Finding of No Significant Impact
Extended Range Cannon Artillery Project
Yuma Proving Ground &
Barry M. Goldwater Range
Yuma County, Arizona

The U.S. Army Garrison Yuma Proving Ground (USAG YPG) prepared the attached environmental assessment (EA), hereby incorporated by reference, to identify and evaluate potential environmental impacts associated with the Extended Range Cannon Artillery (ERCA) Project.

The ERCA Project is a multi-element, multi-phase test program of U.S. Army's next generation 155mm artillery system. Major components of the artillery system include the cannon, gun mount, artillery projectile, and propellant charges. As part of the ERCA Project, a new 495-acre impact area would be established on YPG to sufficiently accommodate test firings of extended range artillery projectiles ranging from approximately 55 kilometers (km) to 73 km. Moreover, existing operational areas at the Barry M. Goldwater Range (BMGR) which is jointly administered by Marine Corps Air Station Yuma (MCASY) and Luke Air Force Base (LAFB) would also be used to conduct extended range test firings.

The EA was prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality regulations implementing NEPA [Title 40, United States Code, Parts 1500 through 1508]; Department of Defense Directive 4715.9 Environmental Planning and Analysis; and Environmental Analysis of Army Actions (Code of Federal Regulations, Title 32, Part 651). YPG is the NEPA Lead Agency. LAFB and MCASY are NEPA Cooperating Agencies.

Two alternatives were carried forward for analysis: the No Action Alternative and the Preferred Alternative. Additional action alternatives on YPG were considered but were not further evaluated due to safety hazards.

No Action Alternative

Under the No Action Alternative the ERCA Project will not conduct extended range test firings at YPG or BMGR. At YPG, the proposed 495-acre impact area on the eastern end of Kofa Region will not be established, and the existing operational areas on BMGR East and West will not be used. Elements of the ERCA Project that are within the scope of previously authorized programs would continue on YPG including firing into existing impact areas. However, the full distance of extended range test firings could not be conducted. Thus, the full extent of weapon capabilities would not be sufficiently characterized.

The Proposed Action will establish three operational areas for the ERCA Project that accommodates test firings of extended range artillery projectiles. Since the full extent of weapon capabilities could not be sufficiently characterized under the No Action Alternative, it was deemed not acceptable for the ERCA Project.

Preferred Alternative

Under the Preferred Alternative, the ERCA Project will test fire extended range artillery projectiles within three operational areas of YPG and BMGR. Tests conducted on BMGR would be limited to use of inert warheads. The duration of the tests on BMGR would initially be two years and would only be extended with authorization from LAFB and MCASY. Three tests per year will be conducted at each location for a total of six tests per year. The duration of each test will be approximately seven days. In addition to the ERCA Project, a new 495-acre impact area will be established near the southeast corner of the Kofa Region near the Palomas Mountains at YPG. The new impact area will function as a multi-purpose, multi-use impact area for other test missions that may run concurrently with or subsequent to the ERCA Project.

The Preferred Alternative pursues the use of one or any combination of three Operations which are correlated to locations where the ECRA project would be executed.

Operation 1 is located on YPG. The ERCA Project would fire fin- or spin-stabilized projectiles from an existing gun position on the southern end of Cibola Range approximately 55 km northward to existing impact areas within the Cibola Range; spin-stabilized projectiles will be fired approximately 67-70 km eastward to a new 495-acre impact area on the Kofa Region. Both inert and high explosive warheads will be used.

Operation 2 and 3 are located on BMGR. Under Operation 2, the ERCA Project will fire fin- or spin-stabilized projectiles from a temporary gun position at Ground Support Area 76 on BMGR West to targets in North Tactical Range (NTAC) and South Tactical Range (STAC) on BMGR East. Munitions will be directed at Targets 106 or 111 in NTAC and Targets 208 or 211 in STAC with Targets 106 and 208 preferred.

Under Operation 3, spin-stabilized projectiles will be fired from a temporary gun position at Ground Support Area 71 to the same targets mentioned above.

Environmental Consequences

Aesthetics, environmental justice, socioeconomics, utilities, infrastructure and traffic were eliminated from analysis because there is no potential for impacts to these resources. The EA evaluated potential impacts on air quality, biological resources, cultural resources, hazardous materials and waste, land use, noise, recreation, safety, soils and water quality. As summarized below, the Proposed Action will result in less than significant impacts to individually and cumulatively:

- **Air Quality:** There will be periodic emissions of criteria pollutants associated with the use of generators, instrumentation vans, heavy duty trucks, and pickup trucks for the duration of each test. However, due to the temporary nature of emissions and the small number of vehicles and equipment, impacts to air quality would be minor/de minimus.

- **Biological Resources:** Periodic vibration, noise and presence of visual forms associated with an active test areas could affect wildlife including the Federally endangered Sonoran Pronghorn (*Antilocapra americana sonoriensis*) and the Acuna Cactus (*Echinomastus erectocentrus var. acunensis*). Limited disturbance to vegetation is anticipated. Given the periodic and short-term nature of the tests the probability for direct impacts is low. Wildlife within the vicinity of the test footprintare habituated to disturbances given the current near constant level of testing and training. With implementation of best management practices as well as terms and conditions of Biological Opinions in effect on YPG and BMGR, impacts to biological resources would be less than significant.

- **Cultural Resources:** Construction of a new impact zone and munitions' impact will cause ground disturbance. Existing targets have a long history of past use as munitions targets and for explosive ordnance disposal operations, which have caused substantial past ground disturbance. There are no known historic properties within the new impact zone proposed on YPG or within a radius of 500 feet of Targets 106, 111, 208, or 211 on BMGR East, of the responding consulted tribes they did not indicate any specific concerns with the proposed project. The SHPO concurred with the determination that the proposed project would result in no adverse effect to cultural resources.

- **Hazardous Materials and Waste:** Spent munitions are currently present within each range; the ERCA Project and continued use of the new impact area on YPG will result in additional discharge of spent munitions. Periodic studies confirm that off-range migration of hazardous material is unlikely due the ephemeral surface waters, depth to groundwater, low annual precipitation, and an extremely high evapotranspiration rate. Discharge of additional spent munitions will not result in significant impacts.

- **Land Use:** The ERCA Project will use existing operational areas on YPG and BMGR and will be consistent with planned land uses within both areas. There will be no land use impacts to

adjacent non-military lands surrounding YPG and BMGR.

- **Noise:** Periodic sound pulses associated with weapon firings are anticipated at the gun positions and at the proposed 495-acre impact area on YPG where high explosives rounds would be used. Due to the distance from populated areas and atmospheric attenuation of noise over such distances, noise impacts beyond the boundaries of YPG and BMGR will be minimal.

- **Recreation:** The ERCA Project will use existing operational areas on YPG and BMGR where recreational uses are not authorized. Under Operation 1 of the Preferred Alternative on YPG, a short overflight across the airspace of the Kofa NWR near the Castle Dome Mountain is expected to periodically disrupt recreational activities in a remote area of the Kofa NWR. However, due to the short duration of tests and the periodic nature of the testing regime, impacts to recreation will be minor.

- **Safety:** The ERCA Project will use existing operational areas on YPG and BMGR. All existing safety protocols and regulations in effect on YPG, BMGR East, and BMGR West will be implemented. Under Operation 1 of the Preferred Alternative on YPG, a short overflight across the airspace of the Kofa NWR near the Castle Dome Mountain will occur. YPG will closely coordinate with Kofa NWR in advance of scheduled test firings. Tests will be scheduled to avoid high visitation periods for the refugeYPG will deploy personnel along roads and aircraft to monitor for the presence of visitors within the SDZ; test firings will be temporarily suspended if visitors are present within the SDZ on Kofa NWR. Additionally, a short overflight over Highway 95 airspace will occur. Scheduling will be limited to low traffic periods, and an approximately three mile long segment of the roadway between Mile Marker 50 and 53 will be closed for up to 30 minutes during testing. Arizona Department of Transportation's road closure protocols will be followed, and traffic management personnel will be placed at both mile markers. Emergency access through the closed road segment will be coordinated between the YPG Public Safety Office and law enforcement or emergency responders on the scene.

  Continued use of the new 495-acre impact area on YPG for other test mission concurrently with or subsequent to the ERCA Project will be wholly contained within the airspace boundary of YPG. There will be no substantial increases in health and safety risks for public and military personnel.

- **Soils:** Ordnance impacts will result in varying levels of surface impacts within the new 495-acre impact area on YPG and STAC and NTAC on BMGR West. Disturbed areas will be localized to the impact site and overt time will be restored through natural sediment transport and surface flows. Impacts will be less than significant.

- **Water Quality:** The ERCA Project will use existing operational areas on YPG and BMGR. There are no wetlands within operational areas on YPG, BMGR East, and BMGR West and anycConstruction activities within the proposed 495-acre impact area on YPG will avoid discharges. tThe potential for conveyance of contaminants off range will be minimal due to infrequent surface flows and the depth of alluvial fill in washes. Impacts will be less than significant.

Conservation Measures for the Sonoran Pronghorn

The Proposed Action-Preferred Alternative will have adverse effect to the Sonoran Pronghorn but nothing beyond what has already been considered in an existing biological opinion (BO) for training and firing activities occurring currently on YPG and BMGR. As part of the ERCA Project, USAG YPG will implement all conservation measures prescribed in Biological Opinion 02EAAZ00-2017-F-0039 (see Appendix B). Key measures from the BO are: briefing ground personnel on the Sonoran pronghorn; vehicle and road restrictions; speed limits enforcement; minimizing impacts to vegetation; proper disposal of trash and debris; use of temporary containment for parked vehicles; and funding contribution for Sonoran pronghorn recovery.

Public Participation

By letters dated March 3, 2016, USAG YPG announced the preparation of this EA and solicited comments and concerns from interested stakeholders, agencies, and tribal governments using a combined stakeholder list from YPG, LAFB and MCASY. See Appendix E.

The EA and the draft Finding of No Significant Impacts were made available for a 29-day public review period from January 29, 2017 through February 28, 2017. By letters dated January 30, 2017 and by public notice published in the Yuma Sun on January 29, 2017, USAG YPG announced availability of the documents for public review (see Appendix F). Seven comments were received. Responses to all comments are appended to the EA (see Appendix G). By letters dated May 23, 2017, USAG YPG provided replies to all commenting parties.

Agency Coordination

USAG YPG has undertaken and completed consultations with the U.S. Fish and Wildlife Service (USFWS) and the State Historic Preservation Officer (SHPO) pursuant to requirements of the Endangered Species Act (ESA) and the National Historic Preservation Act (NHPA), respectively.

Consultation with the USFWS pursuant to Section 7(a)(2) of the ESA was initiated on October 4 2016 for ERCA activities on BMGR West and East. On May 3, 2017, the USFWS issued Biological Opinion 02EAAZ00-2017-F-0039. Furthermore, USAG YPG also coordinated with representatives of the Kofa National Wildlife Refuge. See Appendix B.

Consultation with the Arizona SHPO was initiated on January 23, 2017 for a "no adverse effect" determination for the project. SHPO concurred with the "no adverse effect" determination on February 9, 2017. USAG YPG in coordination with LAFB also completed tribal coordination pursuant to the NRHP. See Appendix C.

Summary

Under the No Action Alternative the elements of the ERCA Project that are within the scope of previously authorized programs will continue on YPG including firing into existing impact areas. However, the proposed 495-acre impact area on the eastern end of Kofa Region will not be established, and BMGR East and West will not used.

Under the Preferred Alternative, USAG YPG will conduct ERCA tests on YPG and BMGR resulting in minor, short-term impacts on a periodic basis. With implementation of all avoidance, minimization, and mitigation measures, impacts to affected resources will be less than significant. Operations 1 through 3 of the Preferred Alternative whether implemented individually or in combination would result in minor contributions to regional trends affecting the evaluated environmental resources.

The Proposed Action-Preferred Alternative will not have a significant direct, indirect, or cumulative impact upon the environment. Accordingly, the requirements of the National Environmental Policy Act, regulations promulgated by the President's Council on Environmental Quality, and Title 32 Code of Federal Regulations Part 989 are fulfilled, and an environmental impact statement is not required.

Conclusion

U.S. Army Yuma Proving Ground (Lead NEPA Agency)

Based on the analysis presented in the EA, establishment of a new impact area on USAYPG as well as use of existing operational areas on BMGR East and BMGR West associated with the ERCA Project will not result in significant environmental impacts. Therefore, preparation of an Environmental Impact Statement is not required and a Finding of No Significant Impact is the appropriate decision document to conclude the NEPA process.

I concur with the findings and analyses documented in the Environmental Assessment and hereby approve the Finding of No Significant Impact.

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GORDON K. ROGERS — Date
Garrison Manager

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Date: 2017.08.30 16:43:39 -07'00'

ROSS C. POPPENBERGER — Date
COL, EN
Commanding

Conclusion

Marine Corps Air Station Yuma (Cooperating NEPA Agency)

Based on the analysis presented in the EA, establishment of a new impact area on USAYPG as well as use of existing operational areas on BMGR East and BMGR West associated with the ERCA Project will not result in significant environmental impacts. Therefore, preparation of an Environmental Impact Statement is not required and a Finding of No Significant Impact is the appropriate decision document to conclude the NEPA process.

I concur with the findings and analyses documented in the Environmental Assessment and hereby approve the Finding of No Significant Impact.

20170623

RICARDO MARTINEZ
COL, United States Marine Corps
Commanding

Date

Partial Adoption of Finding of No Significant Impact

Extended Range Cannon Artillery Project

Luke Air Force Base (Cooperating NEPA Agency)

Based on the analysis presented in the EA, the establishment of a new impact area on YPG and use of existing operational areas on YPG for the ERCA Project will not result in significant environmental impacts. Therefore, preparation of an Environmental Impact Statement (EIS) is not required and a Finding of No Significant Impact (FONSI) is the appropriate decision document to conclude the NEPA process for that portion of the EA concerning the ERCA Project on YPG.

The EA for the ERCA Project evaluates the test firing of spin- and fin-stabilized projectiles within existing operational areas on BMGR East and BMGR West. Based on the analysis presented in the EA as well as review of engineering data for spin- and fin-stabilized projectiles, the 56th Fighter Wing at LAFB concurs that the use of existing operational areas on BMGR East and BMGR West for testing of *spin- and fin-stabilized projectiles* will not result in significant environmental impacts. Therefore, preparation of an EIS is not required and a FONSI is the appropriate decision document to conclude the NEPA process for that portion of the EA concerning the test use *of spin- and fin-stabilized projectiles* on BMGR East and BMGR West.

I concur with the findings and analyses documented in the Environmental Assessment and hereby approve the Finding of No Significant Impact for the portion of the ERCA Project occurring on YPG and the portion of the ERCA Project concerning the test firing of spin-stabilized projectiles on BMGR East and BMGR West.

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BROOK J. LEONARD
Brigadier General, USAF
Commander

Date

ENVIRONMENTAL ASSESSMENT
EXTENDED RANGE CANNON ARTILLERY PROJECT

U.S. ARMY GARRISON
YUMA PROVING GROUND

June 2017

U.S. Army Garrison Yuma Proving Ground
Environmental Sciences Division
Yuma, Arizona 85365

Table of Contents

Table of Acronyms

ADEQ	Arizona Department of Environmental Quality
BO	Biological Opinion
BLM	Bureau of Land Management
BMGR	Barry M. Goldwater Range
BMGR East	Barry M. Goldwater Range East
BMGR West	Barry M. Goldwater Range West
DoDI	Department of Defense Instruction
EA	Environmental Assessment
EOD	Explosive Ordinance Disposal
EIS	Environmental Impact Statement
ERCA	Extended Range Cannon Artillery
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
GSA	Ground Support Area
KTM	Kineto Tracking Mounts
LAFB	Luke Air Force Base
MCOC	Munitions Constituents of Concern
MCASY	Marine Corps Air Station Yuma
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
NTAC	North Tactical Range
NWR	National Wildlife Refuge
POLs	petroleum, oils, and lubricants
RCRA	Resource Conservation and Recovery Act
RMO	Range Management Office
SDZ	Surface Danger Zone
SHPO	State Historic Preservation Officer
STAC	South Tactical Range
USFWS	U.S. Fish and Wildlife Service
YPG	Yuma Proving Ground

1.0 Introduction

The primary mission of United States Army Yuma Proving Ground (YPG) is to provide a flexible, responsive, innovative, and diverse set of testing capabilities and services in a desert environment in order to meet the current and future needs of the U.S. Armed Forces.

The Extended Range Cannon Artillery (ERCA) project is a multi-element, multi-phase test program of U.S. Army's next generation 155mm artillery system. Major components of the artillery system include the cannon, gun mount, artillery projectile, and propelling charges. The program would also evaluate integration and performance of the cannon with different platforms (towed and self-propelled). The ERCA Project would test fire extended range artillery projectiles at distances ranging from approximately 55 kilometers (km) to 73 km within the Kofa Region at YPG and at the Barry M. Goldwater Range (BMGR) which is jointly administered by Marine Corps Air Station Yuma (MCASY) and Luke Air Force Base (LAFB).

1.1 Yuma Proving Ground

YPG encompasses approximately 1,309 square miles of the Sonoran Desert in southwestern Arizona (see Figure 1). Defense systems development at YPG requires the use of impact areas such as those within Kofa Region, a 374,605 acre area within YPG. Kofa Region has been heavily used for munitions testing since the early 1950s and was previously used for World War II troop training as well. The region is heavily contaminated with unexploded ordnance and has been previously disturbed. During this time, defined impact areas had not been created and firing was at will. The first documentation YPG has of the current designated impact areas is from an Environmental Impact Assessment prepared in 1978. Impact Areas have been further defined through the NEPA process. In 2016, YPG completed a Programmatic EIS and Record of Decision for Activities and Operations on YPG which identifies all current impact areas. The action allowed YPG to better utilize and manage its existing land mass to accommodate the future test growth of the test center without having to seek additional land mass or assets.

1.2 Barry M. Goldwater Range

BMGR is an approximately 1.7 million acre military aviation training facility composed of airspace and lands located in southwestern Arizona, south of YPG. BMGR is used by LAFB and MCASY to train military aircrews to fly air combat missions for both air-to-ground and air-to-air operations. To a lesser extent, the range is also used for other types of training most of which support or are associated with air combat training. Examples of existing facilities used for training include an auxiliary airfield complex, realistic targets for air-to-ground attack, air-to-air firing ranges, and electronic warfare training ranges.

The eastern portion of the BMGR, known as BMGR East, is assigned to the Secretary of the Air Force and is approximately 1,050,000 acres in size. LAFB operates BMGR East. The western portion of the range, known as BMGR West, is assigned to the Secretary of the Navy and is approximately 700,000 acres in size. MCASY operates BMGR West. Although the Air Force and Marine Corps are the primary users of their respective portions of the BMGR, all aviation branches of the Armed Services use both portions of the range (LAFB 2010). Users of BMGR East for example include Air Force Reserve, Air National Guard, Army National Guard, and aircrews of allied nations.

Non-military uses include federal agencies such as the U.S. Border Patrol that may use the land and airspace for ongoing operations and training. Public uses on BMGR East are limited to Area B a public access area of approximately 130,000 acres located south of MR 3 and East TAC and East of SR 85. Activities include hunting, camping, hiking, site seeing, photography. Public uses on BMGR West is limited to areas east of the Copper Mountains. Recreational activities include geocaching, off-road vehicle usage, hunting camping, picnicking, hiking, sightseeing, and nature observation. Without exception, all BMGR recreation users are required to obtain an access permit for entry to the range.

1.3 NEPA Lead and Cooperating Agencies

YPG is the proponent for the ERCA Project and is the National Environmental Policy Act (NEPA) Lead Agency responsible for evaluating the potential for direct, indirect, and cumulative effects to the natural, cultural, and human environment associated with the proposed action.

LAFB and MCASY were formally invited to participate as Cooperating Agencies pursuant to NEPA regulations at 40 CFR 1501.6. The Cooperating Agencies would provide assistance in further developing alternatives for the testing program at BMGR; provide technical literature and documentation on environmental resources; facilitate and participate in site visits to BMGR; and review and provide comments on the Environmental Assessment.

In a memorandum dated November 10, 2015, YPG invited LAFB and MCASY to participate as a NEPA Cooperating Agency. A memorandum dated December 16, 2015 from the US Air Force Air Education and Training Command authorized LAFB to participate as a NEPA Cooperating Agency. By letter dated May 2, 2016, MCASY accepted the invitation to participate as a NEPA Cooperating Agency. See Appendix H.

1.4 Purpose of the Proposed Action

The purpose of the proposed action is to establish operational areas for the ERCA Project sufficient enough to accommodate test firings of extended range artillery projectiles and to test components of the U.S. Army's next generation 155mm artillery system.

1.5 Need for the Proposed Action

The distance of long-range artillery projectiles under the ERCA Project would range from 55 km to 70 km. The distance of the shots would nearly span the width of YPG. To sufficiently contain 70 km test shots within YPG, the gun position and the impact area would need to be located close to the edge of the opposing boundaries. Currently, there are no existing impact areas located close to the edge of YPG's boundary. Alternatively, long-range test firings would need to be conducted at other weapon testing or training ranges such as BMGR.

Furthermore, with increased complex and lengthy testing missions at YPG, there are on-going conflicts among test programs which routinely compete for use of the impact areas. The proposed action is needed to reduce range use conflicts, reduce scheduling conflicts, and reduce test delays due to lack of available impact areas while increasing test throughput to meet national defense needs.

1.6 Scope of the Environmental Analysis and Decision to be Made

This EA considers the direct, indirect, and cumulative effects of the Proposed Alternative and the No Action Alternative. It was prepared in accordance with the National Environmental Policy Act of 1969 (42 USC 4321 et seq.), Council on Environmental Quality (CEQ) Regulations 40 Code of Federal Regulations (CFR) Parts 1500-1508, and Army Regulation 32 CFR Part 651 (*Environmental Analysis of Army Actions*). A specific requirement for this EA is to appraise the impacts of the Proposed Alternative, including a determination of a Finding of No Significant Impact or a Notice of Intent to prepare an Environmental Impact Statement (EIS).

