BLM currently does serve certain management consulting, planning, review, and oversight functions. The oversight function is limited to ensuring that the Air Force and Marine Corps manage BMGR East and BMGR West in accordance with the range INRMP. The management roles of the Air Force, Marine Corps, and DOI/BLM would be unchanged from this current status under Alternatives 1, 1A, 1B, 2, 2A, or 2B. The statutory requirements for BLM to provide certain consulting, planning, review, and oversight functions would be suspended under Alternatives 1C and 2C, but the BLM would continue to be invited to participate as a contributing member of the BEC and IEC and, in accordance with the Sike Act, the INRMP would continue to be prepared and updated in cooperation with the USFWS and AZGFD.
13 Bill Borchert	(Goldwater Range) We must keep the Goldwater Range open to train our pilots. It keeps them sharp, and the best there is. I have seen over the years how good our pilots are. Ret USAF Bill Borchert 2/20/2021	Thank you for your comment.

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14-1 Bill Broyles and Gayle Hartmann	One renewal option is to transfer all management responsibility to DoD (see point 6 at LEIS chapter 2-5, or our point 2 above). We see this contingency as both an incentive for the military to do an excellent job and a backup in case range budgets come up short. Plus, we think that DoD should welcome and value partnerships with other federal agencies. Your reasons for requesting permanent jurisdiction without future public hearings regarding renewal are these (LEIS Executive Summary at ES-7, para 2): 1. transfer would "provide sustained, operational support for aviation and training." So will renewal Alternative 2, with a 25-year renewal and retention of the DoI partner. We see the 25-year renewal as comparable to a "sunset" legislative law, a chance to prove need, and keep the public informed and involved. 2. transfer would "Allow access to additional budgeting and administrative processes." This makes it sound as if the military's own budget people don't sufficiently value the range or pilot training to adequately fund it. If so, this needs to be remedied in-house, even if the range were transferred. Your longer-term solution would not resolve this perennial problem. 3. transfer would "provide full accountability for the sustained management of the land." More so than now? We haven't heard anyone at DoD blaming its DoI partners for shortcomings or problem areas. As a mater of fact, at the IEC meetings we have witnessed a number of instances of helpful cooperation between the DoD and DoI partners. 4. transfer would "eliminate the expensive and time-consuming process of extending the reservation in the future." In your own words, the range would still be required to prepare and submit annual reports, five-year INRMP and ICRMP reports, and other reports that Congress may require. And you cite the labor cost of 21,682 hours to prepare the LEIS (Draft LEIS at 2-6, paragraph 2). It is unclear if this includes time to prepare the 5-year INRMPs and ICRMPs and other reports, and it is not stated how much of this time was devoted to the addition of the Gila Bend Annex, a cost that wouldn't be needed at the next 25-year renewal. Put another way, this time spent over 25 years on two ranges—GR-W and GR-E—averages 867 hours per year, or the equivalent of less than a half-time position within DoD, or a 1/5 position for each of the two ranges. Perhaps if renewal were treated as a continuing process, in-house, the number of hours could be reduced further. If the Goldwater does rank in the top few training ranges, this labor cost would seem well spent and its effort could be put to good use. Further, the LEIS cites renewal costs of $3,871,424, plus travel (Draft LEIS at 2-6, paragraph 2). In terms of the over all size of the military budget, the renewal budget must seem miniscule. Put another way, flying the F-35 is reported to cost $35,000 an hour ($44,000 per hour for one version of the aircraft). If four F-35s are flown one less hour per year in training over the next 25 years, the curtailment would have would leave at least $3.5 million in the DoD budget, which surely could cover the cost of a LEIS. Too, a portion of this total was expended to study and define the Gila Bend Annex proposal. As we understand it, this money does not come out of RMO budgets. Over the years we have heard that DoD is a maze of budgets, and range managers sometimes may feel short changed. Perhaps it is time for DoD or Congress to reorganize the DoD budgeting process. And to recognize the full funding needs of range management. We are reminded of one prior range manager, a skilled fighter pilot, who wondered out loud why the military even needed an environmental or cultural office. Range management has greatly progressed from those days. If this request for perpetual renewal is granted to DoD, we doubt that DoD will trim $3.8 million from its budget request to Congress. Nor will it add that $3.8 million to the Goldwater range-management budgets. Amortized over 25 years, the LEIS expenditure is $155,000 annually. We appreciate you wishing to save money, but we ask that you find ways of applying this expense over time to better manage the range and prepare for periodic reviews, as well as saving money where possible. You note at ES-7, para 3, that regardless of the length of renewal or transfer of administration, DoD will be legally required to continue INRMP reports and range management activities.	Our response corresponds to your numbered points: 1. As explained in LEIS Section 1.2, the essential relationship for supporting cost- and time-effective training is for military air bases to be in close operational proximity of ranges that can fully and adequately support training requirements. The BMGR regularly fulfills this role for Air Force, Marine Corps, Air National Guard, Air Force Reserve, and Army National Guard aviation units at eight bases and periodically at an additional four bases in Arizona and California. The foreseeable need to support the training requirements of these units already far exceeds 25 years. Twenty-five-year withdrawals with an automatic extension would sustain these foreseeable training requirements, but the concept of "sunset" legislation, meaning possible range closure, would not provide the same degree of assured availability of an essential training range. 2. The training provided by the range is highly valued, but the budgeting process can be an issue. Infrastructure investments on DOI land that is withdrawn can raise long-term investment concerns as the underlying property lacks the permanence of DoD land. This is particularly a challenge at Gila Bend AFAF, which is a built installation like Luke AFB, but is located on withdrawn land. 3. Full accountability simply means that all accountability for managing the BMGR environment would be vested with the Air Force and Marine Corps, which would place these agencies on the same footing that USFWS has for the CPNWR, NPS has for OPCNM, and BLM has for SDNM and other public lands contiguous to the range. Refer to the responses to Comments 1-3 and 1-4 regarding the roles of DOI agencies at the BMGR. 4. Regardless of the instrument to extend the land withdrawal, the preparation of various annual reviews and five-year updates of INRMPs, ICRMPs, and Public Reports, as well as administrative NEPA documents and other environmental compliance activities and reports would be necessary and productive functions for ongoing operational, management, and sustainability activities related to the range. Further, the BEC and IEC are an ongoing forum for the collaboration of agency and public participation that are also independent of the withdrawal process. Preparing an application for a land withdrawal extension requires a number of additional studies and reports that may include a LEIS and is a time and cost consuming process as described in Section 2.4. The process requires considerable attention from Air Force and Marine Corps personnel at Luke AFB and MCAS Yuma that would otherwise be focused on range environmental and operational management issues. Comparing the costs of operating aircraft or performing any other ongoing training or support activities is not useful because the funding for these defense activities and for processing land withdrawal extension applications are not transferrable. The Air Force and Marine Corps cannot choose to train less to fund land withdrawal extensions. Processing extensions remains an additional expense.

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14-2 Bill Broyles and Gayle Hartmann	Page 2-5 of the Draft LEIS at 2.3.3 shows some of the ways that DoD and DoI partner. Perhaps you can expand or build on that partnership. It is worth remembering that in 1999 during the last renewal, Arizona Senator John McCain was arguably the staunchest supporter of DoD in Congress. He was very active in the withdrawal process and presumably had sufficient clout to fashion the renewal however he wished. But he did not choose an indefinite renewal or DoD takeover, even though it was on the table then, too. Instead, he said, "I am very pleased that the conferees approved language this year that renews the withdrawal of the Goldwater Range for military training purposes [for 25 years] and affirms the status of the Cabeza Prieta as one of our nation's crown jewels of wilderness areas" (Sen. John S. McCain, Press Release, August 6, 1999). He did not push for a military takeover of the ground. He saw that a strong DOI partner could help DoD cooperatively management the Range, reduce DoD's financial burden, handle public uses, and provide expertise. He also understood balancing military and public needs, so BLM remained as DoD's partner representing DoI.	Please refer to the responses to Comments 1-3 and 1-4 regarding the roles of DOI agencies at the BMGR. No criticism of the USFWS or BLM is intended or implied, but in accordance with the MLWA of 1999 the Air Force and Marine Corps exercise almost sole federal responsibility for managing natural and cultural resources at the BMGR and, with the exceptions of their roles as members of the Sonoran pronghorn Recovery Team, these DOI agencies have no on-the-ground management presence at the range. The DOI does not contribute to the financial burden for resource management at the BMGR.
14-3 Bill Broyles and Gayle Hartmann	Considering DoD's repeated requests for additional land from Desert NWR and from BLM near Fallon NAS, we are puzzled why DoD does not at least consider relinquishing lands from the Goldwater. The GR-E's Area B is not required for ground missions, and like Area A in 1999, it would make a splendid addition to Sonoran Desert National Monument. Airspace would remain under GR-E's control. The Tinajas Altas area was once part of the Cabeza Prieta NWR and should be returned to the refuge. Back in 1975 some 79,000 acres were reassigned to the refuge with the understanding that air operations would continue overhead. Today's few emitter sites could be retained, and of course, airspace would remain available.	The continuing military need for the entire existing BMGR is fully supported as explained in LEIS Sections 1.2.2.2, 3.2.1.1, and 3.2.1.2 and Appendix B. Area B and the Tinajas Altas area are both used for periodic ground missions by small tactical units of special forces, CSAR personnel, or reconnaissance troops performing land navigation, CSAR, or reconnaissance exercises. Area B is also routinely overflown by armed aircraft positioning to attack targets at Ranges 1 and 2 or East Tactical range. Either area may be closed to public access on an irregularly scheduled and temporary basis to support training or possibly test missions. Retaining these areas as components of the BMGR is essential to the full operation of the range. The Tinajas Altas area and about 95 percent of the CPNWR were withdrawn and reserved as part of the BMGR during World War II. In March 1975, the Secretary of the Interior added a 79,000-acre area, including Tinajas Altas, to the CPNWR by Public Land Order. The Tinajas Altas area, however, also remained an active part of the BMGR, as did most of the CPNWR. After only 81 days, the Tinajas Altas addition to the refuge was revoked by a second Public Land Order, as a required mineral survey had not been performed. No further action to add the Tinajas Altas area to the CPNWR was taken and it has remained part of the BMGR ever since. The withdrawal and reservation of the CPNWR as part of the BMGR was eliminated by the MLWA of 1999.
14-4 Bill Broyles and Gayle Hartmann	5. Transparent management involving public education, involvement, and meetings. Continue both the BEC and IEC. Enhance and expand your websites.	All existing opportunities that are currently afforded to the public to provide input regarding resource management on the BMGR would remain in place under all action alternatives. These processes include the recurring updates to the INRMP and Public Report at 5-year intervals. If an annual review of the INRMP reveals a revision is necessary, the public, Tribal Nations, and local government would continue to be invited to review and comment on the proposed changes. The IEC and the BEC would both continue their current functions with no changes under all action alternatives.
14-5 Bill Broyles and Gayle Hartmann	6. Develop a forward-thinking plan to address and cope with climate change.	Refer to the response to Comment 2-6.
14-6 Bill Broyles and Gayle Hartmann	7. Ensure that Native Nations remain involved and are kept up to date on range matters. We suggest that transfer of the range to DoD, away from DoI, is not in the best interest of our Native Nations. 8. Too, we ask, what special protections are places like Tinajas Altas, Raven Butte tinajas, and Baker Tanks being given under the Traditional Cultural Properties Act?	The Air Force and Marine Corps are responsible for initiating all government-to-government consultation with affiliated Tribal Nations regarding BMGR East and BMGR West use, management, and proposed actions. The DOI/BLM role pertaining to the interest of Native Nations for the BMGR is primarily limited to participating in the exchange of information and ideas that occur at BEC and IEC meetings. As stated in Section 4.13.1 of the LEIS, none of the action alternatives would change the government-to-government consultation relationships or protocols. DoD would continue to regularly consult with affiliated Tribal governments regarding undertakings that have the potential to affect cultural resources and would continue to maintain and strengthen established Tribal relationships. None of the alternatives would strengthen or diminish the role of the DOI in these relationships. While there is no "Traditional Cultural Properties Act," historic properties of traditional, religious, and cultural significance are afforded protection under Section 106 of the NHPA and will continue to be considered in future project planning and ongoing Tribal consultation.