This EA provides a discussion of the affected environment and the potential impacts to physical, natural, and human environments. The following resources were identified and analyzed for the Proposed Alternative and No Action Alternative:

- Air Quality
- Biological Resources
- Cultural Resources
- Hazardous Materials and Waste
- Land Use
- Noise
- Recreation
- Safety
- Soils
- Water Quality

Recreation is also evaluated as part of the Land Use and Safety chapters. Munitions constituents of concern (MCOC) are evaluated as part of the Hazardous Materials and Waste chapter.

The following environmental resources were not evaluated since the proposed action would not impact or result in negligible impacts:

- **Aesthetics:** With the exception of a new impact area on YPG, the ERCA project would use existing operational areas on YPG and BMGR. The proposed activities on existing operational areas would not result in additional impacts to aesthetics. The vista of the new impact area generally consists of heterogeneous textures and nonlinear form associated with scrub vegetation on desert landscape with varying beige hues. With the exception of observation berms and targets, the new impact area on YPG would retain the existing vista.

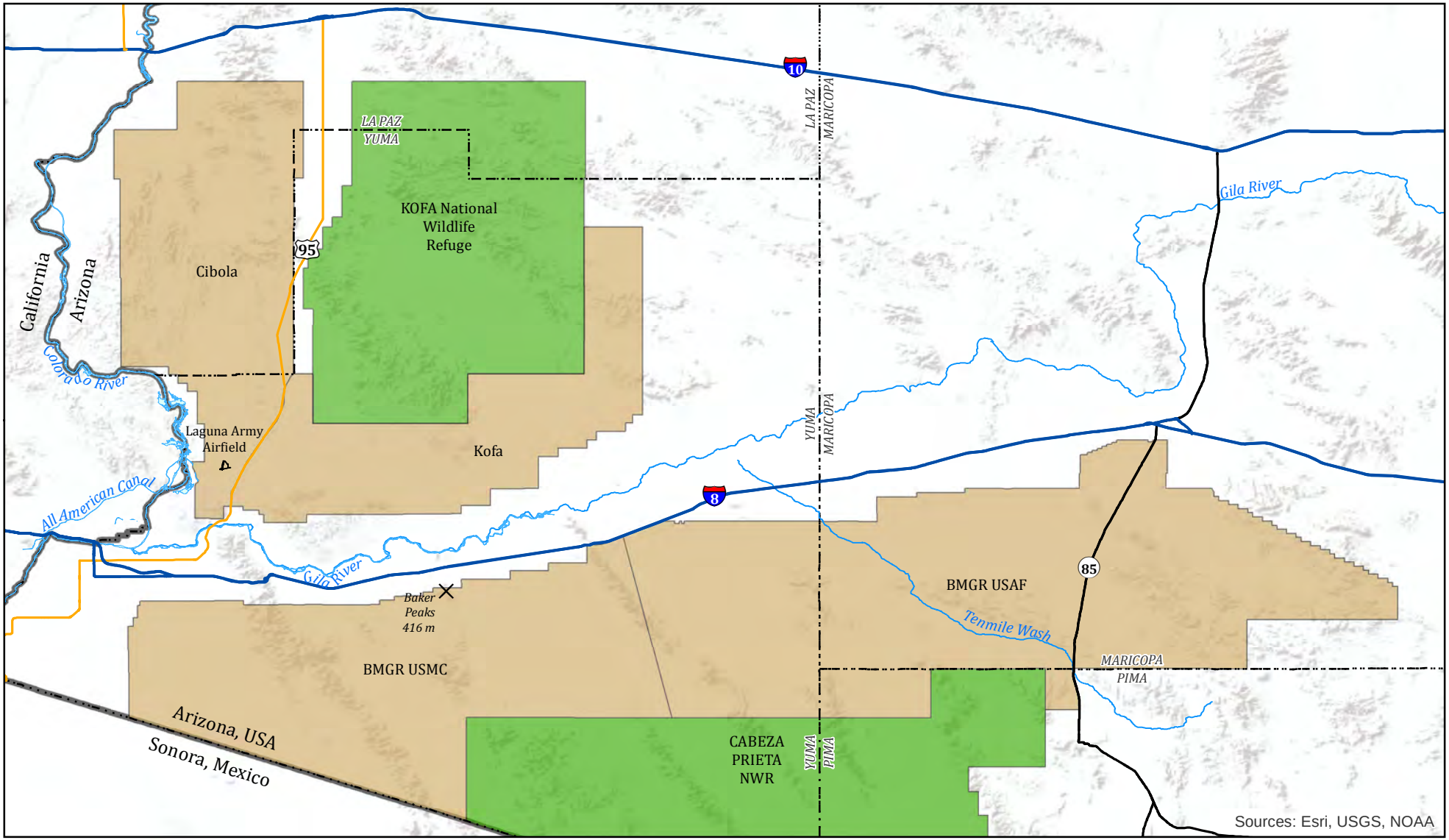
- **Environmental Justice:** The proposed action would be located on existing military installations. Furthermore, the proposed action areas within the installations are located at sufficient distances from populated areas such that there would be no disproportionate impacts to low income or minority populations: North Tactical Range (NTAC) and South Tactical Range (STAC) are located approximately 25 miles from the town of Ajo and 38 miles from the town of Gila Bend. GSAs 71 and 76 are located approximately 36 miles from the city of Yuma. The new impact area on YPG is located approximately 53 miles from the town of Gila Bend. The existing gun position on Cibola Region within YPG is located approximately 24 miles from the city of Yuma.

- **Socioeconomics:** The ERCA project would utilize existing YPG technical and military personnel. The proposed action is not a new major military program or a major expansion of existing military programs or infrastructure that could induce additional growth of the local and regional economy. The proposed action would not require deployment of mass military personnel; additional staff hiring; construction of additional facilities; or additional support services and personnel. Thus, there would be no impacts to socioeconomics.

- **Utilities, Infrastructure and Traffic:** The proposed action is not a new major military program or a major expansion of existing military programs or infrastructure that could induce additional growth of the local and regional economy. There would be no short-term or long-term impacts to traffic levels and patterns. Temporary impacts to traffic for ERCA-related activities are assessed under the Safety section (see Section 3.8). With the exception of a new impact area on YPG, the ERCA project would use existing operational areas and roads on YPG and BMGR. Infrastructure would be limited to construction of observation mounds and access roads on the new impact area at YPG. Mobile generators would provide power for support equipment at the gun position. No permanent utilities would be required for the proposed activities. Thus, there would be no impact to utilities.

ARIZONA/CALIFORNIA WGS 84 1:1,100,000 YUMA PROVING GROUND, U.S. ARMY TEST AND EVALUATION COMMAND Data Current as of APRIL 2017/WO #971

REGIONAL PROJECT AREA MAP



Distribution Statement A
Approved for public release;
Distribution is unlimited

Legend

- Summit
- River/Wash
- Military Range
- Wildlife Refuge
- County Boundary
- State Boundary

1:1,100,000

0 10 20 30 40 50 Kilometers

0 10 20 30 40 50 Miles

N W E S

2.0 Description of the Proposed Action and Alternatives

2.1 Description of the Proposed Action

The ERCA Project would test fire extended range artillery projectiles within YPG and on BMGR West and BMGR East. On YPG tests may occur for an indefinite period. On BMGR, the duration of the test would initially be two years and would only be extended with authorization from LAFB and MCASY.

Three tests per year are anticipated at each location for a total of six tests per year. The duration of a typical test would be approximately seven days: three days for mobilization, two days for test firings, and two days for demobilization. Approximately 12 rounds would be fired each of the two test-firing days. Consequently, approximately 24 rounds would be fired per event and 72 rounds would be fired per year. A survey crew consisting of YPG test personnel would access the target subsequent to the conclusion of each firing, if possible. In total, the survey crew would access targets approximately 3 times per year.

Fin-stabilized and spin-stabilized projectiles would be utilized. Spin-stabilized projectiles require an approximately 6 km-wide surface danger zone (SDZ) whereas fin-stabilized projectiles may require an approximately 26 km-wide SDZ. The SDZ for fin-stabilized projectiles could be recalibrated to narrower widths as the weapon is further characterized and proved through testing evolutions.

Both inert and high explosive warheads would be tested on YPG. Tests conducted on BMGR East and West would be limited to use of inert warheads.

An existing gun position would be used for tests on YPG. Temporary gun positions on BMGR West would be established within Ground Support Areas (GSAs) 71 and 76 for tests on BMGR (see Figures 3 and 4). Gun positions would be generally semicircular in shape with an approximately 60 m radius, encompassing approximately 1.5 acres. Once established, the site would serve as multi-purpose use locations for gun emplacement; emplacement of data collection equipment; and emplacement of support vehicles and equipment such as mobile temperature conditioning chambers for the artillery projectiles and blast shields.[1] No permanent infrastructure or utilities would be required for the establishment and use of the gun positions.

2.1.1 Testing Regime at YPG

The weapon would fire from an existing gun position on the southern end of Cibola Range. Fin- or spin-stabilized projectiles would be fired approximately 55 km northward to existing impact areas within the Cibola Range. Spin-stabilized projectiles would be fired approximately 67-70 km eastward to a new 495-acre impact area on the Kofa

[1] Example of data collection equipment includes Kineto Tracking Mounts, radars, metrological instrumentation, telemetry antennas and/or various other sensors.

Region. Both inert and high explosive warheads would be used. Two new observation mounds for stationing of instrumentation (telemetry receivers, radars, etc.) may be constructed outside the new impact area. Based on the design of similar observation mounds, these would be compressed earth with fill obtained from the immediate surroundings. The dimensions would be approximately 8 meters high, 8 meters wide, and 12 meters long on the top with base dimensions of approximately 27 meters by 100 meters. Each mound would have a single access road.

Standard safety protocols require use of a statistically developed SDZs along the line of fire designed to contain the munition impact in the event it veers off course or fragments midflight as a result of launch or flight malfunction. The eastward line of fire on YPG would require additional scheduling consideration and coordination due to the SDZ crossing other facilities and jurisdictions including manned facilities on YPG, Highway 95, and Kofa National Wildlife Refuge (NWR). Activation of the SDZ along this line of fire would prompt temporary evacuation of manned facilities, closure of Highway 95, and coordination with the Kofa NWR to mitigate hazards to personnel for the duration of each test. As such, scheduling may be limited to low traffic periods and avoid high visitation periods for Kofa NWR. In the event that the munition veers off course, the test team would use tracking radar data to determine impact location. The decision to recover the munition would depend on terrain, physical accessibility, technical requirement for failure analysis and the proper approvals if it lands in a jurisdiction other than YPG.

2.1.2 Testing Regime at BMGR

Testing would be limited to inert warheads. Temporary gun positions would be established on BMGR West within GSAs 71 and 76 (see Figures 3 and 4). From these gun positions, fin or spin-stabilized projectiles would be fired at existing targets within NTAC and STAC.

Standard safety protocols require use of a statistically developed SDZ along the line of fire designed to contain the munition impact in the event it veers off course or fragments midflight as a result of a launch or flight malfunction. The eastward line of fire on BMGR East or West would require additional scheduling consideration and coordination due to the SDZ emanating at BMGR West and terminating at BMGR East. Activation of the SDZ along this line of fire would require temporary closure of any access roads that enter the SDZ. In order to avoid conflicts with use of air space over BMGR, ERCA test firings would be limited to periods when aircraft operations are not scheduled such as weekends at both BMGR East and West.

On BMGR East, munitions would be directed at Targets 106 or 111 in NTAC and Targets 208, 211 or 215 in STAC with Targets 106 and 208 preferred. There are no cultural resources within a 500- foot radius of the targets (see Figures 3 and 4). Impacts to sensitive biological resources such as the Sonoran Pronghorn would be avoided or minimized through implementation of LAFB's Operation Instruction 13-01. Observation mounds would not be constructed within NTAC or STAC. Instead, a survey

party would travel to the target array to assess accuracy/precision of fire and to perform projective recovery operations as need in close coordination with BMGR East personnel including explosive ordnance disposal personnel (EOD) and cultural staff as appropriate. Projectile recovery would occur on an as needed basis and YPG would follow range procedures identified by BMGR East or West on a case by case basis. Mobile data collection equipment such as radars and telemetry units would be stationed on existing roads. In order to avoid conflicts with use of air space over BMGR, ERCA test firings would be limited to periods when aircraft operations are not scheduled such as weekends at both BMGR East and West.

In the event that munitions veer off course during flight or land short of the intended target, recovery operations may be undertaken based on terrain, physical accessibility, technical requirement for failure analysis and compliance with range procedures for BMGR West or East. Recovery efforts would make use of existing roads to the extent practicable. If the impact site is inaccessible or munition recovery is impractical, a survey team would use helicopters to locate the munition and record the impact location. A standardized recovery plan would be developed in coordination with MCASY and LAFB to ensure full compliance with range procedures at BMGR East and West.

2.1.3 Designation of a New Multiple Use Impact Area at YPG

A new 495-acre impact area would be established near the southeast corner of the Kofa Region near the Palomas Mountains at YPG. The new impact area would function as a multi-purpose, multi-use impact area for other test missions that may run concurrently with or subsequent to the ERCA Project. The site would support testing of mines, networked munitions, anti-vehicle effects, anti-personnel effects, surveillance systems, demolition charges, indirect and direct fire weapon systems and munitions for various air-to-ground, ground-to-ground, ground-to-air, and air-to-air tests.

A variety of munitions to be fired and impacted at this site may include high explosive, illumination, obscurant, non-lethal, and inert warheads. Ballistic munitions include small arms, mines, networked munitions, anti-vehicle effects, anti-personnel effects, demolition charges, aerial guided/unguided bombs, mortars, artillery, and tank. These munitions may range in size from 5.56mm to 203mm. Both foreign and domestic rockets would be also utilized, ranging in size from 20mm up to 240mm. Guided missiles, both foreign and domestic would also be fired and impacted at this site, ranging in size from 20mm with warheads weighing less than 10 pounds, to warheads weighing in excess of 60 pounds. Specialized munitions such as Dual Purpose Improved Conventional Munitions, cluster munitions, flares, illumination, chaff, etc. could also be fired or dispensed during testing.

A variety of stationary targets would be used during testing. The targets would be constructed of common construction materials such as cloth, metal, wood, masonry, etc. Targets would be emplaced as needed on a test-by-test basis, and removed after each test.

Impacts associated with other test missions unrelated to the ERCA project within the new 495-acre impact area are evaluated under Operation 1 throughout this EA. In general, potential impacts associated with other test missions would be similar to those characterized for the ERCA project.

2.2 Alternatives

Two alternatives are carried forward for analysis: the No Action Alternative and the Preferred Alternative. The Preferred Alternative encompasses all elements of the Proposed Action as detailed in Section 2.0., pursued under three envisioned operations. The three operations are detailed below in section 2.2.2. thru 2.2.4., which have been determined to be equally viable in accommodating test firings of extended range artillery projectiles and for testing components of the 155mm artillery system. As the Preferred Alternative the ERCA Project will implement any one of or any combination of the three operations during execution of the Project. For simplicity of describing the environmental impacts of the Preferred Alternative, each of the three operations and its impacts are discussed and evaluated individually.

2.2.1 No Action Alternative

Under the No Action Alternative the elements of the ERCA Project that are within the scope of previously authorized programs would continue on YPG including firing into existing impact areas. However, the distance of the test firings on YPG would be limited and the ERCA Project would not conduct extended range test firings at YPG or BMGR. At YPG, the proposed 495-acre impact area on the eastern end of Kofa Region would not be established. The existing operational areas on BMGR East and West would be not used. A temporary gun positions would not be established at BMGR West. Neither would the ERCA Project fire at selected targets within NTAC and STAC.

2.2.2 Preferred Alternative - Operation 1 (YPG Narrow SDZ)

Spin-stabilized projectiles would be fired from an existing gun position on the southern edge of Cibola Range along a singular line of fire directed 67-70 km eastward to the proposed 495-acre impact area on the eastern end of Kofa Region (see Figure 2). The projectiles could contain either inert or high explosive warheads. The line of fire and the associated 6 km-wide SDZ would cross Highway 95 and the southeast corner of the Kofa NWR near the Castle Dome Mountains. The testing regime described at Section 2.1.1 would be implemented.

2.2.3 Preferred Alternative - Operation 2 (BMGR Wide SDZ)

From temporary gun positions on BMGR West within GSA 76, fin- or spin-stabilized projectiles would be fired approximately 67-73 km eastward along a singular line of fire towards existing targets in NTAC (see Figure 3). The projectiles would only deliver inert warheads. The testing regime described at Section 2.1.2 would be implemented.

2.2.4 Preferred Alternative - Operation 3 (BMGR Narrow SDZ)

From temporary gun positions on BMGR West within GSA 71, spin-stabilized projectiles would be fired approximately 67-73 km eastward along two different lines of fire towards existing targets in either NTAC or STAC (see Figure 4). The projectiles would only deliver inert warheads. The testing regime described at Section 2.1.2 would be implemented.

Table 1: Comparison of Operations under the Preferred Alternative

Operation	Test Location	Gun Position Location	Projectile Stabilization	SDZ Width (km)	Warhead	Firing Distance (km)	Construct Observation Mounds?	Target Location
Operation 1	YPG	Cibola Region	Spin	6	Inert/HE	67-70	Yes	New Impact Area on Kofa Region
Operation 2	BMGR	BMGR West Within GSA 76	Fin and Spin	26	Inert	67-73	No	NTAC
Operation 3	BMGR	BMGR West Within GSA 71	Spin	6	Inert	67-73	No	NTAC and STAC

2.3 Alternatives Considered and Eliminated from Detailed Study

The following alternatives on YPG were considered for the proposed action but were eliminated from further consideration due to safety considerations.

2.3.1 South Fire Trajectory

Under the South Fire Trajectory Alternative, the entire fire trajectory would be contained within Cibola Range. From an existing gun position on the northern edge of the range, firings would be directed into the south end of Rocket Alley Impact Area. However, the gun position would be located beyond the northern boundary of the special use airspace for Cibola Range. Furthermore, the trajectory would traverse special use airspace reserved for aerostats.

2.3.2 Northeast Fire Trajectory

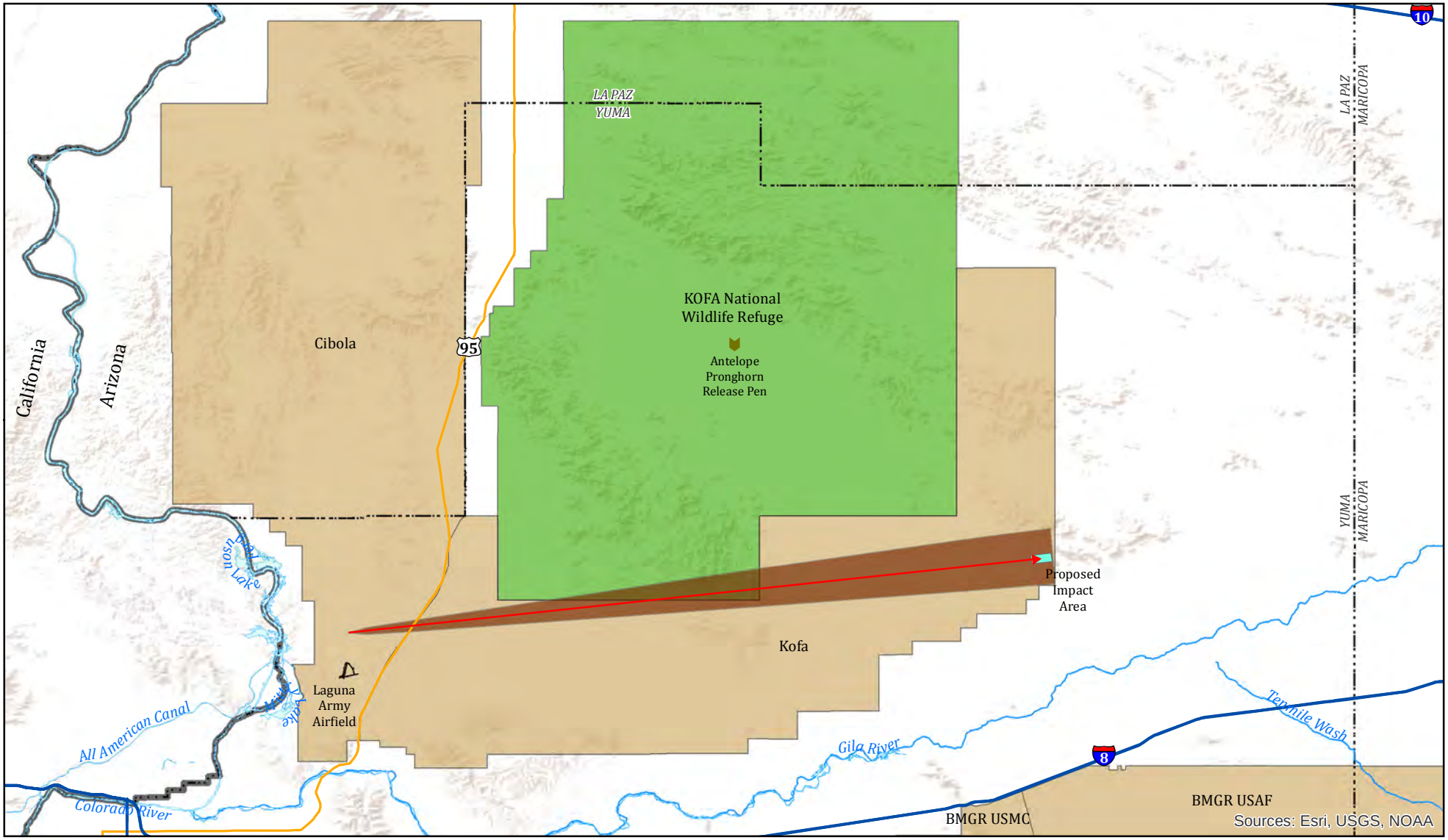
Under the Northeast Fire Trajectory Alternative, the cannon would be located on GP2, an existing gun position near the southwest corner of Kofa Region. Firings would be directed northeast to an impact area on the northern portion of Kofa Region East Arm. However, most of the fire trajectory would cross the Kofa Refuge. There would be constraints on the ERCA Project as a result. Long-range firings must avoid hunting season or any other times when there may be visitors in parts of the Kofa Refuge underneath the trajectory. Moreover, the associated SDZ would be sufficiently large such that protocol helicopter flyovers to clear the area of visitors before test firings would be insufficient.

2.3.3 Northwest Fire Trajectory

Under the Northwest Fire Trajectory Alternative, the cannon would be located on the western edge of Kofa Region. Firings would be directed northwest to an impact area near the northern edge of the special use airspace boundary of Cibola Range. The trajectory would traverse special use airspace reserved for aerostats.