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14-7 Bill Broyles and Gayle Hartmann	9. Develop a range-wide response to land degradation, especially that caused by illegal migration and smuggling activities, by border law enforcement, and most of all by DHS building and maintaining its wall. How can the range effectively fight invasive plant species? Prevent soil from becoming "moon dust"? How can DoD address water and wind erosion problems created by DHS road-blading? Ideally, DHS should fund much of this range-wide work and restoration.	The Air Force and Marine Corps consider land/resource degradation, mitigation, and restoration issues and their management responses through their ongoing environmental and resource management programs, which are guided by the BMGR INRMPs. These programs consider exchanges of information and consultations with BEC and IEC partners (including the Border Patrol) and the public. The 2018 INRMPs for BMGR East and BMGR West identify actions that are already being taken or are in planning to address invasive species control, soil degradation and erosion, road system conditions, and range-wide ecosystem quality. Neither the Air Force or Marine Corps had any administrative jurisdiction or management discretion regarding the construction of the border barrier. Land and resource management responses that may emerge as a result of border barrier impacts will have to be considered during INRMP and ICRMP reviews.
14-8 Bill Broyles and Gayle Hartmann	10. From our perspective, the gravest threat to sound Range management over the past 25 years has not been the Public, but rather it has been DHS running unfettered and its claims for exemption from all Range policies, rules, laws, and attempts at sound management. This precedent is highly dangerous and has caused, and will continue to cause, inordinate damage to natural and cultural resources of the Range, Cabeza Prieta Refuge, and Organ Pipe Cactus National Monument.	CBP border protection activities are identified in Table 5.1-1 and are addressed as part of the cumulative effects analysis in Chapter 5. Also refer to the response to Comment 2-1.
14-9 Bill Broyles and Gayle Hartmann	11. DoD Range Managers should never seek or allow exemptions or waivers from the following laws as applied to the Goldwater Range or surrounding lands: The National Environmental Policy Act, the Endangered Species Act, the Federal Water Pollution Control Act, the National Historic Preservation Act, the Migratory Bird Treaty Act, the Migratory Bird Conservation Act, the Clean Air Act, the Archeological Resources Protection Act, the Paleontological Resources Preservation Act, the Federal Cave Resources Protection Act of 1988, the National Trails System Act, the Safe Drinking Water Act, the Noise Control Act, the Solid Waste Disposal Act, the Comprehensive Environmental Response, Compensation, & LiabilityAct, the Archaeological and Historic Preservation Act, the Antiquities Act, the Wild and Scenic Rivers Act, the Farmland Protection Policy Act, the Coastal Zone Management Act, the Wilderness Act, the Federal Land Policy and Management Act, the National Wildlife Refuge System Administration Act,	The Air Force and Marine Corps have not sought, and are not seeking, any waivers of any applicable environmental laws in relation to the proposed extension of the existing BMGR land withdrawal nor the proposed Gila Bend Addition. Section 1.5 of the LEIS lists applicable laws, statutes, regulations, ordinance, rules, and/or policies and instructions that were adhered to during the development of this LEIS.

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	the National Wildlife Refuge System Improvement Act of 1997, the National Fish and Wildlife Act of 1956, the Fish and Wildlife Coordination Act, the Wild Horse and Burro Act, the Eagle Protection Act, the Native American Graves Protection and Repatriation Act, the American Indian Religious Freedom Act, and the Religious Freedom Restoration Act.	
14-10 Bill Broyles and Gayle Hartmann	12. Public access must continue wherever and whenever possible without jeopardizing the training mission, endangering the public, or compromising natural or cultural resources. We believe that wider access is possible and reasonable.	As stated in Section 3.7.1 of the LEIS, approximately 38 percent of the BMGR currently is open to public recreation access on a near full-time basis through a range permit system. This includes about 137,000 acres in BMGR East and 527,000 acres in BMGR West and reflects the extent of the range that can presently be safely accessed by the public in consideration of current training and test mission requirements. Motorized vehicle access is restricted to approved segments of the designated BMGR road system in the areas of the range open to the public. Non-motorized public access for activities such as hiking, backpacking, or hunting is permissible throughout the areas of the range open to the public. Public access, recreation opportunities, and the extent and serviceability of the designated road system are reevaluated during each review cycle of the INRMP. Motorized and non-motorized public access and recreation opportunities could change in the future in response to changes in training or test missions; however, no military operations or infrastructure changes are currently proposed or foreseen that would impact public access or recreation for more than temporary periods of time.
14-11 Bill Broyles and Gayle Hartmann	13. "Mission creep" is a serious threat to range resources. Battle tank maneuvers, fleet testing, cannon tests, and mega-bomb drops that harm wildlife and habitat or greatly disturb the ground should be forbidden on the Goldwater. This is a pilot training range.	The priority defense mission at the BMGR has always been aviation training. A variety of test activities have also been conducted at the range and currently operational test missions for tactical aviation are routinely flown there—an activity that cannot be distinguished in appearance or environmental effect from the aviation training. Tactical aviation training, which continues to predominate over all other military activities in frequency and volume, is expected to remain the primary mission and defense investment at the BMGR into the foreseeable future. Ground combat and maneuver is not included as part of any action alternative, and any such proposal would be subject to a future NEPA review. Large-scale ground maneuvers are assigned to other ranges, such as the Marine Corps Air Ground Combat Center at Twentynine Palms in southern California, where the mission is to operate live fire combined arms training that promotes readiness of operating forces.
14-12 Bill Broyles and Gayle Hartmann	14. Likewise, highways, mining, and subleases should be banned, as well as utility pipelines and power lines not directly required by the Range.	Unless otherwise provided by law, extending the land withdrawal for the BMGR would continue to keep the range closed to all forms of appropriation under the general land laws, including the mining laws and the mineral leasing and geothermal leasing laws. The extended withdrawal would continue to exclude highways, mines, subleases, pipelines, and power lines that are not needed to support the purposes for which the range is reserved (LEIS Glossary Withdrawn Land and LEIS Sections 4.6, 4.8.1.2 and 4.8.2.2).
14-13 Bill Broyles and Gayle Hartmann	And your new EIS must analyze how the border wall, its construction, its deployment, and its maintenance may or may not affect the Range's management and mission.	Refer to the response to Comment 1-4.
14-14 Bill Broyles and Gayle Hartmann	15. We are seeing DoD disrespect the Cabeza Prieta NWR. The U.S. Army and its Yuma Proving Ground is asking for special waivers to access Cabeza Prieta Wilderness and to shoot long-range cannon munitions that may impact within the refuge. These requests would roll-back hard-earned refuge standards and expose the land and visitors to danger or to the inconvenience of having to leave the refuge during testing. These cannon tests are sanctioned by the Goldwater Range West and East, and the tests are launched from within the Goldwater Range. Please do not ask to bypass or roll-back refuge and Wilderness protections.	As described in Table 5.1-1, the extended range cannon artillery test shoots previously conducted at the BMGR by YPG were from established Marine Corps ground support areas in BMGR West into established target impact areas in BMGR East. The authorized closed hazard area (also referred to as a surface danger zone) for these test shoots did not extend into the CPNWR. The Marine Corps has fired cannon artillery in a similar manner at the range as a part of the WTI Course (U.S. Marine Corps 1997). This LEIS does not include proposals for artillery test missions. The Army would need to prepare separate NEPA documentation to address proposed artillery tests at the BMGR that would require portions of the CPNWR be included in a surface danger area.