ARIZONA/CALIFORNIA WGS 84 1:650,000 YUMA PROVING GROUND, U.S. ARMY TEST AND EVALUATION COMMAND Data Current as of APRIL 2017/WO #971

Operation 1
YPG NARROW SDZ



Legend

- Antelope Pronghorn
- Chart Azimuth
- River/Wash
- Proposed Impact Area
- SDZ
- County Boundary
- State Boundary

1:650,000

0 10 20 30 Kilometers

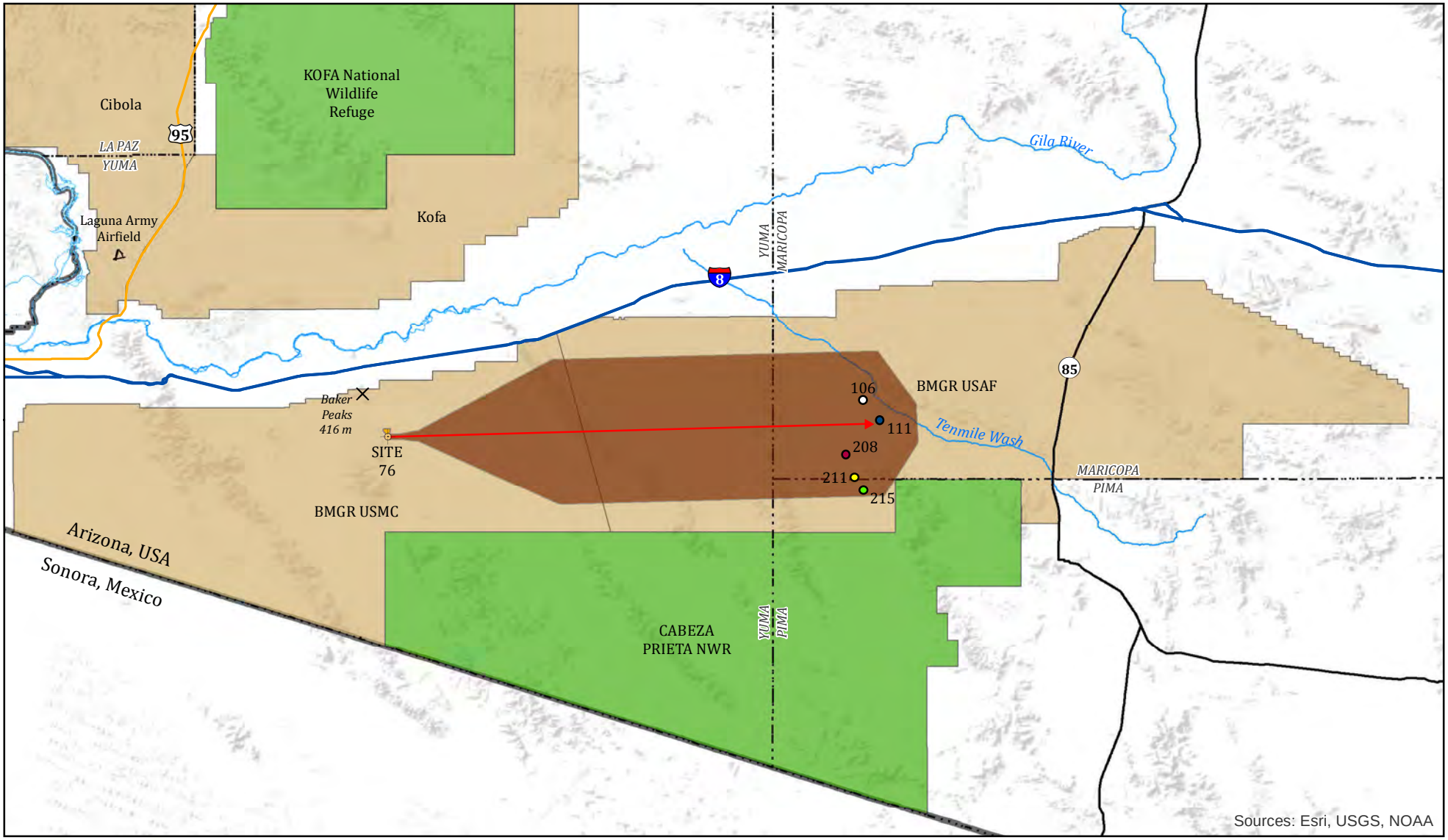
0 10 20 30 Miles

N W E S

Distribution Statement A
Approved for public release;
Distribution is unlimited

ARIZONA/CALIFORNIA WGS 84 1:1,000,000 YUMA PROVING GROUND, U.S. ARMY TEST AND EVALUATION COMMAND Data Current as of APRIL 2017/WO #971

Operation 2
BMGR WIDE SDZ



Legend

- GP
- Target 106
- Target 111
- Target 208
- Target 211
- Target 215
- LOF
- River/Wash
- GSA Baker Peaks
- SDZ
- County Boundary
- State Boundary

1:1,000,000

N W E S

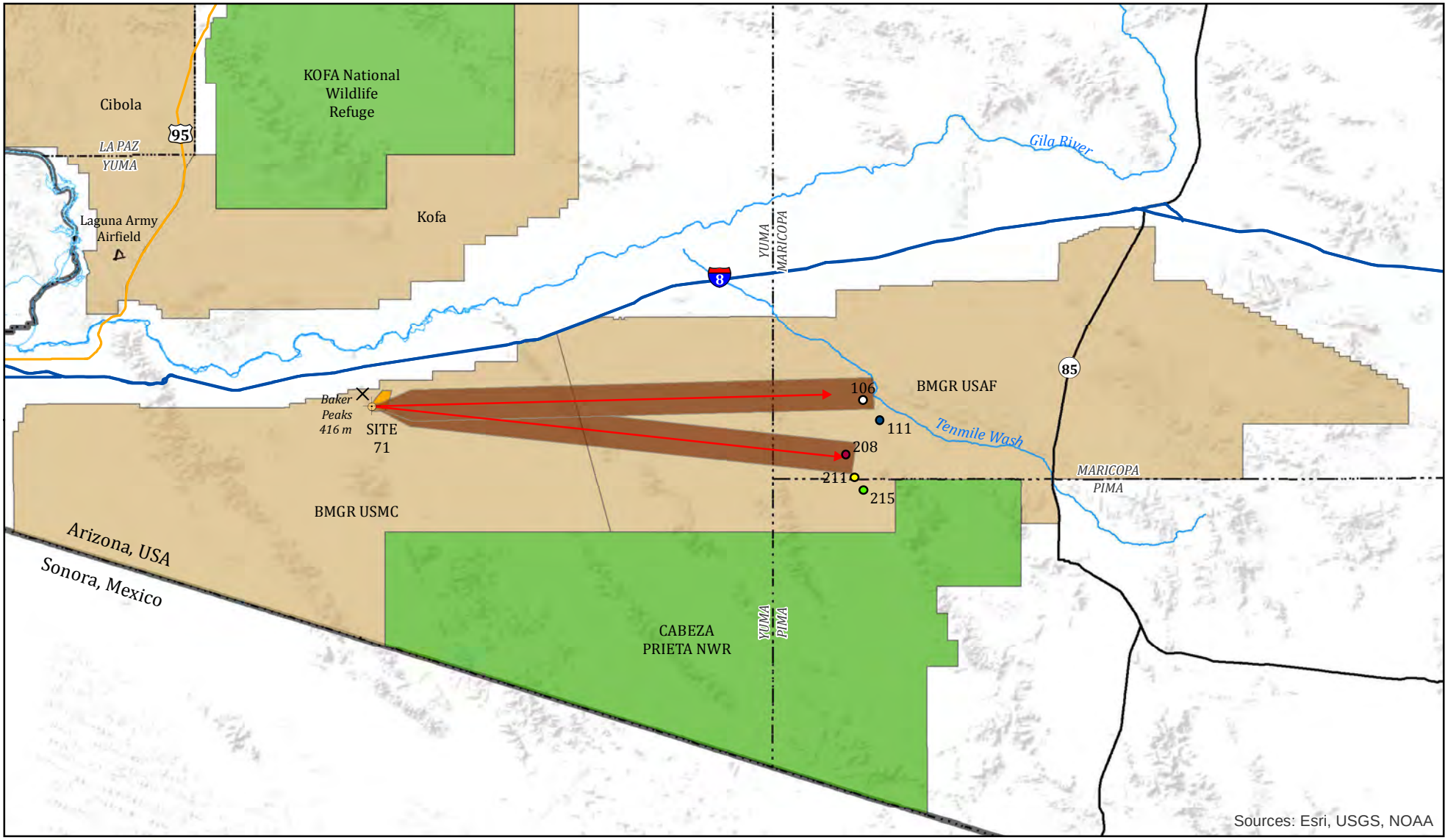
0 10 20 30 40 50 Kilometers

0 10 20 30 40 50 Miles

Distribution Statement A
Approved for public release;
Distribution is unlimited

ARIZONA/CALIFORNIA WGS 84 1:1,000,000 YUMA PROVING GROUND, U.S. ARMY TEST AND EVALUATION COMMAND Data Current as of APRIL 2017/WO #971

Operation 3 BMGR
NARROW SDZ



Legend

- GP
- Target 106
- Target 111
- Target 208
- Target 211
- Target 215
- LOF
- River/Wash
- GSA Baker Peaks
- SDZ
- County Boundary
- State Boundary

1:1,000,000

N W E S

0 10 20 30 40 50 Kilometers

0 10 20 30 40 50 Miles

Distribution Statement A
Approved for public release;
Distribution is unlimited

3.0 Affected Environment and Environmental Effects

3.1 Air Quality

3.1.1 Affected Environment

National Ambient Air Quality Standards
The Clean Air Act identified and established the National Ambient Air Quality Standards (NAAQS) for a number of criteria pollutants in order to protect the public health and welfare. The criteria pollutants include ozone (O_3), carbon monoxide (CO), suspended particulate matter (PM), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and lead (Pb). PM emissions are regulated in two size classes: Particulates up to 10 microns in diameter (PM_{10}) and particulates up to 2.5 microns in diameter ($PM_{2.5}$).

A region is given the status of “attainment” or “unclassified” if the NAAQS have not been exceeded. A status of "nonattainment" for particular criteria pollutants is assigned if the NAAQS have been exceeded. Once designated as nonattainment, attainment status may be achieved after three years of data showing non-exceedance of the standard. When an area is reclassified from nonattainment to attainment, it is designated as a “maintenance area,” indicating the requirement to establish and enforce a plan to maintain attainment of the standard.

The Arizona Department of Environmental Quality (ADEQ) has adopted the NAAQS (http://www.epa.gov/air/criteria.html) as the Arizona Ambient Air Quality Standards, and the ADEQ Air Quality Division regulates and enforces these standards in Arizona.

National Ambient Air Quality Standards Attainment Status

YPG and BMGR West are located within Yuma County while BMGR East is located in Maricopa County and Pima County. NTAC is located within Maricopa County. STAC is split between Maricopa and Pima Counties.

Yuma County is in attainment for all criteria pollutants with the exception of PM_{10}. Portions of Yuma County were designated a moderate nonattainment area for the 24-hour standard of PM_{10}. Mobile emission sources, such as vehicular and agricultural equipment emissions, and blowing dust are the primary contributors to PM_{10} emissions in this region. The Yuma PM_{10} nonattainment area is located in the southwestern potion of Yuma County comprising about 300,000 acres. The nonattainment area encompass primarily agricultural areas near the city of Yuma, west of the proposed action area. Per 40 CFR 81.303, these areas are defined as

- Township 7S, Ranges 21 and 22W,
- Township 8S, Ranges 21-24W,
- Township 9S, Range 21-25W, and
- Township 10S, Ranges 21-25W

A small portion of YPG is located in Township 7S, Range 21W and is within the Yuma PM_{10} nonattainment area. However, the existing gun position in the Cibola Range is located north of the nonattainment area at Township 6S, Range 21W. The proposed impact area is located east of the nonattainment area at Township 52, Range13W.

A portion of BMGR West from the Gila Mountains to the west is within the Yuma nonattainment areas of Township 9S, Range 21; Township 9S, Range 22, Township 10S, Range 21, and Township 10S, Range 22. The proposed temporary gun position at BMGR is located east of the nonattainment area at Township 9S, Range 17W.

Portions of Maricopa County have been designated as being in nonattainment for three pollutants: particulate matter (PM_{10}), carbon monoxide (CO) and ozone (O3) (Maricopa 2005). The majority of the nonattainment areas are located to the north east of BMGR East around the Phoenix metropolitan area. A nonattainment area for PM10 is located on the Tohono O'odham Nation in Township 12S, Range 6W.

Portions of Pima County traversing the southeast boundary of BMGR East have been designated as being in maintenance for sulfur dioxide (SO2) and nonattainment for PM_{10}. The area encompassing Township 12S, Range 6W is in maintenance for SO2. The following areas are in nonattainment for PM_{10}: Townships 11S-13S, Range 6W and Townships 11-12S, Range 5W. NTAC and STAC are located west of the nonattainment areas.

General Conformity Rule

Section 176(c) of the federal Clean Air Act states that a federal agency cannot issue a permit for, or support an activity within, a nonattainment or maintenance area unless the agency determines it will conform to the most recent U.S. Environmental Protection Agency-approved State Implementation Plan. Thus, a federal action must not:

- Cause or contribute to any new violation of a NAAQS.
- Increase the frequency or severity of any existing violation.
- Delay the timely attainment of any standard, interim emission reduction, or other milestone.

A conformity determination is required for each criteria pollutant or precursor where the total of direct and indirect emissions of the criteria pollutant or precursor in a nonattainment or maintenance area caused by the federal action would equal or exceed the General Conformity de minimis rates specified in 40 C.F.R. 93.153. Since all operational areas are in attainment for all NAAQS, emissions from the proposed test firings are exempt from the Clean Air Act General Conformity Rule. Though exempt, the General Conformity de Minimis Rates are used in this document for the purpose of evaluating air quality impacts under NEPA.

Greenhouse Gas Emissions

Gases that trap heat in the atmosphere are often called greenhouse gases (GHG). GHGs are emitted by natural processes and human activities. Examples of GHGs that

are produced both by natural processes and industry include carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O). Currently, there are no Federal standards for GHG emissions and no Federal regulations have been set at this time, though the CEQ has issued draft guidance on the consideration of GHG emissions, entitled Revised Draft Guidance on the Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in NEPA Reviews, dated December 24, 2014, and published at 79 Federal Register 77801. This draft guidance establishes a recommended reference point of 25,000 metric tons of annual CO2 emissions as warranting further review.

3.1.2 Environmental Consequences

Impacts would be considered significant if the alternative results in:

- Long term emissions that would equal or exceed the General Conformity de minimis rates specified in 40 C.F.R. 93.153.

3.1.2.1 No Action Alternative

Under the No Action Alternative the ERCA Project would not conduct long-range test firings at YPG or BMGR. At YPG and BMGR, there would be no emissions from vehicle and generator engines at the gun position and impact area. There would be no dust emissions from vehicles using unpaved roads. At BMGR, temporary gun positions would not be established; at YPG, observation mounds would not be constructed .Thus, there would be no emissions from construction equipment (e.g., graders, loaders or bulldozers) or fugitive dust from earthmoving operations.

3.1.2.2 Preferred Alternative - Operation 1 (YPG Narrow SDZ)

Spin-stabilized projectiles would be fired from an existing gun position on the southern edge of Cibola Range along a singular line of fire directed 70 km eastward to the proposed 495-acre impact area on the eastern end of Kofa Region. There would be localized increases in dust and air emissions during the testing period.

Construction of observation mounds would typically require a grader, loader, tractor, and water truck operating eight hours per day for two days. Vehicles at the gun position would consist of four instrumentation vans, 10 pickup trucks, four generators, and four additional generators for the ammunition conditioning chambers. All generators would operate twenty four hours per day for seven days. Remote tracking vehicles would consist of one instrumentation van and one pickup truck while the survey party would consist of four pickup trucks. All vehicles would travel approximately 100 round trip miles to their respective destinations. The number, types, and usage of equipment required for the ERCA Project would be generally similar to those that would be used for other testing activities on the proposed 495-acre impact area.

Use of supporting vehicles and generators at the gun position and impact area as well as transport of armament and other equipment would result in temporary emissions

from gasoline or diesel engines. Vehicles travelling to and from the gun position and impact areas on unpaved roads would result in temporary fugitive dust emissions. Construction of observations berms would result in diesel emissions from construction equipment as well as fugitive dust from earthmoving work. Emissions would cease upon conclusion of the test firings. Thus, there would be periodic emission of criteria pollutants. However, the emissions would not exceed applicable General Conformity de minimis rates as shown in Table 2. As a result, impacts would be less than significant.

The number, types, and usage of equipment required for the ERCA Project would be generally similar to those that would be used for other testing activities on the proposed 495-acre impact area. Thus, there would be periodic emission of criteria pollutants. However, the emissions would not exceed applicable General Conformity de minimis rates as shown in Table 2 (see Appendix A for calculations). As a result, impacts would be less than significant.

Table 2: Estimated Emissions of Criteria Pollutants

Criteria Pollutant	General Conformity De Minimis Rates (metric tons/year)	Estimated Annual Emissions Test Firings on YPG and BMGR (metric tons/year)	Estimated Daily Emissions Test Firings on YPG and BMGR (pounds/day)	Estimated Annual Emissions Berm Construction on YPG (metric tons/year)	Estimated Daily Emissions Berm Construction on YPG (pounds/day)
Ozone (VOC)	10	0.00	0.00	0.00	0.15
CO	100	0.00	0.03	0.00	0.83
NO2	100	0.00	0.02	0.00	1.01
SO2	100	0.00	0.00	0.00	0.00
PM10	100	0.00	0.00	0.00	0.05
PM2.5	100	0.00	0.00	0.00	0.00
Pb	25	*	*	*	*

* Estimates of lead emissions were not calculated. Lead emissions from mobile sources significantly decreased due to the near elimination of lead in fuels. Thus, there are no emission factors available for mobile sources.

Table 3: Estimate Emissions of Greenhouse Gasses

CEQ GHG Guidelines (metric tons/year)	Estimated Emissions (metric tons/year)
25,000	0.1

General Conformity Analysis

The proposed action is located outside of designated maintenance and nonattainment areas. Thus, a General Conformity analysis is not required.

GHG Emissions

As shown in Table 3, GHG emissions did exceed CEQ recommended reference point of 25,000 metric tons of annual CO2 emissions as warranting further review.

3.1.2.3 Preferred Alternative - Operation 2 (BMGR Wide SDZ)

In general, impacts would be similar to those characterized for Operation 1 (YPG Narrow SDZ). However, observation mounds would not be constructed within NTAC. There would be minor periodic emission of criteria pollutants associated with the use of test support vehicles. The emissions would neither be long term nor would they exceed General Conformity de minimis rates. Based on the above, impacts would be less than significant.

General Conformity Analysis
The proposed action is located outside of designated maintenance and nonattainment areas. Thus, a General Conformity analysis is not required.

GHG Emissions
As shown in Table 3, GHG emissions did exceed CEQ recommended reference point of 25,000 metric tons of annual CO2 emissions as warranting further review.

3.1.2.4 Preferred Alternative - Operation 3 (BMGR Narrow SDZ)

In general, impacts would be similar to those characterized for Operation 1 (YPG Narrow SDZ). However, observation mounds would not be constructed within NTAC or STAC. There would be minor periodic emission of criteria pollutants associated with the use of test support vehicles. The emissions would neither be long term nor would they exceed General Conformity de minimis rates. Based on the above, impacts would be less than significant.

General Conformity Analysis
The proposed action is located outside of designated maintenance and nonattainment areas. Thus, a General Conformity analysis is not required.

GHG Emissions
As shown in Table 3, GHG emissions did exceed CEQ recommended reference point of 25,000 metric tons of annual CO2 emissions as warranting further review.

3.2 Biological Resources

3.2.1 Affected Environment

3.2.1.1 Vegetation

YPG and the portion of BMGR to the west of State Route 85, where the proposed action is located, are within the Lower Colorado Valley Subdivision of the Sonoran Desert. This arid region is characterized by drought-tolerant shrubs, grasses, and cacti on low and gently sloping alluvial fans and terrace areas commonly referred to as bajadas.

Four plant communities primarily present in the proposed action area are:

- **Creosote-Bursage Desert Scrub Community:** This community is primarily dominated by creosote bush with presence of woody and non-woody cacti and rosette succulents that commonly occur on rocky slopes. The vegetation is found on lower bajadas and intermountain basins that are generally flat or on gentle to moderate slopes. Substrate associated with this community is usually sandy or gravelly alluvium.

- **Paloverde-Mixed Cacti-Mixed Scrub Community:** This community has a conspicuous but relatively sparse layer of saguaro cactus. A sparse to moderately dense short tree/tall shrub canopy is also present consisting of paloverde and creosote bush, along with ironwood and ocotillo in lesser prominence. A sparse herbaceous layer dominated by perennial grasses and forbs with seasonal annuals is present. Vegetation is found on rocky slopes of low mountain ranges where soil consists of gravelly alluvium.

- **Valley Bottom Floodplain Complex:** This community is found on nearly flat terrain (valley bottoms) and includes creosote bush, triangle-leaf bursage, white bursage, acacias, paloverdes, mesquites, and annual and perennial grasses. Associated substrate are deep loams and sandy loams.

- **Desert Xeroriparian Scrub Community:** The desert xeroriparian scrub community occurs in association with wash systems. Characteristic vegetation is variable and includes blue paloverde (*Parkinsonia florida*), ironwood (*Olneya tesota*), mesquite and sparse annual grasses and forbes. This community is found in narrow strips alongside linear channels formed by channel constricted flows. Vegetation in this community usually consists of moderate to dense stands of trees and shrubs influenced by ecological process associated with water flow (frequency and amount of flow, channel scouring, etc.). This community is generally located on course textured substrates and gravelly silty loam soils associated with stream channels in bajadas and valley bottoms.

On YPG, the existing gun position on Cibola Range is located on the Castle Dome Plain where Creosote-Bursage Desert Scrub community is present throughout. The proposed 495-acre impact area on KFR is located near the Palomas foothills. Thus, the area likely encompasses a transitional area where both Creosote-Bursage Desert Scrub Community and Paloverde-Mixed Cacti-Mixed Scrub Community are present.