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14-15 Bill Broyles and Gayle Hartmann	16. We ask you to consider special-use management areas, such as once applied to the Tinajas Altas ACEC (Area of Critical Environmental Concern). We further ask that you study places such as Vopoki Ridge and the Aguila Mountains as potential ACECs or even Wilderness Areas. One stumbling block to Wilderness Areas has been Border Patrol's need access to remote areas along the border corridor, but if the new wall works as advertised, this should no longer be necessary.	Consideration of potential special management area designations at the BMGR would be a range administrative and resource management issue that is not germane to the Congressional decision-making required to extend the range land withdrawal. Special management area designations would need to be addressed through the INRMP update process.
14-16 Bill Broyles and Gayle Hartmann	17. We ask you to look at additional DoI partnerships and collaboration at the landscape scale that might help the range. Considering urban and suburban growth on the western and northern boundaries of the range as well as under flight paths to the range, might alliances with US Fish and Wildlife Service, national Park Service, Bureau of Land Management, and US Department of Agriculture be helpful? For example, the 2018 National Defense Authorization Act introduced language that formally recognized the Sentinel Landscapes Partnership. The purpose is to streamline programs that fund land protection and natural resource restoration projects involving DoD, DoI, and USDA. Its core values include protecting vital military test and training missions, conserving habitat and wildlife restoration, and helping farms and ranches to protect soils, provide conservation easements, and boost conservation incentives. See https://sentinellandscapes.org/about/federal-programs/ This may encourage dispersed recreation under airspace and flight corridors to the Range, provide wildlife corridors, and forestall or mitigate incompatible industrial, agricultural, or suburban development that might hinder pilot training.	Thank you for the information about the Sentinel Landscapes Partnership. Intergovernmental and interagency collaboration and public outreach are long-standing management practices at the BMGR. The Air Force and Marine Corps established the BEC in 1997 to provide a collaborative forum for agencies with management responsibilities at the BMGR and the IEC became active in 2000 to serve a similar function that involved a wider membership of regional partners and Tribal and public involvement. In 2005, the Joint Land Use Study for the BMGR was completed as a proactive and collaborative product of DoD, state, and local government officials; business interests; and landowners to provide tools to resolve land use conflicts in the interests of all parties, promote compatible land use, and ensure the sustainability of the range to support its training and test missions. The Air Force and Marine Corps have continued this posture of forward-looking collaboration and appreciate the commenter's suggestions.
14-17 Bill Broyles and Gayle Hartmann	18. We ask you to study range energy efficiency with a mind toward reducing atmospheric carbon and relying upon renewal energy.	Refer to the response to Comment 2-6. The principal expenditures of energy and carbon emissions at the BMGR result from aircraft and vehicles used during training or test activities. In contrast, relatively little energy is required to operate the range. DoD is pursuing innovations to improve the energy efficiency of its aircraft, vehicles, ships, and installations to markedly reduce or eliminate carbon emissions. As noted in the response to Comment 2-6, the Colorado State University assessment may include recommendations that will help improve energy efficiency at the BMGR.
14-18 Bill Broyles and Gayle Hartmann	19. We expect to see well-crafted and fully funded strategies and plans to heal the ground, using revegetation, restoration, and control of invasives. Actual written strategies would be helpful to inform the public as well as provide common ground for interagency work. At the moment we don't see a "playbook" or strategy sheet. One area to address, perhaps with supplemental research, is the subject of landscape restoration, reclamation, or revegetation. What are its "best practices" and most effective methods for various types of terrain and plant communities? This includes invasive plants, which in the long term endanger the composition of the desert plant community itself, and which bring a fire hazard that threatens the training mission itself. These are urgent priorities or action items.	These concerns pertain to managing, conserving, and protecting natural resources at the BMGR, which is addressed through the BMGR INRMP. The 2018 Sikes Act INRMP for the range, which will be part of the case file provided to Congress for its consideration of the proposed land withdrawal extension, already addresses many of the expressed needs and is scheduled for its next update cycle beginning in 2023. The INRMP update process provides the statutory authorization and planning tools to address resource management needs and priorities. The LEIS is not an appropriate instrument for these concerns as they require administrative, not Congressional, decision making.
14-19 Bill Broyles and Gayle Hartmann	We already need more of the Goldwater Range open to the public than we have now. Why not open-up the eastern Mohawk Mountains to public visitation? Allow tours to the Aguila Mountains and Crater Range on designated public days? Thirty years ago these areas were open several weeks a year during "cold" range days, holidays, or range cleanups. And during the spring bloom, the public should be able to spend a few days in the Butler Mtns. Special areas are seasonally opened to hunters and their families and friends—why not to the general public?	Changes in public access policy are addressed through the INRMP update process.