On BMGR West, the vegetation association throughout the area in the vicinity of Mohawk Mountains where the TGPs would be located in Creosote-Bursage/Paloverde-Ironwood fans and pavement. On BMGR East, NTAC lies within the Childs Valley as well as a portion of the Crater Range to the east and a portion of the Aguila Mountains to the west. The Crater Range is located to the north and the Aguila Mountains to the west. STAC lies within the Growler Valley, and is bounded on the East by the Growlers Mountains, and on the southwest by the Granite Mountains, as well as portions of the

Crater Range, Aguila Mountains to the north, and Granite Mountains to the southeast, northwest, and southwest, respectively. Within both ranges, the Creosote-Bursage Desert Scrub Community is present within the valley while Paloverde-Mixed Cacti-Mixed Scrub Community is present on the bajadas and rocky slopes of the mountains. In addition, the Valley Bottom Floodplain Complex is present within the Growler Wash where it traverses STAC.

3.2.1.3 Wildlife

Wildlife on YPG and BMGR is typical of the Sonoran Desert scrub habitat. Numerous mammal, reptile, and bird species typical of the Sonoran Desert are present within the area of the proposed action (Sullivan 2015).

- **Large Mammals:** Common large mammals include the desert bighorn sheep (*Ovis canadensis nelson**)***, mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), kit fox (*Vulpes macrotis*), gray fox **(***Urocyon cinereoargenteus***)**, badger (*Taxidea taxus*), bobcat (*Lynx rufus*), ringtail (*Bassariscus astutus*), and mountain lion (*Puma concolor*).

- **Small Mammals:** Common small mammals include the rock pocket mouse (*Chaetodipus intermedius*), Merriam's kangaroo rat (*Dipodomys merriami*), black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), woodrats (*Neotoma spp.*), Harris' antelope squirrel (*Ammospermophilus harrisii*), round-tailed ground squirrel (*Spermophilus tereticaudus*), California leaf-nosed bat (*Macrotus californicus*), California myotis (*Myotis californicus*), and canyon bat (*Pipistrellus hesperus*).

- **Reptiles:** Common reptile species include the western whiptail (*Cnemidophorus tigris*), side-blotched lizard (*Uta stansburiana*), sidewinder snake (*Crotalus cerastes*), western diamondback rattlesnake (*Crotalus atrox*), coachwhip (*Masticophis flagellum*), and western shovel-nosed snake (*Chionactis occipitalis*).

- **Birds:** A wide variety of bird species in the region, many of which are migratory birds that may breed or winter in other locations. Common birds in the region includethe ash-throated flycatcher (*Myiarchus cinerascens*), Audubon's warbler (*Setophaga coronate*), black-tailed gnatcatcher (*Polioptila melanura*), black-throated sparrow (*Amphispiza bilineata*), Brewer's sparrow (*Spizella breweri*), Eurasian collared dove (*Strepropelia decaocto*), Gambel's quail (*Callipepla gambelii*), LeConte's thrasher (*Toxostoma lecontei*), loggerhead shrike (*Lanius ludovicianus*), northern rough-winged swallow (*Stelgidopteryx serripennis*), phainopepla (*Phainopepla nitens*) and red-tailed hawk (*Buteo jamaicensis*).

- **Amphibians:** The red-spotted toad (*Bufo punctatus*) as well as other amphibians may be present in the mountains at NTAC and STAC.

Sensitive wildlife include:

- **Sonoran Desert Tortoise:** Scattered populations of Sonoran Desert Tortoise (*Gopherus morafkai*) occur throughout the mountainous regions of BMGR East and West. Their habitat mostly consists of rocky slopes and bajadas where there are adequate shelter sites or burrowing substrate. This tortoise generally increases in abundance east of SR 85 on BMGR East (John Arnett pers comm). On YPG, tortoise may be found in the mountainous regions of north Cibola and the East Arm (YPG INRMP 2012). Surveys of the proposed new impact area on YPG indicate that overall habitat quality in the project area is poor to moderate. No tortoise or tortoise sign were observed (Sullivan 2015).

  Sonoran Desert tortoise was a candidate species pursuant to the Endangered Species Act (ESA), but has since been removed from candidate status and is now managed under a Candidate Conservation Agreement between U.S. Fish and Wildlife Service (USFWS) and several other federal state and local agencies including the US Army, Air Force, and Marine Corps.

- **Golden Eagles:** Golden eagles are protected by the Bald and Golden Eagle Protection Act. Golden Eagles nests have been found in mountainous areas along NTAC and STAC on BMGR East within the Aguila mountain range. On YPG, large stick nests similar to eagle nests have been found, however, it is difficult to determine if these structures were made by eagles or red-tailed hawks. (Sturla 2014) There is potential nesting habitat for Golden Eagles on YPG, and eagles have been seen in flight over the range (Sullivan 2015). Eagles may be found flying over large parts of the range as the forage for jackrabbits, ground squirrels and other prey animals. Eagles also pass through the region during migration.

- **Desert Bighorn Sheep:** Desert Bighorn Sheep (*Ovis canadensis nelson*) are considered a Species of Greatest Conservation Need (SGCN) Tier 1(b). They occupy mountainous terrain throughout the project area on both BMGR and YPG. Tracks and scat of bighorn sheep were found on the proposed new impact area on YPG (Sullivan 2015).

- **Peregrine falcon**: Peregrine falcon (*Falco peregrinus)* are an SGCN tier 1(b) species that can be found in mountainous areas along high cliffs or in flight throughout YPG and BMGR. Nesting is rare in southeastern Arizona with documented nests at Picacho State Park and on the Kofa National Wildlife Refuge. A Peregrine falcon was observed in flight over the proposed impact area on YPG (Sullivan 2015).

Ground disturbance due to military operations has primarily occurred in valley bottom and low hill habitats, so wildlife species that typically occupy creosote bush desert scrub habitats have been exposed to the greatest potential for impacts due to military activities.

Military features within training ranges and at developed facilities sometimes provide artificial wildlife habitat. For instance, elevated military structures are sometimes used as perch sites for raptors and other bird species. Small mammals burrow in target areas where soil has been loosened by target construction and maintenance and/or munitions impacts. Reptiles, small mammals, and invertebrates may use targets (e.g., vehicle bodies, and simulated tanks and structures) and/or munitions debris (e.g., expended munitions casings, and parachutes) for cover. Also, many disturbed sites near targets exhibit green-up of annual vegetation after rain events which attracts some herbivores such as mule deer and Sonoran pronghorn.

3.2.1.3 Threatened, Endangered, and Candidate Species

Threatened, Endangered, or Candidate species within the Proposed Action Area include:

- **Lesser Long-nosed Bat (Endangered):** The Lesser Long-nosed Bat (*Leptonycteris curasoae yerbabuenae*) is a medium sized leaf-nosed bat that feeds on nectar from the flowers of columnar cacti (e.g., saguaro; cardon [*Pachycereus pringlei*]; organ pipe cactus and from paniculate agaves (e.g., Palmer's agave [*Agave palmeri*]). While Lesser Long-nose Bats do occur on BMGR East, their forage plants are mostly found in mountainous areas outside the proposed gun positions or target areas. All three operations under the Preferred Alternative are not likely to adversely affect Lesser Long-nosed Bat.

- **Acuna Cactus (Endangered):** The Acuna Cactus (*Echinomastus erectocentrus var. acunensis*) is a small cactus with straight central spines and a single plump stem that can reach 30 cm in height. The acuna cactus occurs in valleys and on small knolls and gravel ridges of up to 30 percent slope in the Palo-Verde-Saguaro Association of the Arizona Upland subdivision of the Sonoran desert scrub at 1,198 to 3,773 feet in elevation. The Acuna Cactus has been found on BMGR East to the east of NTAC approximately, more than 30 miles from nearest proposed ERCA targets proposed target arrays in NTAC and STAC. The cactus has not been observed at any of the targets.

- **Sonoran Pronghorn (Endangered):** The Sonoran Pronghorn (*Antilocapra americana sonoriensis*) occupy portions of the YPG and BMGR East and West. The Sonoran pronghorn is a subspecies of the American pronghorn and was originally listed as endangered under the Endangered Species Preservation Act of 1966 on February 24, 1967.

    - **YPG:** The USFWS established a Nonessential Experimental Population for Sonoran pronghorn under Section 10(j) of the ESA. The USFWS has released pronghorn from the captive breeding pens onto the Kofa National Wildlife Refuge (NWR) since 2013. Presently, there are more than 72 pronghorn ranging across the King Valley, with some individuals scattering

west as far as Highway 95 and east onto the Palomas Plain (YPG BA 2016). Pronghorn from the experimental population have been observed in portions of the Kofa Region. The Section 10(j) population on the YPG is treated as a species proposed to be listed with respect to ESA compliance. Thus, potential impacts to individuals from this population does not require consultation under Section 7 ESA. In contrast, the Section 10(j) population of the Kofa NWR is treated as a federally threatened species. Thus, potential impacts to this population requires consultation under Section 7 ESA. Per consultation with the USFWS, potential impacts to Sonoran pronghorn on the Refuge have been evaluated in Biological Opinion 02EAAZ00-2014-F-0161 dated September 9, 2014. There is no designated critical habitat for the Sonoran pronghorn.

- **BMGR:** The distribution of Sonoran pronghorn on BMGR encompasses both BMGR West and BMGR East. Starting from BMGR West, between the Copper Mountains and Mohawk Mountains. The distribution extends eastward across the Mohawk Mountains and San Cristobal Valley on BMGR East. The proposed TGP near Baker Peaks is located west of the Sonoran pronghorn distribution.

  Both MCASY and LAFB have separately completed two Section 7 ESA consultations for potential adverse impacts to the Sonoran pronghorn associated with on-going military training and operations on BMGR West and BMGR East, respectively:

  - Biological Opinion for Military Training on the Barry M. Goldwater Range East (22410-1996-F-0094-R004) issued in 2010.

  - Biological Opinion for Ongoing Activities at the Barry M. Goldwater Range West by the Marine Corps Air Station-Yuma (22410-1995-F-Ol 14-R007) issued in 2015.

3.2.2 Environmental Consequences

Impacts would be considered significant if the alternative results in:

- Extirpation of a regional or local species.
- Damages to ecologic processes to the extent that the ecosystem is no longer sustainable or biodiversity is impaired.
- Loss of habitat necessary for all or part of the life cycle such as lambing areas, migratory corridors, or wildlife watering areas.
- Jeopardize the continued existence or recovery of listed species.

3.2.2.1 No Action Alternative

Under the No Action Alternative the ERCA Project would not conduct long-range test firings at YPG or BMGR. At YPG, the proposed 495-acre impact area on the eastern end of KFR and the associated observation mounds would not be established. Thus, there would be no long term impacts to approximately 1.3 acres of vegetation associated with the establishment of two observation mounds south of the proposed impact area. Likewise, there would be no disturbances to wildlife at the impact area. Potential adverse impacts to Sonoran pronghorn within Kofa NWR and Kofa Region would be avoided. The existing gun position at Cibola Range may be used for other types of test firings into existing impact areas. Likewise, other elements of the ERCA Project may continue at YPG under previously authorized programs on existing facilities. Thus, potential impacts to vegetation, wildlife, and Sonoran pronghorn associated with on-going training and testing missions would remain.

At BMGR, temporary gun positions would not be established at BMGR West. Neither would the ERCA Project fire at selected targets within existing air-to-ground target areas (NTAC and STAC). Thus, potential impacts to vegetation, wildlife, and Sonoran pronghorn associated with activities proposed under the ERCA Project would be avoided due to lack of noise, vibration, vehicle use, and ground disturbing activities. Potential impacts to vegetation, wildlife, and Sonoran pronghorn associated with on-going training and testing missions would remain.

3.2.2.2 Preferred Alternative - Operation 1 (YPG Narrow SDZ)

Spin-stabilized projectiles would be fired from an existing gun position on the southern edge of Cibola Range along a singular line of fire directed 70 km eastward to the proposed 495-acre impact area on the eastern end of Kofa Region.

The new impact area would function as a multi-purpose, multi-use impact area for other test missions that may run concurrently with or subsequent to the ERCA Project. The impacts analysis below encompasses the use of the new impact area for the ERCA Project as well as other test missions.

- **Vegetation:** There would be negligible impact to vegetation at the gun position since an existing gun position on the southern edge of Cibola Range would be used. Within Kofa Region, two observation mounds would be established south of the new 495-acre impact area. Construction would require removal of vegetation from an area slightly larger than the approximately 1.3 acre footprint for each site since fill would be borrowed from the immediate surroundings. Bulldozers would scrape vegetation within the footprint and the immediate surroundings. Earthen fill within would be shaped and compacted to design requirements to form the observation mounds. Due to the slow recovery of desert vegetation, disturbance to the vegetation would result in long-term impacts. Furthermore, areas where native vegetation is cleared or where soils

are disturbed are more susceptible to colonization by exotic invasive plant species. However, given the small size of the disturbed area relative to the larger vegetated landscape in the Kofa Region, impacts to vegetation would be minimal. Thus, the vegetation would continue to provide all functions and services required to sustain the ecosystem; essential elements critical for part of the life cycle of a species (e.g., lambing areas, migratory corridors, or wildlife watering areas) would remain intact.

Vegetation would not be removed within the new impact area for other YPG programs except to meet specific testing requirements. Impacts to vegetation within the impact area could result from damage caused by ordinance delivery or demolition such as explosions or fire. Crushing of vegetation due to accessing target areas or recovering rounds is possible. Actual disturbance within the impact area would be limited as most vegetation would be avoided as much as possible.

- **Wildlife:** Vibration, noise and presence of visual forms associated with an active gun position on Cibola Range during tests would temporarily scatter wildlife from the area into the immediate surroundings. The same characterization holds true for construction of the observation mounds on Kofa Region. Animals, such as birds and mammals, may abandon nests or dens in the immediate area of human activities, including abandonment of young. These types of impacts can be minimized by conducting tests outside of the reproductive period, but avoidance of this type would not be practicable for testing activities. The nearly constant level of testing and training conducted on YPG makes it unlikely that animals would nest or den in proximity to areas used for these purposes unless those animals were already acclimatized to increased human activity. Thus, the potential for nest/den abandonment would be minor.

  Use of spin-stabilized projectiles would result in a 6 km wide SDZ. Weapon malfunction may result in a shorter trajectory, projectiles veering off course, in-flight fragmentation, or in-flight separation of the rocket motor from the warhead may result in debris landing within the SDZ corridor. Meteorological conditions or inaccurate modeling could also result in deviations from the intended line of fire. Potential for direct impacts to wildlife from munition or debris strikes within the SDZ is possible but the probability would be low. Targets would not be located at locations where wildlife would congregate (e.g., lambing areas, migratory corridors, or wildlife watering areas). Furthermore, given the vast open space within the target area and the SDZ, the possibility of wildlife being present at specific impact locations at the exact moment of impact is low.

  Based on the above, extirpation of local of species is unlikely. Furthermore, similar activities have not resulted in any appreciable loss of species richness anywhere else on the range.

- **Threatened and Endangered Species (Sonoran pronghorn)**

  - **YPG:** Individual Sonoran pronghorns from the nonessential experimental population on Kofa NWR are present within Kofa Region. Due to its distance from Kofa Region, proposed activities at the existing gun position on Cibola Range would not affect the Sonoran pronghorn. Though unlikely, animals on Kofa Region could be injured or killed by munitions strike or explosions from live ordinance on the ground during test firings. Vehicle strikes along roads leading to the observation mounds is possible. Noise from incoming munitions as well as noise from detonation of high explosive munitions would result in visual and auditory disturbance. These disturbances could affect habitat utilization by occasionally frightening pronghorn from food or water sources. These impacts to behavior can affect the nutrition and body condition of the animals and could reduce survival rates, particularly in times of drought. Other indirect impacts may include habitat alteration due to fire. Short term impacts from loss of foraging area could occur subsequent to wildfires.

    Use of spin-stabilized projectiles would result in the use of a 6 km wide SDZ. Weapon malfunction may result in a shorter trajectory, projectiles veering off course, in-flight fragmentation, or in-flight separation of the rocket motor from the warhead may result in debris landing within the SDZ corridor. Meteorological conditions or inaccurate modeling could also result in deviations from the intended line of fire. Potential for direct impacts to wildlife from munition or debris strikes within the SDZ is possible but the probability would be low. Targets would not be located at locations where wildlife would congregate (e.g., lambing areas, migratory corridors, or wildlife watering areas). Furthermore, given the vast open space within the target area and the SDZ, the possibility of wildlife being present at specific impact locations at the exact moment of impact is low.

    Based on the above, the proposed action May Affect, and Likely to Adversely Affect Sonoran pronghorn on YPG pursuant to the ESA. Sonoran pronghorn population on Kofa Region is part of a Nonessential Experimental Population established under Section 10(j) ESA. Thus, they are treated as a proposed species for the purpose of Section 7 consultation.

  - **Kofa NWR:** The line of fire would briefly traverse one corner of the Kofa NWR boundary located at southern tip of the Castle Dome Mountains. Munitions firing or ordnance deliveries could injure or kill Sonoran pronghorn on the Kofa NWR. However, this is highly unlikely as the proposed impact area is located approximately 17 miles east of the segment where the line of fire would cross the Kofa NWR boundary. The likelihood of ordnance landing within the refuge is low and the likelihood of

munitions hitting and injuring or killing Sonoran pronghorn is even lower given that they regularly move and are not fixed on the landscape.

Use of spin-stabilized projectiles would result in a 6 km wide SDZ. Weapon malfunction may result in a shorter trajectory, projectiles veering off course, in-flight fragmentation, or in-flight separation of the rocket motor from the warhead may result in debris landing within the SDZ corridor. Meteorological conditions or inaccurate modeling could also result in deviations from the intended line of fire. Potential for direct impacts to wildlife from munition or debris strikes within the SDZ is possible but the probability would be low. Targets would not be located at locations where wildlife would congregate (e.g., lambing areas, migratory corridors, or wildlife watering areas). Furthermore, given the vast open space within the target area and the SDZ, the possibility of wildlife being present at specific impact locations at the exact moment of impact is low.

Based on the above and detailed analysis in the Biological Evaluation, the proposed action May Affect, and is Likely to Adversely Affect Sonoran pronghorn on the Kofa NWR pursuant to the ESA. Potential impacts to Sonoran pronghorn in the refuge associated with munitions testing and expansion of impacts areas on the Kofa Range have been evaluated in Biological Opinion 02EAAZ00-2014-F-0161 dated September 9, 2014. The Biological Opinion made the following findings: (1) Expanding the available munitions impact area will not result in increased frequency of munitions firing; however, it will result in additional impacted areas on YPG. In other words, munitions firing is dependent on the demand for testing, not on the area available for testing. (2) Due in part to atmospheric noise attenuation, the pronghorn would perceive artillery noise as part of the background noise due to constant testing and training in the area. (3) Munition-ignited wildfires on Kofa NWR are mostly small and isolated due to the sparse nature of fuels in the area. Based on the above, the USFWS concluded that with continued implementation of conservation measures from the Biological Opinion expansion of impact areas and use of these areas for munitions testing is Not Likely to Jeopardize the continued existence of Sonoran pronghorn and would be in full compliance with the ESA.

3.2.2.3 Preferred Alternative - Operation 2 (BMGR Wide SDZ)

From a temporary gun position on BMGR West near GSA 76, fin- or spin-stabilized projectiles would be fired approximately 67-73 km eastward along a singular line of fire towards existing targets in NTAC.

- **Vegetation:** There would be negligible impact to vegetation at the gun position since gun position would be located on previously disturbed areas near GSA 76. Ordinance impacts would result in small surface craters, ranging from 36 inches

to 54 inches in diameter, within the vicinity of selected targets.[2] Due to the slow recovery of desert vegetation, disturbance to the vegetation would result in long-term impacts to vegetation. Furthermore, areas where soils have been disturbed are more susceptible to colonization by exotic invasive plant species. However, vegetation within the vicinity of existing targets have been previously disturbed from past munitions impacts as well as range maintenance. Furthermore, the number of munitions impacts would be small. Approximately 72 inert rounds would be fired at different targets over the course of each year (see Section 2.1). Last, given the small size of the disturbed area around each target relative to the larger vegetated landscape in NTAC, impacts to vegetation would be minimal. Thus, the vegetation would continue to provide all functions and services required to sustain the ecosystem; essential elements critical for part of the life cycle of a species (e.g., lambing areas, migratory corridors, or wildlife watering areas) would remain intact.

- **Wildlife:** Vibration, noise and presence of visual forms associated with an active gun position on GSA 76 during tests would temporarily scatter wildlife from the area into the immediate surroundings.

  Within NTAC on BMGR East, the possibility of wildlife injury as a result of direct munitions strikes is minimal. Indirect impacts are more likely. Noise from incoming munitions would result in auditory disturbance. Animals, such as birds and mammals, may abandon nests or dens in the immediate area of human activities, including abandonment of young. However, the on-going air-to-ground targeting operations on NTAC makes it less likely that animals would nest or den in proximity to targets. Thus, the potential for nest/den abandonment would be minor. Vehicle strikes along roads leading to the target areas are possible, however, implementing range procedures such as OI 13-01 will reduce that likelihood. Impacts would be limited since there are only six tests per year approximately 72 inert rounds would be fired at different targets over the course of each year (see Section 2.1).

  Use of spin- and fin-stabilized projectiles would result in SDZ widths ranging from 6 km to 26 km, respectively. Weapon malfunction may result in a shorter trajectory, projectiles veering off course, in-flight fragmentation, or in-flight separation of the rocket motor from the warhead may result in debris landing within the SDZ corridor. Meteorological conditions or inaccurate modeling could also result in deviations from the intended line of fire. Potential for direct impacts to wildlife from munition or debris strikes within the SDZ is possible but the probability would be low. Targets would not be located at locations where wildlife would congregate (e.g., migratory corridors, or wildlife watering areas). Furthermore, given the vast open space within the target area and the SDZ, the

[2] Surface craters are typically two to three times larger than the projectile diameter (approximately 18 inches).

possibility of wildlife being present at specific impact locations at the exact moment of impact is low.

Due to the sparse nature of tortoise distribution in the valleys on BMGR East and West, it is unlikely that tortoise will be adversely impacted by the proposed action. Implementation of the conservation measures will further reduce the likelihood of impacts to tortoise.