Comment Number/ Commenter	Comment	Response
15-1 Lois Bunn	2/19/2021 Dear Sirs (or Madame): This letter is written to support the renewal of Alternative 2 regarding the Goldwater Range in Arizona. Though it is positively used by the military of the U.S. it is also frequently visited by tourists. It should stay the protection of the Dept. of the Interior. Sincerely, Lois Bunn	Refer to the response to Comment 12-1.
16-1 Martha Burgess	February 23, 2021 BMGR LEIS P.O. Box 2324 Phoenix, AZ 85003 Hello Barry M. Goldwater LEIS Reviewers – I write to you as not only an amateur botanist but also as an ethnobotanist and as an Adjunct Professor at Tohono O'odham Community College, to register my request that you endorse Alternative 2 in your upcoming plan. This area is so critical in our understanding of Sonoran Desert flora, and in our continued monitoring of many species as climate changes. The public must have continued access, plus access to the additional proposed area near Gila Bend, as citizen scientists.	Refer to the response to Comment 3-1.
16-2 Martha Burgess	It is of deep importance to me, as an instructor and mentor for Tohono O'odham youth, to know that they, too, will have continuing access to these lands (described in Alternative 2) which are their traditional homelands. Indigenous descendants of earlier residents should have continuing easy access to their forbears' lands, for their spiritual, communal, practical, and personal health. For these important scientific and cultural reasons please endorse Alternative 2. With appreciation for your work, Martha A. Burgess Adjunct TOCC	Alternative preference is noted. LEIS Sections 3.13.2.2 and 3.13.2.3 each include a subheading titled "Tribal Access" that list the procedures and policies for Tribal member access to BMGR East and BMGR West, respectively. The 38 percent of the BMGR that is open to public access is also open to Tribal members. In accordance with the MLWA of 1999 Section 3031(b)(3)(E)(ii)(II), Tribal Nations also have special access privileges for certain purposes to areas of the BMGR that are not open to the general public; none of the alternatives propose to change to Tribal access provisions.
17-1 Carianne Campbell	I support Alternative #2 for ongoing management of BMGR. Public access should be retained – this is some of the most beautiful examples of Sonoran Desert. Thank you. Carianne Campbell	Refer to the response to Comment 3-1.
18-1 Sylvia Clevenger	2.24.21 Dear Sirs: Please do not allow DMAFB no to Alternative 2. The DMAFB pilots have been harassing me for 3-4 yrs by flying directly and in close proximity to my property at [redacted]. They fly over wherever I go whether grocery shopping, to the post office. I have complained for the same number of years – to no avail - $ talks. I used to love our air force and now having nothing but disdain for them the pilots/Commander. I would like DMAFB closed. Their pilots have no integrity – no humility. We pay their salaries. Do not give them anything planes, use of land, airspace, etc. Sincerely, Sylvia Clevenger	Operations at Davis-Monthan Air Force Base would not change under any of the proposed action alternatives. Flights originating and terminating at Davis-Monthan Air Force Base would continue to fly over the Tucson area because even if the BMGR land withdrawal were not extended, training could continue in the restricted airspace overlying the BMGR and in the several Military Operating Areas in the region.

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19 Sidney and Barbara Coon	BMGR LEIS, P.O. Box 2324, Phoenix, AZ 85003 Feb 23, 2021 Gentlepersons, We appreciate the current use of the Barry M. Goldwater Range and want to express our support for continuation of the present arrangement which has some portions of the range accessible to citizen use. Therefore we endorse Alternative 2 for the upcoming 25 year renewal. To be clear we copy below the version of Alternative 2 we endorse: Alternative 2: Extend the existing land withdrawal and reservation of the BMGR for 25 years, but the BMGR East boundary would be extended to include the Gila Bend Addition. Management of the withdrawn public lands in the BMGR would continue as described for Alternative 1. Thank you for your consideration, Sidney A. Coon and Barbara L. Coon	Thank you for your comment.
20 Janice Cootz	Renewal of the Barry M. Goldwater Range. I endorse Alternative 2. Janice Cootz	Thank you for your comment.
21 Jay Cravath	February 19, 2021 BMGR LEIS P.O. Box 2324 Phoenix, AZ 85003 To whom it may concern: Please register my strong support for Alternative 2 to renew the Goldwater Range for twenty five years. Jay Cravath, Ph.D.	Thank you for your comment.
22-1 Daniel Davis	2.19.21 Dear Sirs, I support Alternative 2 for the Barry M. Goldwater Range. I've lived in Arizona since 1957 and have been to the BMGR/Cabeza Prieta three times. It's an amazing place on so many levels, and should remain open to the citizens who want to make the effort to visit this remote, unique, historic environment. This use has been proven compatible with military uses, and hopefully the current plan will be maintained. Thank you for your time. Sincerely, Daniel C. Davis	Refer to the response to Comment 3-1.
23 Donald Davis	I fully support only Alternative 2 for the BMGR LEIS and urge that this option be adopted. While the BMGR is an essential component for maintaining our military capabilities, this range is also land that belongs to the American people, just as other Federally owned land – National Parks, National Forests, and many others. As such, a 25 year review of the use of the BMGR allows for updating land usage to allow for changing times – who can predict what the needs of the military will be a quarter-century hence. And having external input every quarter century will serve to insure optimal land use in light of changing circumstances.	Thank you for your comment.
24-1 Jan Dowking	I am writing to support Alternative 2, which renews the Goldwater Range for 25 years so members of the public can continue to enjoy it for recreation.	Refer to the response to Comment 3-1.