Presence of eagle nests within vicinity of targets may be possible. For example, a large raptor nest near Target 111 in NTAC (A. Rankin, personal communication). With only 72 rounds fired per year, the risk to eagles foraging along the SDZ is negligible. The most likely impact would be that eagles may briefly hear the projectile as it passes by.

Based on the above, extirpation of local of species is unlikely. Furthermore, similar activities have not resulted in any appreciable loss of species richness anywhere else on the range.

- **Threatened and Endangered Species**

  - **BMGR West**

    Pronghorn: A temporary gun position within GSA 76 would be established close to existing roads and previously disturbed areas to avoid the need for grading or other ground disturbing activities.

    Noise impacts associated with cannon firings could startle and cause individuals to flee. Over the course of one year, three one-week long tests would be conducted and approximately 72 rounds would be fired. The impulse noise from the gun at one mile is similar to that of thunder, but of shorter duration. This noise is atmospherically attenuated and would be barely audible at approximately 3 miles.

    Use of GSA 76 as a gun position would reduce these impacts because the site is at the western edge of Sonoran Pronghorn range. According to most recent pronghorn locations (2000-2016), pronghorn have not been observed within an approximately four mile radius of GSA 76.

    In addition to noise impacts, vehicle strikes along roads leading to the temporary gun position are possible since mobilization and demobilization of equipment would require vehicles to traverse through the Sonoran pronghorn's range. However, as noted in MCASY's 2015 Biological Opinion, vehicle strikes are rare. Furthermore, the temporary gun position is located west of the existing Sonoran pronghorn distribution. Thus, potential for vehicle strikes would be further minimized.

Use of spin- and fin-stabilized projectiles would result in SDZ widths ranging from 6 km to 26 km, respectively. Weapon malfunction may result in a shorter trajectory, projectiles veering off course, in-flight fragmentation, or in-flight separation of the rocket motor from the warhead may result in debris landing within the SDZ corridor. Meteorological conditions or inaccurate modeling could also result in deviations from the intended line of fire. Potential for direct impacts to wildlife from munition or debris strikes within the SDZ is possible but the probability would be low. Targets would not be located at locations where wildlife would congregate (e.g., lambing areas, migratory corridors, or wildlife watering areas). Furthermore, given the vast open space within the target area and the SDZ, the possibility of wildlife being present at specific impact locations at the exact moment of impact is low.

- **BMGR East:**

  Pronghorn: Within BMGR East, the ERCA Project would fire at selected existing targets within existing air-to-ground target areas (NTAC and STAC). Neither would there be target placement, construction, or maintenance activities. Thus, there would be no additional habitat disturbances within the Sonoran Pronghorn range associated with target placement and construction activities. Projectile impact would be limited to a 36 to 54 inch crater. There is little risk of fire ignition because the rounds would be inert.

  In-coming rounds would make a "whoosh" sound before impact. Noise impacts associated with the incoming rounds would be audible at less than 1 mile from the flight line, but not nearly as loud as an aircraft and shorter in duration (Steve Flores, personal communication). Beyond a muted “thud” sound of metal striking the ground, there would be no additional noise associated when rounds make contact with the ground. The 2010 BO issued to LAFB notes that noise may generally induce increased heart rates in ungulates and may cause them to flee. Indirectly, the Sonoran pronghorn foraged more and bedded less on days without ground and air stimuli. A study cited in the 2010 BO concluded that, “military activity was associated with changes in the behavior of pronghorn, but these changes did not likely influence animals in a detrimental manner.”

  Impacts from direct strikes are unlikely with implementation of avoidance measures such as monitoring for the presence of pronghorn before a shot. As noted in the 2010 BO, “The likelihood of practice bombs or inert ordnance affecting pronghorn is remote. Such ordnance or pieces thereof would have to fall on or otherwise strike an animal to kill or injure it. Of greater concern are live bombs and strafing or cannon fire” (p. 54). In addition, the inert rounds would not result in impacts associated with high explosive rounds such as explosion noise and wildland fire. Last, with

implementation of avoidance and minimization measures specific to target closures as prescribed in LAFB's Operation Instruction 13-01, impacts from ordinance impacts would be avoided.

Use of spin- and fin-stabilized projectiles would result in SDZ widths ranging from 6 km to 26 km, respectively. Weapon malfunction may result in a shorter trajectory, projectiles veering off course, in-flight fragmentation, or in-flight separation of the rocket motor from the warhead may result in debris landing within the SDZ corridor. Meteorological conditions or inaccurate modeling could also result in deviations from the intended line of fire. Potential for direct impacts to wildlife from munition or debris strikes within the SDZ is possible but the probability would be low. Furthermore, given the vast open space within the target area and the SDZ, the possibility of wildlife being present at specific impact locations at the exact moment of impact is low.

Vehicle strikes are possible but the probability is low. A survey crew would access the target subsequent to the conclusion of each firing. In total, the survey crew would access targets approximately three times per year. With implementation of avoidance and minimization measures specific to vehicle use on the range as prescribed in LAFB's Operation Instruction 13-01, potential impacts from vehicle strikes would be minimized.

Based on the above and detailed analysis in the Biological Assessment, the proposed action May Affect, and Likely to Adversely Affect Sonoran pronghorn on BMGR East pursuant to the ESA.

Acuna Cactus: The acuña cactus on BMGR East has only been found on the eastern portion of the range approximately 30 miles from the proposed targets for the project. Projectiles fired at the targets would not affect acuña cactus. Direct impacts from projectiles hitting the ground would be many miles from acuña cactus locations or proposed critical habitat. Because the rounds are inert, there would be no likelihood of indirect impacts from wildland fire spreading into acuña cactus habitat.

Lesser Longnose Bat: According to Biological Opinion 22410-1996-f-0094-R003, NTAC and STAC generally do not support lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*) forage plants except in the mountains (BO 2010). The selected gun positions and targets are not located in mountainous areas so there would be no habitat disturbance in foraging areas. If any shots occur at night, it is possible that foraging bats could hear the projectile in flight; however, this sound would likely not disturb foraging bats or their habitat. The projectile would have a very high trajectory (up to 75,000 feet) except on firing and landing. Lesser long-nosed bats fly much lower. It is highly unlikely that the projectile would strike long-nosed bats so this impact would be discountable Therefore,

the ERCA project may affect, but is not likely to adversely affect the lesser long-nosed bat.

Endangered Species Act, Section 7 Consultation

Based on the information above and detailed analysis in the Biological Assessment, YPG made the following determinations of effect.

Table 4: Summary of ESA Effect Determinations

Species	Determination	Reason
Acuña Cactus	No Effect	Does not occupy the proposed project area.
Lesser Long-nosed Bat	May Affect, Not Likely to Adversely Affect.	Proposed gun positions and impact targets are not within roosting or foraging areas. Projectile overflight would cause negligible disturbance.
Sonoran pronghorn	May Affect, Likely to Adversely Affect	The effects of the proposed project do not cause effects not already considered in existing biological opinions for BMGR West and East. All conservation measures and terms and conditions would apply to the proposed action.

YPG initiated consultation with the United States Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act on October 4 2016 for ERCA activities on BMGR West and East. On May 3, 2017, the USFWS issued Biological Opinion 02EAAZ00-2017-F-0039. With implementation of the terms and conditions of this BO as well as the following installation-specific BOs, the proposed action would be in compliance with Section 7 of the Endangered Species Act: BO 22410-1995-F-0114-R007 (BMGR West); BO 22410-1996-F-0094-R003 (BMGR East); BO 02EAAZ00-2014-F-0161 (YPG). See Appendix B.

3.2.2.4 Preferred Alternative - Operation 3 (BMGR Narrow SDZ)

From a temporary gun position on BMGR West near GSA 71, spin-stabilized projectiles would be fired approximately 67-73 km eastward along two different lines of fire towards existing targets in either NTAC or STAC. The projectiles would only deliver inert warheads.

- **Vegetation:** Impacts to vegetation at GSA 71, NTAC and STAC would be similar to those characterized under Operation 2.

- **Wildlife:** Impacts to wildlife at GSA 71, NTAC and STAC would be similar to those characterized under Operation 2.

- **Threatened and Endangered Species (Sonoran pronghorn):** Impacts to Sonoran pronghorn at GSA 71, NTAC and STAC would be similar to those characterized under Operation 2.

3.2.3 Avoidance, Minimization, and Mitigation Measures

Bio-1: For all operations, implement the Candidate Conservation Agreement for Sonoran Desert Tortoise in Arizona.

Bio-2: All ground personnel would be 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.

Bio-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. Vehicles will stay within pre-existing EOD clearance areas.

Bio-4: Minimize surface disturbance and to restore the area to the previous condition when restoration is practicable.

Bio-5: Implement conservation measures and terms and conditions of BO 22410-1995-F-0114-R007 (BMGR West); BO 22410-1996-F-0094-R003 (BMGR East); BO 02EAAZ00-2014-F-0161 (YPG); BO 02EAAZ00-2017-F-0039 (ERCA).

Bio-6: Obey speed limits on roadways to minimize the probability of a vehicle-pronghorn collision. 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. If a vehicle is 1-2 km from a Sonoran pronghorn, the speed limit is 15 mph; if a vehicle is less than 1 km from a Sonoran pronghorn, every effort is made to use an alternate route; if none are available and movement is essential, then the speed limit is 15 mph; and if Sonoran pronghorn are observed running due to ground disturbance, vehicles near Sonoran pronghorn will stop until the animals have stopped running.

Bio-7: Dispose all discarded matter (including but not limited to human waste, trash, garbage, and chemicals) in a manner consistent with federal and State of Arizona regulations. Maintain work sites in a sanitary condition.

Bio-8: Place temporary containment such as drip pans under vehicles or stationary equipment from which hazardous materials may be spilled or leaked.

Bio-8: Dispose of hazardous or toxic materials in a manner consistent with federal and State of Arizona guidelines.

Bio-9: Implement applicable management measures for biological resources pursuant to Integrated Natural Resource Management Plans for YPG, BMGR.

Bio-10: Inspect and clean vehicles subsequent to working in or traveling through weed infested areas.

3.3 Cultural Resources

Cultural resources consist of prehistoric and historical districts, sites, buildings, structures, objects, artifacts, or other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. In particular, cultural resources include historic properties as defined in the National Historic Preservation Act (NHPA; 54 U.S.C. 300101 et seq.); cultural items as defined in the Native American Graves Protection and Repatriation Act (25 U.S.C. sections 3001-3013); archaeological resources as defined in the Archaeological Resources Protection Act (16 U.S.C. sections 470aa-470mm); and sacred sites as defined in Executive Order 13007, Indian Sacred Sites, May 24, 1996;

Section 106 of the NHPA requires that federal agencies take into account the effect of an undertaking on historic properties listed, or eligible for listing, on the National Register of Historic Places (NRHP), and afford the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation an opportunity to comment with regard to the undertaking. The statute also requires consultation with Native American Tribes that claim cultural affiliation to the area.

3.3.1 Affected Environment

3.3.1.1 Background

A summary of the ethnography for the area encompassing the project area is provided below. A detailed ethnography and cultural history is found in Appendix D.

Prehistory

Recent research suggests that the first Americans were present on the American continent approximately 15,500 years ago via multiple migrations by land and sea. The Clovis complex, dated around 13,000 years ago, represents the earliest generally accepted evidence of the first Americans. Associated with highly mobile groups that specialized in large-game hunting, the Clovis complex is characterized by distinctive

fluted projectile points that are widely distributed across North America. Efforts have been made to investigate an archaeological culture that preceded the Clovis complex. The Malpais complex, which predate 12,000 B.P. is characterized by tool assemblages consisting of choppers, scrapers, and worked shell. It is also commonly found in association with "sleeping circles," trails, rock shrines, and intaglios. However, evidence supporting this notion remains inconclusive.

Though widely distributed across North America, few Paleoindian sites are reported from the western portion of the Papaguería. Most of the evidence of Paleoindian sites in the western portion of the Papaguería consists of surface artifacts composed of fluted Clovis-style projectile points within the vicinity of BMGR.

The Archaic Period from 8,500 B.C. to A.D. 1, was characterized by hunting and gathering adapted to local environments and resources such as hunting small-game animals and gathering wild plants. Grinding tools, such as manos and metates, were used in plant processing. Less specialized projectile points probably were used as dart points and knives. Evidence from Early-, Middle-, and Late Archaic Periods are present within BMGR East.

Evidence of distinct cultures emerged during the Ceramic period (A.D. 1 to A.D. 1450). Floodplain horticulture, ceramics, and the bow and arrow were introduced during the latter part of which is broadly referred to as Patayan I/II in the western portion of the project area and Hohokam in the eastern portion of the project area (YPG 2010, Pathways Culture History Chapter 4). The regional population appears to have expanded dramatically at this time, occupying both the lower Colorado River basin and the lower reaches of the Gila River, as well as the peripheral desert regions (YPG 2010). Site types typical of the area include trails, rock shrines, and habitation sites that have rock rings, rock piles, clearings in the desert pavement, and artifact scatters (YPG 2010). Less common site types include petroglyphs and geoglyphs.

In contrast to the major formative cultures inhabiting the banks of the Colorado and Gila Rivers who depended on agriculture for at least 50 percent of their diet, the Hia C-ed O'odham were a mobile people occupying the interior of the Papaguería who formed few large villages, depended heavily on hunting and gathering, and only occasionally practiced agriculture.

Historical Period

- **Spanish Period:** The rugged, arid, and isolated nature of the western portion of the Papaguería constrained historical-period European activities. The Spanish presence in the Southwest began with the expedition of Francisco Vásquez de Coronado in the 1540s. Melchior Díaz, one of Coronado's lieutenants, traveled through the western portion of the Papaguería to Yuma, where he forded the Colorado River into California (Sheridan 1995:26). The next 150 years saw very little Spanish exploration due likely to the paucity of available water. During the period 1693–1707, Jesuit Eusebio Francisco Kino made numerous trips across

the region. Although he passed through the Papaguería many times en route to the Gila River, he spent little time there and made no attempt to establish settlements. In 1775, Juan Bautista de Anza, commander of the presidio at Tubac, led a group of Spanish settlers down the Gila River to open an overland route to the Franciscan missions along the coast, but the road to California was soon closed because of the hostility of the Yumans on the lower Colorado River (Bischoff 2000; Hartmann 1989; Majewski and Ayres 1997; Weber 1992:248–258).

- **Native American Early Historical Period:** In the 1690s, the Hia C-ed O'odham led Kino and Captain Juan Mateo Manje to their villages at present-day Wellton and Dome along the Gila River. (Doyel and Eiler 2003). By the early 1800s, European diseases had depopulated some areas, and some groups moved to more-distant locations, including the interior of the western portion of the Papaguería. The lifeways of all O'odham were disrupted by the arrival of the Europeans, which was accompanied by new diseases, the new mission and mining communities, the creation of the international border, and the loss of access to traditional sites and use areas. Unlike the situation of their O'odham neighbors, no land was set aside for the Hia C-ed O'odham in their traditional homeland in the Western Papaguería on either the Mexican or the U.S. side of the border. Overall, the history of the region after 1600 involved systemic impacts to the local populations from Apache, Spanish, and such widespread European intrusions such as crops, cattle, horses and sheep (Doyel and Eiler 2003; Eiler and Doyel 2008).

  The native inhabitants of the lower Colorado River region have been classified as part of the Yuman sub-group of Hokan speakers (Kroeber 1943). In reference to the Western Papaguería, the Quechan, Cocopah, and Mojave are of central concern, as they lived nearest to this region and interacted most with the Hia C'ed O'odham. In general, it can be said that all of these groups were adapted to a riverine, foraging pattern of subsistence, with hunting and gathering being supplemented by floodplain farming of maize, beans, squash, melon, cotton, and various grasses. Castetter and Bell (1951) have claimed that the Mojave were the most agricultural of the river and delta Yumans and that roughly half of their subsistence derived from farming. The Cocopah were the least oriented toward agriculture of the three, with perhaps a third of their food coming from farming. Agricultural practices relied on floodwater to bring needed moisture to the fields, which were usually quite small (0.8–1.2 ha [2–3 acres]). Fish provided a critical source of protein, with hunting restricted primarily to small game, such as jackrabbits, cottontails, squirrels, and pack rats. Larger game was not abundant in the region, and mule deer and bighorn sheep were hunted only occasionally.

- **Early American Period:** U.S. interests in what is now the project area began with attempts to link California with other states to the east. With the discovery of gold in California in 1848, this became critical. The Camino del Diablo, which crosses the formidable southern portion of the Papaguería and was first used by

Europeans in Kino's day, became a common but lethal route for the rush of forty-niners headed to California. Surveys of the U.S.-Mexico border were also commissioned and constituted the first exploration of much of southwestern Arizona. Other survey parties searched for routes for a transcontinental railroad. Stagecoach lines were established across the region, most notably the Butterfield Overland Stage in 1858.

- **Post-Civil War Period:** After the Civil War, ranching and mining increased in Arizona, as did routes of travel across the region. To protect the new settlers, the military began a concerted effort to subdue "hostile" Native American groups. Communication and transportation links were improved. Trails that had been used by Native Americans for centuries were expanded to handle wagon transportation. One of the most significant developments for the area during the historical period was the arrival of the railroad in the early 1880s. The growth of large cattle ranches brought lasting change to the entire region.

- **World War II and Establishment of BMGR and YPG:** Precursors to both YPG and BMGR were established during the World War II period. YPG was initially established as a U.S. Army training camp in 1942 (YPG 2010). In 1943, the Yuma Test Branch began to operate along the banks of the Colorado River, testing new bridge designs, boats, and well-drilling equipment for the Allied Armies during World War II. The Yuma Test Branch was officially closed in 1950. In 1951, the installation was reactivated as the Yuma Test Station and used for desert environment testing. By 1955, the post had become a test center and, in 1963, the installation had been placed under the command of the U.S. Army Materiel Command and re-designated as YPG. Today, YPG is the only general-purpose proving ground located in a desert environment.

  The BMGR was established in the fall of 1941 to support the Army Air Forces (USAAF) flying training programs at Luke Field and Williams Field during WW II. The Eastern portion was called the Gila Bend Gunnery Range and the west portion was the Yuma Aerial Gunnery and Bombing Range. The initial parcel of land set aside for training included most of what is today BMGR. By 1943, additional parcels had been added to the range to expand the training capacity of the eastern portion of the range and support flight training programs to the west at Yuma Army Air Base (LAFB 2010). The Yuma Army Air Base was developed as a training command separate from those at Luke and Williams fields. This base, and the addition of the western parcels to the gunnery and bombing range, established a second area for training operations that were independent from those conducted in the eastern range areas. This basic east-west split of range resources has been continued ever since and is currently represented by the BMGR East and BMGR West divisions of the range. The Yuma Army Airfield became Vincent AFB in 1956 and then in 1959, MCASY (LAFB 2010).

3.3.1.2 Areas of Potential Effect

The Area of Potential Effect (APE) is the geographic area within which a proposed action may directly or indirectly affect cultural resources. The APE for the ERCA Project encompasses areas where the Proposed Action would result in ground disturbing activities, such as construction of observation mounds or access roads, as well as ground disturbances associated with the use of munitions. The APE also includes areas where auditory impacts can occur. The APE would encompass:

- The new 495-acre impact area on Kofa Region including the two new observation mounds and access roads within the new impact area on YPG.

- Proposed gun positions on Cibola Range on YPG and GSAs 71 and 76 on BMGR West.

- Areas within the vicinity of Targets 106 or 111 in NTAC and Targets 208, 208 or 211 in STAC.

3.3.1.3 Site Specific Cultural Resources

The known cultural resources and previous cultural investigations within the APEs, are summarized below.

- **New Impact Area on Kofa Region (YPG):** Two Class III surveys (YPG-R-112 and YPG-R-274) cover 100% of the area as well as a minimum 600 foot buffer. There are nine sites located within the impact area, all previously determined to be not eligible for listing on the NRHP. Seven are rock features and artifacts associated with historic military use of the area and one is a historical section marker. The last site is a multicomponent site comprised of historic military rock features and artifacts as well as a prehistoric mano.

  There are five sites located within the larger 600 foot buffer area outside the proposed impact area. Three historic sites, a military site, a rock feature, and mining cairns, are located more than 350 feet from the impact area. A multicomponent historic military and prehistoric lithic scatter site located is 219 feet from the edge of the impact area. The last site is the historic Palomas Road which just clips the southwestern edge of the buffer. All five of these sites have also been determined to be not eligible to the NRHP.

  The proposed impact area is located approximately twelve miles (19 km) and two mountain ranges south of White Tanks Management Area (“White Tanks”), a 2,069 acre area that encompasses 46 archaeological sites in the northern part of the East Arm of the Kofa Region. White Tanks is also located outside of YPG’s Zone I noise contour (57-62 dBA) for on-going operations. The contours do not extend past the first set of mountains north of the proposed impact area.

- **Observation Mound West:** Two cultural surveys have been conducted in the proposed western observation mound area. No sites or eligible isolated occurrences (IO) were observed.

- **Observation Mound East:** One cultural survey has been conducted in the proposed area of the eastern observation mound. Only one site, the historic Palomas Road, clips the northeastern edge of the survey area. It has been determined not eligible to the NRHP.

- **GSA 71 and 76 (BMGR West):** Ground disturbing activities would not be required for proposed gun positions on Cibola Range on YPG or GSAs 71 and 76 on BMGR West. However, four cultural surveys have previously been conducted that include GSA 71 and GSA 76 (BMGRW-1988-001, BMGRW-1989-001, BMGRW-2008-002, BMGRW-2010-002). Approximately 65% of GSA 71 has full cultural survey coverage to a radius of 500 feet while the surveys encompass GSA 76 to a radius of 500 feet. No known sites are located within 500 feet of GSA 71 or GSA 76.

  There are two known archaeological sites located within one mile from GSA 71. Both sites have been determined not eligible for the NRHP and occur at least 2,708 feet from the GSA. Additionally, there are four known archaeological sites located within one mile of GSA 76. Three of the sites have been determined not eligible to the NRHP while one remains undetermined. The closest site to GSA 76 is located 1,852 feet away.

- **NTAC and STAC (BMGR East):**
  Multiple cultural surveys have been conducted around the extant targets in NTAC and STAC. A total of 100% of the APE encompassing Targets 106 and 111 in NTAC has been previously surveyed. There is one site, which has been determined not eligible for the NRHP, located within 500 feet of Target 106, and there are three known archaeological sites located within 1,000 feet of Target 106, all of which have been previously determined eligible for the NRHP. There are no known sites within 1,000 feet of Target 111. The closest eligible archaeological site to Target 111 is located 1,860 feet away.