Comment Number/ Commenter	Comment	Response
25-1 Susanne Durling	I support Renewal Alternative 2 which will continue cooperation with the Interior Department in operating the Goldwater Range. I have traversed the Camino del Diablo, surely one of the most compelling adventures of my life and believe such opportunities should remain for all.	Refer to the response to Comment 3-1.
26 Jack Dykinga	We believe that the 25 year renewal period process is an way insure an on-going review process and it needs to continue.	Thank you for your comment.
27-1 Michele Frisella	I ask that the Barry M Goldwater Range continue to be open for public recreation. I enjoy camping, hiking, and wildlife viewing. I support ALTERNATIVE 2	Refer to the response to Comment 3-1.
28 Stephanie Grant	Regarding the Barry M. Goldwater Range Impact. To me it seems vitally important to protect and preserve the wild lands we have left and to manage them for the wildlife and plants that are threatened by interference. For the sake of our descendants and their enjoyment of wild places lets take care of this land for us all.	Thank you for your comment.
29 Susi Hauser	I had the incredible opportunity to visit the BMGR in January. I support the partnership that the military has with the Department of the Interior. I support Alternative 2 that simply renews the lease for 25 more years. Thank you. Sincerely, Susi Hauser	Thank you for your comment.
30-1 Douglas Helber	Please keep public access available in the Barry Goldwater range. The area has valuable cultural resources and is utilized by many.	Refer to the response to Comment 3-1.
31 Sally Hills	I support Least Alternative 2.	Thank you for your comment.
32-1 Michael Ingram	I am opposed to any changes in the management of the Goldwater Range from it's current situation. The Department of Interior absolutely needs to have a say in the resources of the range which include things other than military uses. (Recreational uses, wildlife conservation, etc)	Refer to the response to Comment 12-1.
32-2 Michael Ingram	This important parcel of land is too important to the people of Southern Arizona to be permanently removed from Public Use. It is a part of our Public Lands. I've been on the Range (with my permit), enjoyed it and plan to come back.	Refer to the response to Comment 3-1.
33-1 Wendy Isner	Sending my endorsement of Alternative 2 plan. This piece of desert is too beautiful to be kept from the public.	Refer to the response to Comment 3-1.
34-1 Don Jones	In regards to the Goldwater Range 25 year renewal I cast my vote for Alternative 2. Please maintain the current limited access to this beautiful Sonoran Desert with the addition of the Gila Bend buffer. Thank you, Don W. Jones	Refer to the response to Comment 3-1.
35-1 Verlon Jose	Therefore, it is requested that the U.S. Military and the Department of Interior continue the lease of said lands for another 25 years on behalf of the American people and to honor trust responsibility and commitments to the American Indians, (namely the Tohono O'odham / Hia Ced O'odham). Option 2 is strongly suggested. To renew the lease for another 25 years for use of lands within the Barry M. Goldwater Range to include the addition of the Gila Bend Land addition.	Refer to the response to 12-1.

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36 Mark Kasunicd	I support Alternative 2. Please consider.	Thank you for your comment.
37 Diane Kelly	Alternative 2	Thank you for your comment.
38 Diane Kelly	I support Alternative 2.	Thank you for your comment.
39 Kristine Klewin	I support Alternative 2	Thank you for your comment.
40 Kristine Klewin	I support Alternative 2	Thank you for your comment.
41-1 Gisela Kluwin	It is an exceptional refuge that people should be allowed to experience. I strongly urge you to adopt ALTERNATIVE 2	Refer to the response to Comment 3-1.
42-1 Diana Lancaster	2/19/2021 I'm writing to record my support of renewal of Alternative 2 to keep the Goldwater Range open for recreation and conservation of our precious Sonoran Desert. The preservation of this land and natural life in all forms so essential. Sincerely, Diana Lancaster	Refer to the response to Comment 3-1.
43-1 Carolyn Leigh and Ron Perry	19 Feb 2021 Dear Sir or Madam, We support Alternative 2 to renew the Goldwater Range for 25 years – and to keep it open for public access. Thanks for your consideration Carolyn Leigh and Ron Perry	Refer to the response to Comment 3-1.
44-1 Lainie Levick	I support Alterative 2 (the original, not the variations), to add the Gila Bend addition, to continue public access to this special place, to maintain the 25 year review period, and to continue the existing management scenario.	Refer to the response to Comment 3-1.
45-1 Marilyn Loveless	February 23, 2021 Barry M. Goldwater Range LEIS P.O. Box 2324 Phoenix AZ 85003 Dear Sir or Madam: I am writing to you as an interested and concerned Arizona citizen to urge your adoption of LEIS Alternative 2 in your upcoming renewal. I value the natural and human capital that is part of the 1.7 million acres of land within the Barry M. Goldwater Range. As an outdoor advocate and ecologist, I also value the fact that a large part of that landscape is accessible to the public for recreation under permitting processes. I support your efforts to add the land near Gila Bend and a 25-year renewal alternative. I also STRONGLY ENDORSE the shared management that currently exists between the military and the Department of the Interior.	Refer to the response to Comment 12-1.