  Likewise, 100% of the APE in STAC has been previously surveyed. There are no known sites located within 500 feet of Target 208, but there are three known archaeological sites located within 1,000 feet. One of those sites has been previously determined eligible, while the other two remain undetermined. There are no known archaeological sites located within 1,000 feet of Target 211, the closest eligible site being 1,563 feet away.

  Detailed list of cultural resources within the vicinity of the above targets are found in Appendix I.

3.3.2 Environmental Consequences

Impacts would be considered significant if the alternative results in:

- A substantial, irreversible, or unmitigatable change to the characteristics which make an historic property eligible for the NRHP.

3.3.2.1 No Action Alternative

Under the No Action Alternative, the ERCA Project would not conduct long-range test firings at YPG or BMGR.

At YPG, the existing gun position at the southern terminus of Cibola Range would continue to be used for other test missions as needed. The proposed 495-acre impact area on the eastern end of Kofa Region and the associated observation mounds would not be established. Thus, there would be no munitions-related surface disturbances in the impact area. Furthermore, there would be no surface disturbances associated with construction of observation berms and access roads. Munitions-related surface disturbances associated with use of existing impact areas within Kofa Region are expected to continue.

On BMGR, GSAs 71 and 76 would not be used for gun emplacement. Furthermore, the ERCA Project would not fire at selected targets NTAC and STAC. Thus, there would be no munitions-related surface disturbances at BMGR East. However, there would be continued surface disturbances within NTAC and STAC in the immediate vicinity of established targets associated with on-going training operations.

3.3.2.2 Preferred Alternative - Operation 1 (YPG Narrow SDZ)

- **Proposed Impact Area:** Spin-stabilized projectiles would be fired from an existing gun position on the southern edge of Cibola Range along a singular line of fire directed 67-70 km eastward to the proposed 495-acre impact area on the eastern end of Kofa Region.

  Construction of the earthen observation mounds would result in disturbance of surface soils around the perimeter of the observation mound. The construction of the western observation mound will have no direct, indirect, or cumulative impacts to cultural resources as there are no sites or eligible isolated occurrences in this area. One site, the not-NRHP-eligible historic Palomas Road, is present in the vicinity of the eastern observation mound. Since the Palomas Road is not eligible for the NRHP, it is not considered an historic property and does not necessitate further consideration under the NHPA.

  Ordnance impacts within the impact area would result in varying levels of surface impacts such as craters throughout the impact area. Levels of surface disturbance would be commensurate with the types and sizes of munitions

tested. For example, high explosive rounds would result in craters that are wider and deeper than inert rounds.

Nine sites, all determined to be not eligible for listing on the NRHP, have been identified within the proposed boundary of the proposed impact area. In addition, there are five ineligible sites located within 500 feet of the proposed impact area. There could be both direct and indirect effects to these site as a result of the proposed project. However, since they have all been determined not eligible for the NRHP, they are not considered historic properties and do not necessitate further consideration under the NHPA.

- **White Tanks:** Noise from the impact area would not result in indirect impacts to White Tanks. Several studies (King et al.1985, Battis 1983, Lavallee and Loubser 2015) have been conducted that study the effects of vibration on archaeological ruins and petroglyphs. King et al. (1985) recommend the following minimum distances from standing archaeological ruins to prevent adverse impacts, 1.2 kilometers (km) from blasting, 0.5 km from railroad traffic, 45 meters (m) from road building, and 25 m from vehicular traffic. Battis (1983) examines the seismo-acoustic recording of sonic booms at two rock shelter and pictograph sites in Texas. These studies indicate that sonic booms are unlikely to cause damage to the archaeological finds. The expected motions are, at worst, 8 percent above the limits set by strict blasting codes (Battis 1983).

  Lavallee and Loubser (2015) provide the best evidence for any potential impacts on rock art from military activities. They have several tables in the document that outline the critical distance for effects to occur from vibrations caused by groundborne mortar fire, airborne mortar fire, demolition from TNT and airblasts, and ground maneuvers. They state that as long as mortar ranges and firing points are restricted to distances beyond 321 feet from any rock art site, there will be no adverse impacts (Lavallee and Loubser 2015).

  As stated in the Noise Chapter, the atmospheric attenuation of sound level is approximately 6 dB for every doubling of distance from a noise source. Since White Tanks is located approximately 19 km north of the impact area and beyond two mountain ranges, any noise made from munition impacts would sound like distant, muffled thunder and nowhere near the 142 dB needed to adversely affect the petroglyphs at White Tanks.

Based on the above, there would be no substantial, irreversible, or unmitigatable change to historic properties. SHPO has concurred that activities under Operation 1 would result in no adverse effects to cultural resources. Thus, effects would be less than significant.

3.3.2.3 Preferred Alternative - Operation 2 (BMGR Wide SDZ)

Up to a maximum of 72 inert rounds per year could be fired at Targets 106 or 111 in NTAC. Inert ordnance impacts would result in surface disturbances slightly larger than those associated with BDU-33, a common practice munition used by aircraft at BMGR East. BDU-33s are approximately 22.5 inches long, have a 4 inch body diameter, and weigh 25 pounds. Surface disturbance associated such munitions can be large as 32 inches in diameter (T. Berry, personal communication, 2016). The 155 mm inert rounds are approximately 24 inches long, have a 6 inch body diameter, and weigh 95 pounds. Surface disturbance can range from 36 inches to 54 inches in diameter (S. Flores, personal communication, 2016).

The areas within the vicinity of the existing targets are already disturbed. For example, per the latest available records from 2015, there were 6,742 munitions drops into targets in NTAC (T. Berry, personal communication, 2016). Target 106 in NTAC had the fourth highest use with approximately 551 munition drops in 2015. Approximately 608 munition drops were recorded in 2016. Additional munition drops associated with Operation 2 on Target 106 would represent an increase between 12% and 13%.

Furthermore, LAFB conducts explosive ordnance disposal operations every two years around each target to a radius of 500 feet. Every 10 years, explosive ordnance disposal operations are conducted to a radius of 1,000 feet from each target. Explosive ordnance disposal operations typically entail light resurfacing of the top soil layer surrounding each target using graders or an array of chains attached to heavy duty trucks.

The are no known eligible cultural resources located within 500 feet of Targets 106 or 111. Given the history of disturbance around the targets, the potential for additional effects to known or unknown cultural resources from munitions strikes within this range would be minimal. Based on the above, there would be no substantial, irreversible, or unmitigatable change to historic properties. SHPO has concurred that activities under Operation 2 would result in no adverse effects to cultural resources. Thus, effects would be less than significant.

3.3.2.4 Preferred Alternative - Operation 3 (BMGR Narrow SDZ)

Up to a maximum of 72 inert rounds per year could be fired between Targets 106 or 111 in NTAC and Targets 208 or 211 in STAC. Inert ordnance impacts would result in surface disturbances slightly larger than those associated with BDU-33, a common practice munition used by aircraft at BMGR East. BDU-33s are approximately 22.5 inches long, have a 4 inch body diameter, and weigh 25 pounds. Surface disturbance associated such munitions can be large as 32 inches in diameter (T. Berry, personal communication, 2016). The 155 mm inert rounds are approximately 24 inches long, have a 6 inch body diameter, and weigh 95 pounds. Surface disturbance can range from 36 inches to 54 inches in diameter (S. Flores, personal communication, 2016).

As described above, the areas within the vicinity of Targets 106 and 111 are already heavily disturbed. Likewise, the areas within the vicinity of Targets 208 and 211 in STAC are also similarly disturbed. For example, per the latest available records from 2015, there were 7,051 munitions drops into targets in STAC. Target 208 had 259 munition drops in 2015 and 78 drops in 2016. Assuming equal distribution of test firings between Targets 106 and 208, additional munitions drops associated with Operation 3 on Target 106 would range from 6% to 6.5%. Additional munitions drops associated with Operation 3 on Target 208 would range from 6% to 6.5%.

Furthermore, LAFB conducts explosive ordnance disposal operations every two years around each target to a radius of 500 feet. Every 10 years, explosive ordnance disposal operations are conducted to a radius of 1,000 feet from each target. Explosive ordnance disposal operations typically entail light resurfacing of the top soil layer surrounding each target using graders or an array of chains attached to heavy duty trucks.

There are sensitive cultural resources present within the vicinity of Target 215. Target 215 was eliminated from detailed analysis per the recommendation of LAFB. (due to erosion from erosion).

There are no known eligible cultural resources located within 500 feet of Targets 106, 111, 208, or 211. Given the history of disturbance around the targets, the potential for additional effects to known or unknown cultural resources from munitions strikes within this range would be minimal. Based on the above, there would be no substantial, irreversible, or unmitigatable change to historic properties. SHPO has concurred that activities under Operation 3 would result in no adverse effects to cultural resources. Thus, effects would be less than significant.

Section 106 Consultation Related Activities

See Appendix C for a complete record of Section 106 correspondences.

September 2, 2015: YPG met with the Quechan Tribe to discuss the project.

February 2016: LAFB consulted with the following tribes for ERCA activities on BMGR East.

ERCA- Project Introduction and Invitation to Consult	
Contact	**Notes ***
Ak-Chin Indian Community	
Chemehuevi Indian Tribe	
Cocopah Indian Tribe	
Colorado River Indian Tribes	
Fort McDowell Yavapai Nation	

ERCA- Project Introduction and Invitation to Consult	
Contact	**Notes ***
Fort Mojave Indian Tribe	
Gila River Indian Community	Responded that they would like to participate in consultation and requested to review any future documents (letter dated March 23, 2016)
Havasupai	
Hopi Tribe	Requested to review any future documents (letter dated March 21, 2016)
Hualapai Tribe	
Kaibab-Paiute Tribe	
Pueblo of Zuni	
Quechan Tribe	
Salt River Pima-Maricopa Indian Community	
San Carlos Apache Tribe	
Tohono O'odham Nation	
Tonto Apache Tribe	
Torres-Martinez Band of Cahuilla Mission Indians	
White Mountain Apache Tribe	
Yavapai-Apache Nation	
Yavapai-Prescott Indian Tribe	

* Lack of entries in the Notes column indicates no responses received.

March 2016: The Quechan Tribe expressed interest in a field visit to the project area. YPG made various contacts on March 30, 2016, March 22, 2017, and April 17, 2017 to try to arrange such a trip. On May 4, 2017, YPG emailed a PowerPoint presentation that provided an overview of the sites with the project APE for the five proposed targets on BMGR East. A trip scheduled for May 14, 2017 was cancelled by the Quechan.

November 2, 2016: YPG sent a letter to SHPO summarizing the results of a contracted survey of 761 acres for the proposed ERCA project. Twenty sites were recorded during the survey. All were determined not to be eligible for the NRHP. SHPO concurred with these ineligible determinations on November 22, 2016.

November 30, 2016: YPG was formally designated as the lead agency for consultation on behalf of MCAS Yuma and LAFB.

December 1, 2016: YPG reintroduced the project to SHPO by email that followed a telephone call.

December 2016 through February 2017: LAFB conducted fieldwork to gather updated information on the sites located near targets in preparation for a future meeting with the Four Southern Tribes.

January 23, 2017: YPG sent letters to tribes requesting concurrence on the proposed determination of "no adverse effect" for the project. The tribes contacted include:

ERCA- Overall project effects determination consultation		
Contact	**Notice Rec'd**	**Notes***
Arizona State Historic Preservation Officer	1/25/2017	Concurred with no adverse effect (email/letter dated 2/9/2017)
Ak-Chin Indian Community	1/25/2017	
Chemehuevi Indian Tribe	1/25/2017	No specific comments regarding this project (email dated 1/30/2017)
Cocopah Indian Tribe	1/25/2017	
Colorado River Indian Tribes	1/25/2017	
Fort McDowell Yavapai Nation	1/25/2017	
Fort Mojave Indian Tribe	1/25/2017	
Gila River Indian Community	1/25/2017	
Hia-Ced Hemajkam	1/25/2017	
Hopi Tribe	1/25/2017	Concurred with no adverse effect but want to be informed of any new discoveries or future proposed adverse effects (letter dated March 13, 2017)
Pascua Yaqui	1/25/2017	
Quechan Tribe	1/24/2017	
Salt River Pima-Maricopa Indian Community	1/25/2017	
San Carlos Apache Tribe	1/25/2017	Concurred with no adverse effect, have no further interest in consultation, and deferred to the Four Southern Tribes (letter dated January 27, 2017)
Tohono O'odham Nation	1/25/2017	
Yavapai-Apache Nation	1/25/2017	Concurred with no adverse effect and have no specific concerns, but they are as concerned with the plants and animals in the APE as much as conservation of archaeological sites. Deferred to any interested tribes with issues (letter dated February 6, 2017)

ERCA- Overall project effects determination consultation		
Contact	**Notice Rec'd**	**Notes***
Yavapai-Prescott Indian Tribe	1/25/2017	
Zuni	1/25/2017	

* Lack of entries in the Notes column indicates no responses received.

January 23, 2017: YPG also sent a letter to SHPO regarding the proposed "no adverse effect" determination for the project. SHPO concurred with the "no adverse effect" determination on February 9, 2017.

February 17, 2017: As part of the ongoing tribal consultation process, YPG and LAFB met with the Four Southern Tribes, comprising Gila River Indian Community, the Ak-Chin Indian Community, the Salt River Pima-Maricopa Indian Community, and the Tohono O'odham Nation, at the Ak-Chin Indian Community. No specific concerns were brought forward.

April 10, 2017: YPG briefed the Quechan Tribal Council on the project. No comments or requests were made by the Council at that meeting.

3.3.3 Avoidance, Minimization, and Mitigation Measures

Unanticipated discoveries of archaeological remains may occur even in areas that have been previously surveyed. To avoid disturbance of known and previously undiscovered or undocumented cultural resources or remains, the following measures would be implemented.

Cul-1: All support vehicles will use existing roads or marked routes to access project sites to the extent practicable.

Cul-2: Grading and smoothing of surface soils will be confined to the delineated boundaries for construction activities at gun positions and construction of observation mounds.

Cul-3: If archaeological remains are uncovered or discovered during site preparation activities, all activities in the area of the find would be stopped, and the appropriate Cultural Resources Manager at the installation where the find is located as well as the YPG Cultural Resources Manager will be notified immediately. The installation Cultural Resources Manager would assess the significance of the discovered resources in accordance with the NRHP evaluation criteria and the resources would be managed in accordance with 36 CFR 800, as appropriate.

Cul-4: If human remains are encountered, all project activity on or near the discovery site shall cease immediately. The human remains shall be protected from further disturbance. The appropriate Cultural Resources Manager at the installation

where the find is located as well as the YPG Cultural Resources Manager will be notified immediately.

Cul-5: Conduct after-action reports for munition impacts within the SDZ in the event munitions veer off course or fragment midflight as a result of a launch or flight malfunction. Document location of the impact area and assess whether nearby cultural resources, if any, were affected. Coordinate results of the after-action reports with appropriate Cultural Resource Managers at the respective installations; State Historic Preservation Officer; and applicable Tribal Historic Preservation Officer(s) as appropriate.

Cul-6: Implement applicable management measures for cultural resources pursuant to INRMPs for YPG and BMGR.

3.4 Hazardous Materials and Waste

Hazardous materials are broadly defined as materials of general use containing clearly hazardous properties in commercial, military, or industrial applications. Hazardous materials are chemical substances which pose a substantial threat to human health or the environment. In general, these materials pose hazards due to quantity and concentration, or physical and chemical characteristics.

Hazardous constituents are defined as hazardous materials present at low concentrations in a generally non-hazardous matrix, such that their hazardous properties do not produce acute effects. Component hazardous materials are considered hazardous constituents. Components that contain hazardous constituents include propellants, batteries, flares, igniters, jet fuel, diesel fuel, hydraulic fluid, and explosive warheads. Each of these may potentially affect human health and the environment through direct contact with water, soil, or air.

A hazardous waste may be solid, liquid, semi-solid, or contain gaseous material that alone or in combination may: (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or (2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed, or otherwise managed.

Section 6901 of the Resource Conservation and Recovery Act (RCRA) regulates management of solid waste and hazardous waste. Solid wastes include garbage; refuse; sludge (from a wastewater treatment plant, water supply treatment plant, or air pollution control facility); other discarded material including solid, liquid, semi-solid; and contained gaseous materials resulting from industrial, commercial, mining, and agricultural operations.

Military munitions differ from other wastes; the rules and regulations regarding the management of military munitions hazards and military munitions waste differ from those regulating other wastes. The Military Munitions Rule (promulgated in Federal

Register Volume 62, Number 29, Pages 6621-6657), defines when military munitions become waste and how these waste military munitions will be managed. Military munitions are not a solid waste when used for their intended purposes, which include use in training military personnel in the recovery, collection, and on-range destruction of unexploded ordnance and munitions fragments during range clearance activities. However, used or fired munitions are classified as solid waste when managed off-range or recovered, collected, and subsequently buried/placed in a landfill on the range. In both cases, once the used or fired munition is a solid waste, it is potentially subject to regulation as a hazardous waste.

- **Hazardous Materials:** Hazardous materials such as aircraft, automotive, and generator fuels, oils, lubricants, paints, cleaning solvents, pesticides, and herbicides are currently used at developed range administration and support facilities. Use of hazardous materials at other dispersed locations, such as manned and tactical ranges, is generally limited to petroleum, oils, and lubricants; however, latex paints used in the construction and repair of simulated targets are also potentially hazardous.

- **Solid Wastes**: Municipal solid wastes from administrative, support, and temporary field facilities are collected and transported off-range to approved landfills. Human sewage from temporary field facilities is contained in portable toilets and removed by a commercial contractor and discharged in approved sewage treatment facilities.

- **Munitions Constituents of Concern:** Munitions constituents of concern (MCOC) are hazardous constituents associated with munitions. Expended munitions such as artillery rounds, obscurants, bombs, missiles, targets, pyrotechnics, flares, as well as small, medium, to large munitions could release contaminants to the environment upon use or leach small amounts of toxic substances as they explode and decompose. The MCOC are found in the explosive, propellant, and pyrotechnic elements of munitions. MCOC may also leak from munitions that do not detonate on impact as intended. Most MCOC are located within firing ranges, training ranges, and air-to-ground targeting ranges. Propellants are a potential source of MCOC at gun positions. MCOC associated with each munitions class are summarized below:

    - **Small Caliber Munitions:** Lead is the primary potential MCOC. Other metals, including antimony, copper, and zinc, are also MCOC. Nitroglycerin, a component of solid propellant for small caliber munitions is considered a potential MCOC.

    - **Medium and Large Caliber Munitions:** High explosives used in these munitions may result in the release of trinitrotoluene and cyclotetramethylenetetranitramine. The propellants for these munitions may contain 2,4-dinitrotoluene (DNT), 2,6-DNT, and nitroglycerin .

- **Pyrotechnics and Obscurants:** Perchlorate compounds are the primary MCOC associated with pyrotechnics. White phosphorous is frequently used as an incendiary and smoke-screening agent in training areas.

- **Other Munitions:** Pentaerythritol tetranitrate is a component of detonation cord and could be a potential MCOC at ranges where demolition training is performed. Additionally, the explosive components used in some of these munitions may result in the release of trinitrotoluene and cyclotetramethylenetetranitramine.

  In addition to the hazardous constituents from energetic chemicals, other hazardous constituents may also leach from solid components of munitions such as bomb hulls, targets, and small arms ammunition. These hazardous constituents may include: carbon, manganese, phosphorus, sulfur, copper, nickel, chromium, molybdenum, vanadium, columbium, or titanium.

- **Munitions Constituents of Concern Assessments**: MCOC within YPG and BMGR are routinely assessed pursuant to Department of Defense Directive 4715.11 (DODI 4715.11). The Directive requires evaluation of MCOC sources; potential for off-range migration (i.e., wind erosion, surface flows, and ground water plumes); potential human and ecological receptors; and whether such release poses an unacceptable risk to human health or the environment.

3.4.1 Affected Environment

3.4.1.1 YPG

Portions of YPG have historically been used as firing ranges starting in 1942. Both the volume of expended munitions decomposing within the range and the amounts of MCOC in the environment have gradually increased over time. Concentrations of some substances in sediments surrounding the expended material may also increase over time.

Though weapons testing within both Kofa and Cibola regions, the majority of munitions testing occurs within the Kofa Region. Cibola Region also includes drop zones and small arms ranges in addition to ranges used for munitions testing. Due to the presence of operating ranges throughout YPG, the entirety of YPG is a potential source of MCOC. Munitions use included small, medium, and large caliber ammunition; mines; linked and unlinked ammunition; high explosive and ball munitions; pyrotechnics/obscurants; as well as the potential for aircraft-based weapons.

Though spent munitions are present within various firing ranges, off-range migration of MCOC is considered unlikely due the ephemeral surface waters; depth to groundwater (several hundred to over a thousand feet deep), a low annual precipitation (less than 4 inches), and an extremely high evapotranspiration rate (3.3-7.1 feet per year) (YPG

2015a). These factors limit surface water flow off-range and/or recharge into the underlying aquifer, which preclude groundwater from being affected by range activities. Past soil and water sampling as well as periodic revaluations pursuant to DODI 4715.11 including the 2015 revaluation of MCOC concluded insufficient evidence of MCOC migration off-range (YPG 2015a). Thus, no complete MCOC exposure pathways to potential human and ecological potential exist in the vicinity of YPG.

3.4.1.2 BMGR

Munitions delivered from training aircraft to air-to-ground ranges within BMGR are mostly inert warheads, with the exception of a small spotting charge which produces a puff of smoke to reference the location of a hit. In BMGR East, use of live warheads is strictly limited to five specific targets (one high explosive hill target in each TAC range and the existing air-to-ground missile targets in NTAC and East TAC).

For the same reasons cited above for YPG, MCOC assessments conducted pursuant to DODI 4715.11 at BMGR concluded insufficient evidence of MCOC migration off-range. Thus, no complete MCOC exposure pathways to potential human and ecological potential exist in the vicinity of BMGR.

3.4.2 Environmental Consequences

Impacts would be considered significant if the alternative results in:

- Increased and long-term exposure of human and environmental receptors to hazardous materials, MCOC, and wastes.

3.4.2.1 No Action Alternative

Under the No Action Alternative the ERCA Project would not conduct long-range test firings at YPG or BMGR. At YPG, the proposed 495-acre impact area on the eastern end of Kofa Region and the associated observation mounds would not be established. The existing gun position at Cibola Range may be used for other types of test firings into existing impact areas. Likewise, other elements of the ERCA Project may continue at YPG under previously authorized programs on existing facilities. Future test programs could conduct test firings into the proposed impact area, thereby increasing the amount of spent munitions and potential sources of MCOC. However, migration of MCOC off-range at sufficient concentrations and amounts to affect human and environmental receptors is unlikely based on MCOC assessments conducted pursuant to DODI 4715.11.

At BMGR, a new TGP would not be established at BMGR West. Neither would the ERCA Project fire at selected targets within existing air-to-ground target areas (NTAC and STAC). All existing air-to-ground target areas within BMGR West would continue to be used for on-going training programs; thereby increasing the amount of spent munitions and potential sources of MCOC. However, migration of MCOC off-range at

sufficient concentrations and amounts to affect human and environmental receptors is unlikely based on MCOC assessments conducted pursuant to DODI 4715.11.

At YPG and BMGR, transport, use, and disposal of hazardous materials associated with on-going operations would be managed in compliance with RCRA. Solid waste would be stored in containers and transported to an approved landfill. Human sewage from temporary field facilities would be contained in portable toilets and removed by a commercial contractor and discharged in approved sewage treatment facilities.

3.4.2.2 Preferred Alternative - Operation 1 (YPG Narrow SDZ)

Spin-stabilized projectiles would be fired from an existing gun position on the southern edge of Cibola Range along a singular line of fire directed 70 km eastward to the proposed 495-acre impact area on the eastern end of Kofa Region. The projectiles could contain either inert or high explosive warheads.

The new impact area would function as a multi-purpose, multi-use impact area for other test missions that may run concurrently with or subsequent to the ERCA Project. Various munitions mentioned in Section 2.1.3 could be fired into the new impact area.

Spent munitions and potential sources of MCOC would be increased at the new impact area. However, migration of MCOC off-range at sufficient concentrations and amounts to affect human and environmental receptors is unlikely based on MCOC assessments conducted pursuant to DODI 4715.11. Hazardous materials at the gun position may include storage and use of petroleum, oils, and lubricants (POLs); adhesives; sealants; hydraulic fluids; brake fluid; antifreeze; and routine cleaning products. Use of vehicles and supporting equipment such as generators may result in spills or leaks of POLs. Leaks and spills of POLs would be minimized through implementation of best management practices such as: placement of drip pans under parked vehicles and generators; establishment of a designated refueling area; or providing secondary containment for non-mobile containers larger than 55 gallons. Transport, use, storage, and disposal of these and other hazardous materials would be managed in compliance with applicable range rules. Solid waste would be stored in containers and transported to an approved landfill. Human sewage from temporary field facilities would be contained in portable toilets and removed by a commercial contractor and discharged in approved sewage treatment facilities. Based on the above, the Preferred Alternative - Operation 1 (YPG Narrow SDZ) would not result in increased and long term exposure of human and environmental receptors to hazardous materials, MCOC, and wastes. Impacts would be less than significant.

3.4.2.3 Preferred Alternative - Operation 2 (BMGR Wide SDZ)

From temporary gun positions on BMGR West near Ground Support Area 76, fin-stabilized projectiles would be fired approximately 70 km eastward along a singular line of fire towards existing targets in either NTAC or STAC. The projectiles would only deliver inert warheads.

In general, impacts would be similar to those characterized for Operation 1 (YPG Narrow SDZ). The use of inert warheads would result in decreased sources of MCOC associated with explosive elements of munitions at NTAC or STAC on BMGR East. However, migration of MCOC off-range at sufficient concentrations and amounts to affect human and environmental receptors is unlikely based on MCOC assessments conducted pursuant to DODI 4715.11. On BMGR West, hazardous materials at the gun position on Ground Support Area 76 may include storage and use of POLs; adhesives; sealants; hydraulic fluids; brake fluid; antifreeze; and routine cleaning products. Use of vehicles and supporting equipment such as generators may result in spills or leaks of POLs. Leaks and spills of POLs would be minimized through implementation of best management practices such as: placement of drip pans under parked vehicles and generators; establishment of a designated refueling area; or providing secondary containment for non-mobile containers larger than 55 gallons. Transport, use, storage, and disposal of these and other hazardous materials would be managed in compliance with applicable range rules on BMGR West. Solid waste would be stored in containers and transported to an approved landfill. Human sewage from temporary field facilities would be contained in portable toilets and removed by a commercial contractor and discharged in approved sewage treatment facilities. Based on the above, the Preferred Alternative - Operation 1 (YPG Narrow SDZ) would not result in increased and long term exposure of human and environmental receptors to hazardous materials, MCOC, and wastes. Impacts would be less than significant.

3.4.2.4 Preferred Alternative - Operation 3 (BMGR Narrow SDZ)

From temporary gun positions on BMGR West near Ground Support Area 76, spin-stabilized projectiles would be fired approximately 70 km eastward along differing lines of fire towards existing targets in either NTAC or STAC. The projectiles would only deliver inert warheads.

In general, impacts would be similar to those characterized for the Preferred Alternative - Operation 2 (BMGR Wide SDZ). Impacts would be less than significant.

3.5 Land Use

3.5.1 Affected Environment

Land uses surrounding YPG and BMGR are primarily undeveloped open space and sparsely populated areas. Most of the land is owned by the federal government, primarily under the control of the Bureau of Land Management (BLM), Bureau of Reclamation (BOR), and the U.S. Fish and Wildlife Service. BLM-managed lands circumscribe YPG on the west, north, and east. Kofa NWR is located between Cibola Region and the Kofa Region east arm. The Gila River Valley is adjacent to the southern border of YPG and the northern border of BMGR. Private lands used for agriculture, lands managed by the BLM and BOR, as well as lands managed by the state of Arizona are interspersed throughout the Gila River Valley. Residential, commercial, agricultural,

industrial land uses are concentrated within the vicinity of the city of Yuma, west of both YPG and BMGR, at the confluence of the Colorado River and the Gila River. Cabeza Prieta NWR is located immediately adjacent to the south of BMGR East. Also to the south of BMGR West within Mexico is El Pinacate y the Gran Desierto de Altar Biosphere Reserve, a United Nations Educational, Scientific and Cultural Organization World Heritage Site. The Tohono O'odham Nation is located to the southeast of East TAC in BMGR East. Most land use within tribal lands is typically associated with ranching and the grazing of livestock, and may include seasonal cattle camps. The Sonoran Desert National Monument is located along the northeast corner of BMGR East near East TAC.

3.5.1.1 YPG

YPG is primarily used for military testing and evaluation. Most land on YPG is reserved for firing ranges, munitions impact areas, mobility test courses, and drop zones. These activities typically require large open areas with safety and buffer zones. Test ranges are officially closed to civilian use, except for specifically designated public hunting areas. YPG is subdivided into three geographic and functional areas: Laguna Region, Cibola Region, and Kofa Region.

- **Laguna Region:** Within the Laguna Region are the cantonment, Yuma Test Center (YPG's administrative and command facilities) as well as vehicle and aircraft testing facilities. The cantonment includes public works facilities, housing, and community support facilities. Aircraft testing facilities include the Castle Dome Heliport and Laguna Army Airfield. Vehicle testing includes facilities that provide courses and obstacles to evaluate vehicle endurance, performance, reliability, and maintainability.

- **Cibola Region:** The Cibola Region supports a variety of testing and training functions, including aircraft armament testing, static detonation, conflagration testing, combat skills training, instrument drop zones, and extraction zones. Thus, the majority of area is open space and designated as a training range. Development is primarily located within the Castle Dome Annex, airfields supporting unmanned aircraft systems and helicopters, gun positions, vehicle courses and urban combat training facilities.

- **Kofa Region:** The Kofa Region is used primarily for direct and indirect firing of weapons and munitions, mainly artillery pieces. Thus, the majority of area is open space and designated as a training range. Most of the approximately 400 firing positions at YPG are concentrated along the Kofa Firing Front. Developed areas are located along the western edge along the Kofa Firing Front. The area to the east of the Kofa Firing Front is primarily used as munitions impact areas.

3.5.1.2 BMGR

- **BMGR West:** BMGR West has both aircraft tactical ranges, ground troop training areas as well as small arms ranges. The principal facilities supporting this diversity of training include: AUX-2 airfield complex; F-35B auxiliary Landing Field; Moving Sands and Cactus West air-to-ground target ranges; and more than 40 ground support areas. Ground support areas are locations where ground units responsible for air defense, radar surveillance, control of aircraft, and arming and refueling of helicopters can deploy to train as well as support aviation training.

  Non-military uses include state and federal agencies such as the U.S. Border Patrol and the Arizona Department of Game and Fish that may use the land and airspace for ongoing operations and training. Public uses on BMGR West is limited to areas east of the Copper Mountains. Recreational activities include geocaching, off-road vehicle usage, hunting camping, picnicking, hiking, sightseeing, and nature observation. Without exception, all BMGR recreation users are required to obtain an access permit for entry to the range.

- **BMGR East:** BMGR East has multiple ranges for aircrew training: Manned Ranges 1, 2, 3, and 4 (used to train pilots in precision air-to-ground delivery of practice, conventional ordnance, and special weapons); North, South, and East TAC ranges (designed to simulate targets of opportunity for air-to-ground firing); and the Air-to-Air Range within R-2301E (used for air combat training). In addition, there are two outlying auxiliary airfields that are periodically used for certain forward deployed training missions (Auxiliary Airfield 6 and Stoval Auxiliary Airfield); one small arms range; and four support areas for maintaining sub-ranges and storing and processing spent ordnance and target debris (Range Munitions Consolidation Points).

  Non-military uses include federal agencies such as the U.S. Border Patrol that may use the land and airspace for ongoing operations and training. Public uses on BMGR East are limited to Area B a public access area of approximately 130,000 acres located south of MR 3 and East TAC and East of SR 85. Activities include hunting, camping, hiking, site seeing, photography. Because this area is east of NTAC and STAC, it is beyond the geographic limits of the ERCA Project.

3.5.2 Environmental Consequences

Impacts would be considered significant if the alternative:

- Permanently conflicts with existing land use on YPG and BMGR or with adjacent, offsite land uses.

3.5.2.1 No Action Alternative

Under the No Action Alternative the ERCA Project would not conduct long-range test firings at YPG or BMGR. At YPG, the proposed 495-acre impact area on the eastern end of Kofa Region and the associated observation mounds would not be established. At BMGR, temporary gun positions would not be established at BMGR West. Neither would the ERCA Project fire at selected targets within NTAC and STAC. Existing military operations on YPG and BMGR would continue in accordance with existing land uses.

3.5.2.2 Preferred Alternative - Operation 1 (YPG Narrow SDZ)

Spin-stabilized projectiles would be fired from an existing gun position on the southern edge of Cibola Range along a singular line of fire directed 70 km eastward to the proposed 495-acre impact area on the eastern end of Kofa Region. The projectiles could contain either inert or high explosive warheads.

Cibola Region supports a variety of testing and training functions including gun emplacements. Thus, use of an existing gun position would not conflict with existing land uses within Cibola Region. Likewise, Kofa Region is used primarily for direct and indirect firing of weapons and munitions, mainly artillery pieces. Currently, there are 11 impact areas within Kofa Region. Thus, establishment of a new 495-acre impact area would not conflict with existing land uses. Furthermore, most of the line of fire and the associated 6 km-wide SDZ is contained within the boundary of YPG with the exception of a short segment which will cross the airspace of the Kofa NWR near the Castle Dome Mountain. There would be periodic disruption of recreational activities within the area of Kofa NWR which overlaps with the SDZ footprint since users would need to be temporarily excluded from the area. However, use of the airspace would not result in permanent conflict with existing land use within Kofa NWR. Based on above, there would be no significant impacts to land use.

The new impact area would function as a multi-purpose, multi-use impact area for other test missions that may run concurrently with or subsequent to the ERCA Project. In general, the impacts characterized for ERCA would also characterize impacts associated with other testing activities. However, unlike ERCA, these activities would be wholly contained within YPG's boundary. Overflights across Kofa NWR and closure of US 95 would not be required.

3.5.2.3 Preferred Alternative - Operation 2 (BMGR Wide SDZ)

From temporary gun positions on BMGR West near Ground Support Area 76, fin-stabilized projectiles would be fired approximately 70 km eastward along a singular line of fire towards existing targets in either NTAC or STAC. The projectiles would only deliver inert warheads.

An approximately 1.5 acre temporary gun position would be established in a previously disturbed area within Ground Support Area 76 on BMGR West. Since ground support areas are multi-use training areas, establishment of temporary gun position would not permanently conflict with existing land use.

On BMGR West, the line of fire and the associated 26 km-wide SDZ would cross areas east of the Copper Mountains. This area is open to public recreational uses. There would be periodic disruption of recreational activities within the area which overlaps with the SDZ footprint since users would need to be temporarily excluded from the area. Furthermore, temporary closures would likely occur on weekends when recreational use would likely peak. State and federal agencies such as the US Border Patrol and the Arizona Department of Game and Fish also use the land and airspace for ongoing operations and training. Thus, agency operations during weekends would need to temporarily cease and agency personnel would need to be temporarily excluded from the area during the course of each test. Furthermore, the air space within the SDZ would not be open to other uses during testing. Impacts to land uses on BMGR West would be temporary since the actions proposed under ERCA would occur at a maximum of three times per year.

Inert rounds would be fired into selected targets within NTAC or STAC on BMGR East. Inert rounds would be composed of metals such as titanium, steel, lead, copper, brass, and aluminum (B. Gardner, personal communication, April 5, 2017). These components would be no different from aircraft munitions components used at BMGR (T. Berry, personal communication, April 5, 2017).

Since both areas are strictly designated for munitions use and munition components would be the same, test firings would not conflict with the existing land use. Furthermore, the entire line of fire and the associated 26 km-wide SDZ would be contained within the boundary of BMGR. Thus, there would be no land use conflicts with areas outside of BMGR.

The proposed line of fire would traverse the air-to-air training range on BMGR East. Thus, air-to-air training would need to be temporarily suspended during the course of each test. In order to minimize disruptions to training operations at BMGR East, test firings would likely be limited to weekends when air-to-air training is at a minimum or such training is not scheduled. The number of rounds that would be fired may also be limited. The testing regime on BMGR would not conflict with military land uses. However, there would be temporary impacts to recreational and other non-military uses of the land within BMGR. There would be no permanent conflicts with existing land use on BMGR or with adjacent, offsite land uses. Impacts would be less than significant.

3.5.2.4 Preferred Alternative - Operation 3 (BMGR Narrow SDZ)

From temporary gun positions on BMGR West near Ground Support Area 76, spin-stabilized projectiles would be fired approximately 70 km eastward along differing lines of fire towards existing targets in either NTAC or STAC. The projectiles would only

deliver inert warheads. The testing regime described at Section 2.1.2 would be implemented.

Impacts on BMGR East would be similar to those characterized for Preferred Alternative -Operation 2 (BMGR Wide SDZ). However, the SDZ width would be reduced from 26 km to 6 km. Inert rounds would be fired into selected targets within NTAC or STAC on BMGR East. Since both areas are designated for munitions use, test firings would not conflict with the existing land use. Moreover, no other uses are authorized on the ranges due to the danger posed by munitions. Furthermore, the entire line of fire and the associated 6 km-wide SDZ would be contained within the boundary of BMGR. Thus, there would be no land use conflicts with areas outside of BMGR.

The proposed line of fire would traverse the air-to-air training range on BMGR East. Thus, air-to-air training would need to be temporarily suspended during the course of each test. In order to minimize disruptions to training operations at BMGR East, test firings would likely be limited to weekends when air-to-air training is at a minimum or such training is not scheduled. The number of rounds that would be fired may also be limited. The testing regime on BMGR would not conflict with military land uses. However, there would be temporary impacts to recreational and other non-military uses of the land within BMGR. There would be no permanent conflicts with existing land use on BMGR or with adjacent, offsite land uses. Impacts would be less than significant.

3.6 Noise

3.6.1 Affected Environment

Noise is defined as unwanted sound. The effects of noise on human receptors can range from annoyance to permanent hearing loss. Sound travels from a source in the form of wave, which exerts a pressure on a receptor, such as those found in the human ear. The pressure level associated by a sound wave is commonly measured in decibels (dB), which is used to equally weight all frequencies of sound. However, the human ear is not equally sensitive to sounds at all frequencies. Therefore, the dBA scale, which primarily weighs frequencies within the human range of hearing, is used to assess the impact of noise on human hearing.

Table 5: Range of Noises Levels and Human Receptor Response

Noise level (dBA)	Examples	Human Receptor Response
0	recording studio	hearing threshold
20	rustling leaves	
40	conversational speech	quiet
60	freeway at 50 feet	
70	freight train at 100 feet	moderately loud
90	heavy truck at 50 feet	
110	ambulance siren at 100 feet	very loud
120	jet engine at 200 feet	threshold of pain

Ambient noise on both YPG and BMGR includes natural sources such as wind and man-made noise. Nonmilitary noise sources include traffic on public roads, railways, construction, and commercial aircraft overflight. Military sources include aircraft operations and munitions training; munitions and equipment testing; and other military training activities.

3.6.1.1 YPG

Transportation, aviation, and explosive detonations from weapon testing activities are the main noise sources on YPG especially within Kofa and Cibola Regions where most training and testing operations occur. Both regions are unpopulated and lack administrative facilities where human receptors reside. Human receptors in these areas are personnel involved in testing and training activities. All personnel involved in testing and training are required to wear hearing protection suited to the training or testing activity.

Under the Proposed Action, the ERCA Project would use an existing gun position on the southern edge of Cibola Range. A new 495-acre impact area would be established near the southeast corner of the Kofa Region adjacent to the Palomas Mountains. Land use involving human receptors within the vicinity of the existing gun position is the Martinez Lake area and Castle Dome Landing on the Colorado River, recreational areas located approximately five miles to the west. The proposed 495-acre impact area adjacent to BLM-managed lands and is not within the vicinity of populated land uses. The nearest land uses are agricultural areas located approximately nine miles to the south and six miles to the southeast.

To assess noise impacts from on-going training and testing operations to surrounding nonmilitary land uses, YPG utilizes noise contour maps (YPG 2015b, Appendix H). The maps delineate three noise zones based on long term, averaged noise levels and noise attenuation rates. Zone I areas exhibit acceptable noise levels (less than 62 dB) and

are compatible with all land uses including those with sensitive receptors such as hospitals, houses of worship, and schools. Zone II areas exhibit moderate noise levels (62-70 dB) and Zone III areas exhibit unacceptable noise levels (greater than 72 dB). Both Zone II and Zone III areas are not compatible with noise sensitive land uses. Due to on-going training and testing operations, both Cibola and Kofa Regions contain Zone II and Zone III areas. All Zone II and Zone III areas are contained well within the bounds of the installation, with the exception of one small area located in a remote portion of the Kofa National Wildlife Refuge. Thus, areas outside of YPG are not subject to averaged noise levels greater than 62 dB associated with the use of large caliber munitions within Cibola and Kofa Regions.

3.6.1.2 BMGR

GSA 71 and 76 on BMGR West provide approved off-road locations to which Marine Corps ground units can deploy with vehicles and equipment to participate in air and/or ground training activities. These facilities are used occasionally throughout the year. The primary noise sources during periods of use are vehicles and portable equipment such as generators; otherwise, wind would be the primary source of ambient noise. Non-military lands to the north of GSA 71 are primarily agricultural lands interspersed with BOR lands. Industrial, agricultural and a recreational vehicle camp grounds are present approximately two miles to the northwest of GSA 71 and six miles to the northwest of GSA 76. Citrus City, a sparsely built out rural residential area is located approximately four miles north of GSA 71 and over seven miles north of GSA 76.

Both NTAC and STAC on BMGR East are air-to-ground training ranges. Thus, aircraft operations and explosive ordnance are the primary noise sources in these areas. Non-military lands to the north of NTAC are primarily unpopulated State Trust Lands or BLM-managed lands with some ranching at Range 4 boundary north of NTAC. Non-military lands to the south of STAC are lands within the Cabeza Prieta NWR. There are no permanent human receptors in these areas.

Noise contours based on long-term noise level averages indicate that the 60 dB level noise contour for NTAC is contained within the bounds of BMGR East. The 60 dB level noise contour for STAC extends approximately five miles into the Cabeza Prieta NWR.

3.6.2 Environmental Consequences

Impacts would be considered significant if the alternative:

- Results in a substantial change in the level and scope of the operational noise environment for human receptors in the vicinity of YPG and BMGR.

3.6.2.1 No Action Alternative

Under the No Action Alternative the ERCA Project would not conduct long-range test firings at YPG or BMGR. At YPG, the existing gun position at the southern terminus of

Cibola Range would continue to be used for other test missions as needed. At BMGR West, there would be no noise impacts associated with the temporary gun positions. Neither would the ERCA Project fire at selected targets NTAC and STAC. Thus, there would be no noise impacts on within the vicinity of targets in NTAC and STAC. However, there would be continued noise disturbances within NTAC and STAC associated with on-going training operations.

3.6.2.2 Preferred Alternative - Operation 1 (YPG Narrow SDZ)

Spin-stabilized projectiles would be fired from an existing gun position on the southern edge of Cibola Range along a singular line of fire directed 67-70 km eastward to the proposed 495-acre impact area on the eastern end of Kofa Region. At the gun position on Cibola Range there would be periodic increases in noise levels during test periods. There would be temporary increases in the immediate vicinity of the gun position associated with portable generators, mobile temperature conditioning chambers, and vehicles. Approximately 12 rounds could be fired over the course of each firing day. Pulse noise associated with self-propelled and towed howitzers at the gun position would range from 166 dB to 178 dB at approximately 25 feet from the gun (USA 2016).[3] Within the immediate vicinity, technical personnel would be protected from high noise levels through safety training, use of appropriate hearing protection, and compliance with YPG standard operating procedures for testing activities. Sound levels would be attenuated for human receptors at further distances. Atmospheric attenuation of sound level is approximately 6 dB for every doubling of distance from a noise source. Thus, for off-post human receptors at the Martinez Lake area and Castle Dome Landing, located five miles away from the gun position, pulse noise associated with gun bursts would sound like distant, muffled thunder. Since an existing gun position would be used, there would be no changes to existing noise contours.