Comment Number/ Commenter	Comment	Response
45-2 Marilyn Loveless	Making these landscapes accessible ensures that hikers, campers, and recreationalists can appreciate this wonderful habitat. Sincerely yours, Marilyn D. Loveless	Refer to the response to Comment 3-1.
46-1 Robert Luce	February 22, 2021 BMGR LEIS P.O. Box 2324 Phoenix, AZ 85003 I am writing regarding management of our public lands within the Barry M. Goldwater Range. Although I live in southeastern Arizona, I often travel to the Cabeza Prieta National Wildlife Refuge and the part of the Barry Goldwater Range open to the public for camping, photography, and wildlife viewing. I favor a 25-year renewal of the range for military use under Alternative 2, which will continue to retain the Department of the Interior as a partner in management of those lands. Our public lands are important to Arizonans and all Americans. Military use of the area and retention of the public lands for public use are compatible under Alternative 2. Thank you for the opportunity to comment. Sincerely, Robert J. Luce	Refer to the response to Comment 12-1.
47 Pat Madea	I support Alternative 2. It reauthorizes the existing BMGR land withdrawal for another 25 years, but the BMGR East boundary would be extended to include the 2,366-acre Gila Bend Addition.	Thank you for your comment.
48 Warren May	Having traveled and camped in the territory of El Camino del Diablo, I value its historical significance. To this end, I strongly support Alternative 1, oppose Alternatives 1A, 1B, 2A and 2B, and strongly oppose Alternatives 1C and 2C.	Thank you for your comment.
49-1 Gail McDonald	2/22/21 Dear BMGR: Regarding the upcoming lease renewal: I request that you choose Alternative 2: Extend the existing land withdrawal and reservation of the BMGR for 25 years, but the BMGR East boundary would be extended to include the Gila Bend Addition. Management of the withdrawn public lands in the BMGR would continue as described for Alternative 1. Since 1976 I have appreciated camping and hiking in the Barry Goldwater Range. I love the spaciousness, stillness, stark mountains, silence. I actually enjoy seeing the different planes and flying objects as well. It is a fragile desert and I am grateful for your stewardship. Please keep this Arizona gem open so our children and grandchildren can visit it, as did we. Thanks so much, Gail McDonald M.D.	Refer to the response to Comment 3-1.
50-1 Linda Miller	I do not want the military to have total control with no Interior Department partner.	Refer to the response to Comment 12-1.

Comment Number/ Commenter	Comment	Response
50-2 Linda Miller	The public and wildlife need access to this area.	Refer to the response to Comment 3-1.
51 Rod Mondt	As a long time supporter of the BMGR I would ask that you consider Alternative 2 as your future management plan. This is a very special land and one that needs access as well good management. Sincerely, Rod Mondt	Thank you for your comment.
52 Mary Myers	Goldwater Range: I support renewal alternative #2 Mary Myers Tucson Resident voter	Thank you for your comment.
53 Marian O'Reilly	Comment on Barry M Goldwater LEIS Renewal I fully support Alternative 2. Not 2A, 2B, or 2C. Marian O'Reilly	Thank you for your comment.
54-1 Logan Phillips	In regards to the Barry M. Goldwater Range Land Withdrawal Legislative Environmental Impact Statement, I strongly endorse Alternative 2. Maintaining some public access (by permit) to the range is essential, given the size and biological, cultural and tribal resources it holds. While that sky can wholly belong to the jets and helicopters, the ground should continue to be shared use with citizens.	Refer to the response to Comment 3-1.
55-1 Bruce Plenk	Please adopt Alternative 2 to preserve public access and review to a wonderful desert resource for Arizonans and all others.	Refer to the response to Comment 3-1.
56-1 Jeffrey Rein	Please go with alternative #2---25 years with the addition of Gila Bend land. I would like the Interior Department to stay involved so not only are humans protected but so are the flora and fauna. And of course, the land itself.	Refer to the response to Comment 12-1.
57-1 Bruce Robinson	February 21, 2021 BMGR LEIS PO Box 2324 Phoenix, AZ 85003 Dear Madam or Sir, I am writing to express my support for Alternative 2 regarding the renewal of usage for the Goldwater Range. I'm quite happy to see the military using the Range for training. It has given me confidence, in fact, to see aircraft in action, using the Range. This wilderness is a treasure for our society that the Interior Department also should oversee. I urge you to adopt Alternative 2. Sincerely, Bruce Robinson	Refer to the response to Comment 12-1.

Comment Number/ Commenter	Comment	Response
58 Sherri Schamel	I am herein noting my support for alternative 2 for continuing the BMGR for 25 years. Alternative 2: Extend the existing land withdrawal and reservation of the BMGR for 25 years, but the BMGR East boundary would be extended to include the Gila Bend Addition. Management of the withdrawn public lands in the BMGR would continue as described for Alternative 1.	Thank you for your comment.
59 Priscilla G. Scott	I would like to submit a comment on the Reauthorization of the Barry M. Goldwater Range Land Withdrawal and Proposed Gila Bend Addition Land Withdrawal. I would like to support Alternative #2 as the best option for the government and the public as stated below: Alternative 2: Extend the existing land withdrawal and reservation of the BMGR for 25 years, but the BMGR East boundary would be extended to include the Gila Bend Addition. Management of the withdrawn public lands in the BMGR would continue as described for Alternative 1.	Thank you for your comment.
60-1 Roger Shanley	I support Alternative 2 for the Barry Goldwater Range to allow public use of this land.	Refer to the response to Comment 3-1.
61 Cheryl Shearer	Public comment I support Alt #2 for mgmt. of BMGR Cheryl Shearer	Thank you for your comment.
62-1 Jon Sirkis	I urge you to leave all of the BMGR in its natural state, to allow non-motorized public access to the maximum area possible	Refer to the response to comment 14-10.
62-2 Jon Sirkis	I urge you to leave the maximum possible amount of area dedicated to protection of endangered species	As discussed in Sections 3.12.1.3 and 4.12.1.3 of the LEIS, two species listed under the ESA occur presently at BMGR: Sonoran pronghorn and acuña cactus. The Air Force and Marine Corps have consulted with USFWS pursuant to Section 7 of the ESA on 10 previous occasions to address potential project-related adverse effects to species associated with military training activities at the BMGR. The Biological Opinions issued by the USFWS regarding military use of the BMGR have concluded that current and ongoing military operations at the range are not likely to jeopardize the continued existence of Sonoran pronghorn or acuña cactus. Mandatory terms and conditions provided by the Biological Opinions for the Air Force and Marine Corps to implement to help conserve, protect, and recover these species have not identified a need to dedicate areas of the BMGR to protect either Sonoran pronghorn or acuña cactus. Critical habitat or other special designation areas dedicated to endangered species protection have not been designated for Sonoran pronghorn because almost 98 percent of its current distribution is under federal land management. Management plans for the BMGR, CPNWR, OPCNM, and BLM lands provide levels of protection to conserve Sonoran pronghorn habitat. The INRMPs for BMGR East and BMGR West coupled with the mandatory terms and conditions and recommended conservation measures identified by the Biological Opinions have provided active management strategies that have effectively protected these species.

Comment Number/ Commenter	Comment	Response
63 Thomas Smithson	February 20, 2021 BMGR LEIS P.O. Box 2324 Phoenix, AZ 85003 RE: Goldwater Range Lease Renewal Gentlemen, After reading through the documents associated with this renewal I would support Alternative #2. This proposal not only serves the needs of the military, but also adds further environmental protection to the Gila Bend addition. The long term used of the military of this training area should be continued, it would be difficult to find another area which has the same properties. Thank you for your consideration of my input on this important question. Sincerely yours, Thomas Smithson	Thank you for your comment.
64 Darlene Smyth	February 19. 2021 RE: The Barry M. Goldwater Range Renewal My personal comment regarding this issue. I support Alternative 2 as I feel it is the best for all concerned. Sincerely, Darlene Smyth	Thank you for your comment.
65-1 Tim Tilton	BMGR LEIS PO Box 2324 Phoenix, AZ 85003 Re: Public input on the Air Force and Marine Corps' proposal to extend the current land withdrawal and reservation of the BMGR and add about 2,366 acres of public land (a 0.14 percent land increase) to BMGR East I urge you to support Alternative 2. Over the years, my wife and I have spent time on the BMGR in the public areas and we believe it is important to preserve the unique region for public use and enjoyment. Thank you, Tim Tilton	Refer to the response to Comment 3-1.
66 Bruce Tremper	I love to visit the Barry Goldwater Range in the sections open to the public. I support Alternative 2. No change to the present system, which seems to work well.	Thank you for your comment.
67 Jim Truitt	I support Alternative 2. Please renew the Goldwater Range for 25 years.	Thank you for your comment.
68-1 Dale Turner	The range should remain open to those pursuits, subject to reasonable closures for safety, security, and good land management.	Refer to the response to Comment 3-1.

Comment Number/ Commenter	Comment	Response
68-2 Dale Turner	While DOD direct impacts cover a small portion of the range, DOD should develop a range-wide response to land degradation, especially that caused by illegal migration and smuggling activities, by border law enforcement, and most of all by DHS building and maintaining its wall. There is a large and growing area where natural and cultural resources have been damaged, largely by border enforcement actions and projects. These impacts are widespread and long-lasting, and should be addressed through changes in permitted behavior and restoration of damaged lands. Ideally, DHS should fund much of this range-wide work and restoration.	Refer to the response to Comment 14-7.
68-3 Dale Turner	The withdrawal should clarify that the Goldwater Range is not open to new civilian developments that fragment its desert ecosystem. The siting of Arizona State Route 195 through the western edge of the range was completely unnecessary and served no military function, but it reduced the buffer between military and civilian activities, and created a lethal barrier for desert wildlife through what had previously been good habitat. It is easy to imagine future proposals for additional paved roads, pipelines, and electrical transmission lines to run east/west or north/south across the vast spaces of the Goldwater Range, selected for the convenience and profit of project developers. Such projects would not serve the military mission and would permanently degrade the natural and cultural values that currently exist.	Refer to the response to Comment 14-12.
68-4 Dale Turner	The withdrawal should revive and codify special management areas on the Goldwater Range, similar to the previous Gran Desierto Dunes, Tinajas Altas, and Mohawk Mountains/Sand Dunes Areas of Critical Environmental Concern. Those former BLM designations provided an important overlay by highlighting areas with sensitive natural or cultural resources where there was no critical need for ground-disturbing military activity. The Goldwater Range provides some of the best remaining habitat for several rare and protected wildlife species, and establishing clear areas like ACECs for those species is the most efficient path to achieving their conservation.	Refer to the response to Comment 14-15.
68-5 Dale Turner	In particular, note that the Mohawk Dunes Fringe-toed Lizard has been identified as a distinct species, *Uma thurmanae*, separate from all related populations of the genus. To the best available scientific knowledge, the entire distribution of the species occurs within the boundaries of the Goldwater Range, and its survival is dependent on DOD management. That is clearly deserving of a special management area.	Thank you for the update on the recent proposed speciation of the Mohawk Dunes fringe-toed lizard. The need for, and potential designation of, a special management area to protect this species is an administrative management issue that should be addressed through an INRMP update process. The Marine Corps will coordinate with AZGFD and the USFWS regarding future management decisions about this animal.
69-1 Cathy Waterman	2-20-21 To whom it may concern: I wholeheartedly support Alternative 2. Please continue operations of the Goldwater Range for another 25 years. I have driven, hiked, and camped this glorious and historic region numerous times and I would like to be able to do it many more times. Please keep this beautiful desert region open to the public as it is today. Public recreation and tourism also benefit our economy. Thank you. Sincerely, Cathy L. Waterman	Refer to the response to Comment 3-1.
70 Mark Ziska	Please be aware of my opinion on the renewal of the military lease on BMGR. I support option #2. I am a Tucson resident an understand how important BMGR is to our military and the economy of Tucson. Mark D. Ziska	Thank you for your comment.

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71-1 Edward Zukoski	Further, an indefinite withdrawal would appear to conflict with President Biden's "30 by 30" initiative as outlined in Executive Order 14,008, which requires federal agencies to take initial steps "to achieve the goal of conserving at least 30 percent of our lands and waters by 2030." E.O. 14,008 at Sec. 216, 86 Fed. Reg. 7619, 7,627 (Jan. 27, 2021). Taking over a million acres out of the hands of the Interior Department appears to move the nation in exactly the opposite direction of the Commander in Chief's initiative. Any subsequent NEPA document must explain and address this apparent conflict.	Executive Order 14008, Tackling the Climate Crisis at Home and Abroad, Section 216, directs the Secretary of the Interior, in consultation with other relevant agency heads (known as the National Climate Task Force) to initiate efforts to achieve the goal of conserving at least 30 percent of lands and waters by 2030. The Executive Order requests that the National Climate Task Force develop a report that identifies which lands and waters qualify for conservation by April 27, 2021 (90 days from the issuance of the Executive Order). Land and water conservation would not change under any of the proposed action alternatives.

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