Once the munition is in flight, there would be no detectable noise for human receptors on the ground. Furthermore, no personnel would be allowed inside the SDZ. Since the SDZ would be approximately 6 km in width, the closest human receptor would be located approximately 3 km away from the line of fire.

Construction of earthen observation mounds within the new 495-acre impact area would result in use of earthmoving equipment such as graders, loaders or bulldozers, resulting in temporary increases in noise within the construction footprint. Typical construction equipment generates noise levels ranging from approximately 76 to 88 dBA at a distance of 50 feet from the source. Noise impacts would be temporary and would return to ambient levels upon completion of construction.

Noise from munition impacts at the new 495-acre impact area would vary depending on the type of munition and warhead used. In-coming rounds would make a "whoosh" sound before impact. The sound would not be nearly as loud as an aircraft and would be shorter induration. Inert warheads would result in a muted “thud” sound from metal

[3] Noise Levels of Common Army Equipment;
http://www.vi.ngb.army.mil/html/safety/docs/Noise%20in%20Army%20Equipment.pdf

striking the ground. High explosive warheads would result in high intensity pulse noise upon detonation. Furthermore, no personnel would be allowed inside the SDZ. Since the SDZ would be approximately 6 km in width, the closest human receptor would be located approximately 3 km away from the point of impact. Personnel outside the SDZ would be protected from high noise levels through safety training, use of appropriate hearing protection, and compliance with YPG standard operating procedures for testing activities.

The impact area and the adjacent BLM-managed lands are located on the southern slopes of the Palomas Mountains. There are no developments with human receptors in the adjacent areas. The nearest land uses are agricultural areas located approximately nine miles to the south and six miles to the southeast. Atmospheric attenuation of sound level is approximately 6 dB for every doubling of distance from a noise source. At these distances, pulse noise associated with high explosive munition detonations would sound like distant, muffled thunder. Last, since the proposed new impact area would be east of existing impact areas, the existing noise contour is expected to extend further eastward. Based on above, there would be no significant impacts to noise.

The new impact area would function as a multi-purpose, multi-use impact area for other test missions that may run concurrently with or subsequent to the ERCA Project. In general, the impacts characterized for ERCA would also characterize impacts associated with other testing activities.

3.6.2.3 Preferred Alternative - Operation 2 (BMGR Wide SDZ)

A temporary gun position would be established within GSA 76 on BMGR West. At the gun position there would be periodic increases in noise levels during test periods. There would be temporary increases in the immediate vicinity of the gun position associated with portable generators, mobile temperature conditioning chambers, and vehicles. Approximately 12 rounds could be fired over the course of each firing day. Pulse noise associated with self-propelled and towed howitzers at the gun position would range from 166 dB to 178 dB. Within the immediate vicinity, technical personnel would be protected from high noise levels through safety training, use of appropriate hearing protection, and compliance with YPG standard operating procedures for testing activities. Sound levels would be attenuated for human receptors at further distances. Atmospheric attenuation of sound level is approximately 6 dB for every doubling of distance from a noise source. Thus, for off-post human receptors located approximately six to seven miles away from the gun position, pulse noise associated with gun bursts would sound like distant, muffled thunder.

Once the munition is in flight, there would be no detectable noise for human receptors on the ground. Furthermore, no personnel would be allowed inside the SDZ. Since the SDZ would be approximately 26 km in width, the closest human receptor would be located approximately 13 km away from the line of fire.

Tests conducted on BMGR would be limited to use of inert warheads. Thus, noise from munition impacts at NTAC would be limited. In-coming rounds would make a "whoosh" sound before impact. The sound would not be nearly as loud as an aircraft and would be shorter in duration. Inert warheads would result in a muted “thud” sound from metal striking the ground. Based on above, there would be no significant impacts to land use.

3.6.2.4 Preferred Alternative - Operation 3 (BMGR Narrow SDZ)

A temporary gun position would be established within GSA 71 on BMGR West. At the gun position there would be periodic increases in noise levels during test periods. There would be temporary increases in the immediate vicinity of the gun position associated with portable generators, mobile temperature conditioning chambers, and vehicles. Approximately 12 rounds could be fired over the course of each firing day. Pulse noise associated with self-propelled and towed howitzers at the gun position would range from 166 dB to 178 dB. Within the immediate vicinity, technical personnel would be protected from high noise levels through safety training, use of appropriate hearing protection, and compliance with YPG standard operating procedures for testing activities. Sound levels would be attenuated for human receptors at further distances. Atmospheric attenuation of sound level is approximately 6 dB for every doubling of distance from a noise source. Thus, for off-post human receptors located approximately two to four miles away from the gun position, pulse noise associated with gun bursts would sound like distant, muffled thunder.

Once the munition is in flight, there would be no detectable noise for human receptors on the ground. Furthermore, no personnel would be allowed inside the SDZ. Since the SDZ would be approximately 6 km in width, the closest human receptor would be located approximately 3 km away from the line of fire.

Noise from munition impacts at NTAC and STAC would be similar to those characterized for Preferred Alternative-Operation 2.

3.7 Recreation

3.7.1 Affected Environment

General public access to YPG and BMGR are authorized in designated areas. There are no recreational facilities, programs, or other amenities for the general public on lands where public access is authorized. However, lands on BMGR do offer opportunities for hunting, camping, hiking, and wildlife viewing as well as opportunities to visit cultural sites, historical sites, or geographical features. Publically accessible lands on YPG are primarily used for hunting and hunting-associated activities such as camping.

3.7.1.1 YPG

Publically accessible lands on YPG are limited to western and northern areas of Cibola region where lands are contiguous with BLM-managed lands. Most lands from the center of Cibola Region extending eastward are restricted. Existing gun positions that could be used for the ERCA program are located within the restricted area. Public access on is not authorized on Kofa Region with the exception of the northern terminus of the Kofa East Arm where hunting is authorized. The proposed impact areas is located approximately 8 miles south of the hunting area.

The proposed line of fire and the associated 6 km-wide SDZ would cross the southeast corner of the Kofa NWR near the Castle Dome Mountains. Recreational opportunities are associated with wildlife such as wildlife watching and photography, hiking, camping, and limited hunting.

3.7.1.2 BMGR

Approximately 38 percent of the BMGR in total is open general public access (LAFB 2012). With the exception of lands west of the Gila Mountains and an area southwest of the Wellton Hills, most of the lands on BMGR West are open to the general public access including areas near GSA 71 and GSA 76 as well as those areas within the SDZ footprints.

Multiple training ranges encompass the majority of lands on BMGR East. Thus, with the exception of lands between the Sauceda Mountains and State Route 85, there is no general public access to lands on BMGR East. NTAC, which begins at SR 85, and STAC, where targets for the ERCA program are located, are approximately 10 to 12 miles east of lands where the general public access is allowed.

The remaining areas on BMGR are restricted due to safety hazards presented by on-going military training operations. Some special use recreation such as bighorn sheep hunting may be authorized when compatible with military operations. Areas where public access is authorized may be subject to temporary closures as specific training needs arise. Without exception, all BMGR recreation users are required to obtain an access permit for entry to the range.

3.7.2 Environmental Consequences

Impacts would be considered significant if the alternative:

- Results in a substantial and permanent disruption of recreational opportunities.

3.7.2.1 No Action Alternative

Under the No Action Alternative the ERCA Project would not conduct long-range test firings at YPG or BMGR. At YPG, the proposed 495-acre impact area on the eastern

end of Kofa Region and the associated observation mounds would not be established. At BMGR, temporary gun positions would not be established at BMGR West. Neither would the ERCA Project fire at selected targets within NTAC and STAC. Existing military operations on both YPG and BMGR may result in periodic disruptions to recreation activities.

3.7.2.2 Preferred Alternative - Operation 1 (YPG Narrow SDZ)

Spin-stabilized projectiles would be fired from an existing gun position on the southern edge of Cibola Range along a singular line of fire directed 70 km eastward to the proposed 495-acre impact area on the eastern end of Kofa Region. The projectiles could contain either inert or high explosive warheads.

The gun position at Cibola Region is within a restricted area and the line of fire would not cross hunting areas. Thus, weapon firings would not disrupt hunting activities. The line of fire and the associated 6 km-wide SDZ is contained within the boundary of YPG with the exception of a short segment which will cross the airspace of the Kofa NWR near the south eastern portion of the Castle Dome Mountains. There would be periodic disruption of recreational activities within the area of Kofa NWR which overlaps with the SDZ footprint since users would need to be temporarily excluded from the area. Use of the new impact area on Kofa Region would not impact recreation since it is located approximately 8 miles south of hunting areas on the Kofa East Arm. Based on the above, most recreational activities on YPG would remain unaffected while recreational activities near the southeast corner of Kofa NWR near the Castle Dome Mountains would periodically be affected. Impacts would be less than significant.

The new impact area would function as a multi-purpose, multi-use impact area for other test missions that may run concurrently with or subsequent to the ERCA Project. In general, the impacts characterized for ERCA would also characterize impacts associated with other testing activities. However, unlike ERCA, these activities would be wholly contained within YPG's boundary. Overflights across Kofa NWR and closure of US 95 would not be required. Thus, there would be no impacts to recreational activities within the area of Kofa NWR.

3.7.2.3 Preferred Alternative - Operation 2 (BMGR Wide SDZ)

From temporary gun positions on BMGR West near Ground Support Area 76, fin-stabilized projectiles would be fired approximately 70 km eastward along a singular line of fire towards existing targets in either NTAC or STAC. The line of fire and the associated 26 km-wide SDZ would cross areas east of the Copper Mountains. This area is open to public recreational uses. There would be periodic disruption of recreational activities within the area which overlaps with the SDZ footprint since users would need to be temporarily excluded from the area. Furthermore, temporary closures would likely occur on weekends when recreational use would likely peak. However, disruptions would be limited since testing would occur at a maximum of three times per year.

Inert rounds would be fired into selected targets within NTAC or STAC on BMGR East. Since both ranges are designated for munitions use and there is no general public access to these areas, test firings would not conflict with recreational land uses. Impacts would be less than significant.

3.7.2.4 Preferred Alternative - Operation 3 (BMGR Narrow SDZ)

From temporary gun positions on BMGR West near Ground Support Area 76, spin-stabilized projectiles would be fired approximately 70 km eastward along differing lines of fire towards existing targets in either NTAC or STAC.

In general, impacts would be similar to those characterized for Preferred Alternative - Operation 2 (BMGR Wide SDZ). However, the SDZ width would be reduced from 26 km to 6 km. Thus, the area within the SDZ footprint where recreational uses would be temporarily suspended would decrease. The frequency of closures would remain at a maximum of three times per year. Impacts would be less than significant.

3.7.3 Avoidance, Minimization, and Mitigation Measures

Rec-1: Implement applicable management measures for recreation pursuant to INRMPs for YPG and BMGR.

3.8 Safety

3.8.1 Affected Environment

By their very nature, military operations and weapons testing on YPG and BMGR pose some level of hazard to both airspace and ground users. The primary ground-based hazard on both locations are unexploded ordnance. YPG, MCASY, and LAFB operate ranges for testing and training where the types of spent munitions include: artillery shells, mines, rockets, bombs, missiles, gunnery bullets. The number of spent munitions on the ranges is commensurate with the respective designated uses and intensity of military operations. As an example, 940,000 to 1,620,000 rounds, including small arms, are fired annually on YPG; the number of artillery rounds is approximately 25,000 rounds per year depending on the demand for testing. Furthermore, due to historical uses of both installations for military operations, unexploded ordnance can be present on lands outside of active ranges.

All three installations have numerous unpaved roads traversing their respective ranges. For example, there are approximately 622 miles of road within BMGR West alone. Thus, in addition to unexploded ordnance, other ground-based hazards include poor road conditions and military vehicle use. Furthermore, ancillary and support facilities on active ranges such as electronic warfare facilities; aircraft and missile control facilities; and ballistic tracking facilities entail additional hazards such as high energy electromagnetic waves from microwave transmitters and radars; and lasers. Hazards associated with use of military air space include mid-air collisions; collisions with

manmade structures or terrain; weather-related accidents; mechanical failure; pilot error; or bird-aircraft collisions.

In general, YPG, MCASY and LAFB follow similar protocols to avoid and minimize safety hazards:

- Public access to lands managed by the installations is prohibited except in designated areas.
- Locked gates, fencing and warning signs serve to limit inadvertent entry by unauthorized military personnel or members of the public.
- Public access, where allowed, is controlled through a permitting system and range safety training is required prior to entry.
- Access to and movement within active ranges must be authorized by the respective range management offices on the installations. Range safety training is required for authorized personnel.
- All military operation on active ranges are coordinated through the respective range management offices on the installations.

In addition, each installation implements safety protocols specific to their missions. Regulations that specify and implement safety procedures for military operations at YPG are:

- Yuma Proving Ground Standing Operating Procedure for Range Operations YPY-RO-P-1000 (April, 2016) prescribes general range control procedures, instructions, and information necessary for safe conduct of all types of test operations, demonstrations, training, and ground and airspace utilization at Yuma Proving Ground.

- Yuma Proving Ground Regulation 385-1 (June, 2014) provides specific guidance for all safety programs at YPG and applies to all personnel working and living at YPG to include military, civilian, contractor, tenant personnel, and dependents.

- Army Regulation 385-63 (January, 2012) prescribes Army-wide range safety policies and responsibilities for firing ammunition, lasers, guided missiles, and rockets and provides guidance for the application of risk management in range operations.

Military operations on BMGR East are conducted in compliance with Air Force Instruction 13-212 and LAFB Instruction 13-212 which provides specific safety instructions for all operations on the range. Military operations on BMGR West are conducted in compliance with Marine Corps Order (MCO) 3570.1c Range Safety (January 2012) and STO 3710.6 Range and Training Areas Standard Operating Procedures (January, 2013).

Military activities such as the use of explosive ordnance, equipment operation and maintenance can be a wildfire risk. In this region of the Sonoran Desert, wildfires are

typically small in size due to the low density of vegetation. On YPG, there has been approximately 25 small wildfires events that burned a total of 170 acres from 2003 to present (YPG 2015). A total of 87 wildfires were recorded at BMGR East from 2006-2011. The fires are typically located within the target complex (LAFB 2012) and are typically less than 10 acres (D. Graziani, personal communication, April 14, 2017). In the past five years, BMGR East has recorded 53 munition-ignited wildfires (D. Graziani, personal communication, April 4, 2017). There have been no munition-ignited wildfires since in BMGR West since 2012 (B. Law, personal communication, April 4, 2017).

However, during wet years, there is an increase in vegetation that can carry wildfire. For example, in 2005 a wildfire on BMGR East burned approximately 130,000 acres (LAFB 2012). In the same year, the King Valley Fire on YPG burned 3,000 acres burned 3,000 acres on YPG and 26,000 acres on Kofa NWR for a total of about 29,000 acres (YPG 2015). The size of both fires were attributed to the heavy winter rains that year. Furthermore, the spread of invasive plants increases threat of wildfires because the invasive species of concern grow in high densities, will readily carry a wildfire, and recover from fire more readily than native species, thereby choking out the native plants. For example, a wildfire that was evidently fueled by Sahara mustard burned approximately 500 acres of native creosote-bursage community at BMGR West in 2008 or 2009 (LAFB 2012).

3.8.2 Environmental Consequences

Impacts would be considered significant if the alternative results in:

- Substantial increases in health and safety risks for public and military personnel

3.8.2.1 No Action Alternative

Under the No Action Alternative the ERCA Project would not conduct long-range test firings at YPG or BMGR. At YPG, the proposed 495-acre impact area on the eastern end of Kofa Region and the associated observation mounds would not be established. The existing gun position at Cibola Range may be used for other types of test firings into existing impact areas. Likewise, other elements of the ERCA Project may continue at YPG under previously authorized programs on existing facilities.

At BMGR, a new TGP would not be established at BMGR West. Neither would the ERCA Project fire at selected targets within existing air-to-ground target areas (NTAC and STAC).

All existing safety protocols and regulations would continue to be implemented for on-going military operations and public uses on both YPG and BMGR. There would be no substantial increases in health and safety risks for public and military personnel.

3.8.2.2 Preferred Alternative - Operation 1 (YPG Narrow SDZ)

- **Gun Position:** Weapon malfunction could result in release of kinetic energy or fragments that would pose a hazard in the vicinity of the gun position. Thus, all ancillary equipment requiring technicians such as instrumentation vans and other support vehicles would be located behind blast shields. Furthermore, ammunition conditioning chambers would be located 500 m away from the gun position to avoid secondary ignition of munitions. Furthermore, a 500 m surface danger zone around the firing point is restricted. Roadblocks would be emplaced at all roadway and entry points to the gun position ensuring, the safety of non-military personnel would not be compromised. Safety protocols pursuant to Yuma Proving Ground Standing Operating Procedure for Range Operations YPY-RO-P-1000 Yuma Proving Ground Regulation 385-1; and Army Regulation 385-63 would be implemented. With implementation of these measures, there would be no substantial increases in health and safety risks for public and military personnel. Impacts would be less than significant.

- **New Impact Area:** Though the proposed impact area is new, potential for presence of unexploded ordnance within the proposed area remains a possibility due to historical uses of YPG for testing and training.

  During tests, kinetic energy or fragments from high explosive warheads may be present within the SDZ. However, there would be no personnel inside the SDZ. Since the SDZ would be approximately 6 km in width, the closest personnel would be located approximately 3 km away from the line of fire or the point of impact. Observation berms located outside of the SDZ would be used.

  All tests would be scheduled in advance with the range office at YPG to ensure that tests do not coincide with other military operations within the same area. Furthermore, observers and technicians within the impact area would be located outside the SDZ otherwise under adequate protective cover. Safety protocols pursuant to Yuma Proving Ground Standing Operating Procedure for Range OperationsYPY-RO-P-1000; Yuma Proving Ground Regulation 385-1; and Army Regulation 385-63 would be implemented during construction and operational phases of the proposed impact area. As an active impact area, the area would be restricted to the public. With implementation of these measures, there would be no substantial increases in health and safety risks for public and military personnel. Impacts would be less than significant.

  Once established, use of the new impact area would increase the amount of spent munitions and potential sources of MCOC. However, migration of MCOC off-range at sufficient concentrations and amounts to affect human and environmental receptors is unlikely based on MCOC assessments conducted pursuant to DODI 4715.11.

Establishment of the new impact area could increase the frequency of non-lightning ignited wildfires. Vegetation clearing and land disturbance associated with construction of targets may create conditions favorable to establishment of exotic invasive vegetation which would create increased fuel loads and increase the risk of wildfire. Furthermore, live-fire and vehicle use would increase the number of ignition sources. Due to the presence of unexploded ordnance, wildfires are typically not suppressed and are allowed to burn out to minimize risks to firefighting personnel. However, the vegetation within the impact area is not sufficiently dense and is unlikely to promote or propagate wildfires. Furthermore, the proposed impact area is not adjacent or within the vicinity of the general population and is buffered by public lands managed by the BLM. Thus, potential hazards to the general public and military personnel would be minimal.

- **Surface Danger Zone:** The proposed line of fire and the associated 6 km-wide SDZ would cross manned facilities within YPG, Highway 95, and Kofa NWR. The SDZ size and shape is designed/established to contain the munition impact in the event it veers off course or fragments midflight as a result of a launch or flight malfunction. ERCA testing activities would require temporary closure of Highway 95 and an area of the Kofa NWR within the SDZ.

    - **Highway 95:** Scheduling would be limited to low traffic periods. During tests, an approximately three mile long segment of the roadway between Mile Marker 50 and 53 would be closed for up to 30 minutes. In general, road closures will be conducted in accordance with Arizona Department of Transportation's road closure protocols. Traffic management personnel would be placed at both mile markers. Test firings would take place after the area has been cleared of all vehicles. Emergency access through the closed road segment will be coordinated between the YPG Public Safety Office and law enforcement or emergency responders on the scene.

    - **Kofa NWR:** The proposed overflight across Kofa NWR would occur in a remote area of the refuge. YPG would closely coordinate with Kofa NWR in advance of scheduled test firings. Tests would be scheduled to avoid high visitation periods for the refuge. Prior to test firings, YPG would deploy personnel along roads and aircraft to monitor for the presence of visitors within the SDZ. Test firings would be temporarily suspended if visitors are present within the SDZ on Kofa NWR.

Safety protocols pursuant to Yuma Proving Ground Standing Operating Procedure for Range Operations YPY-RO-P-1000; Yuma Proving Ground Regulation 385-1; and Army Regulation 385-63 would be implemented. With implementation of these measures, there would be no substantial increases in health and safety risks for public and military personnel. Impacts would be less than significant.

The new impact area would function as a multi-purpose, multi-use impact area for other test missions that may run concurrently with or subsequent to the ERCA Project. In general, the impacts characterized for ERCA would also characterize impacts associated with other testing activities. However, unlike ERCA, these activities would be wholly contained within YPG's boundary. Overflights across Kofa NWR and closure of US 95 would not be required.

3.8.2.3 Preferred Alternative - Operation 2 (BMGR Wide SDZ)

- **Gun Position:** Gun position safety protocols discussed under Preferred Alternative - Operation 1 would be implemented. As a result, impacts to safety would be similar to those characterized for Operation 1. In addition, safety protocols pursuant to STaO 3710.6 Range and Training Areas Standard Operating Procedures (January, 2013) would be implemented. With implementation of these measures, there would be no substantial increases in health and safety risks for public and military personnel. Impacts would be less than significant.

- **NTAC:** The proposed action would fire munitions with inert warheads into existing targets on BMGR East. In contrast to the testing regime at YPG, observation mounds would not be constructed within NTAC. Because NTAC is an active air-to-ground training ranges, there is no public access. Likewise, access for personnel is restricted during flying hours and ground based observers cannot be utilized during flight mission days. Instead, a survey party would travel to the target array to assess accuracy and precision of fire at the conclusion of the firing, escorted by appropriate Air Force personnel. All tests would be scheduled in advance with LAFB's Range Management Office and the air space above NTAC would not be active for the duration of each test. Furthermore, applicable portions of LAFB Instruction 13-212 would be implemented during testing. Utilization of these measures would ensure that there would be no substantial increases in health and safety risks for public and military personnel. Use of inert projectiles greatly reduces the risk of ignition of wildfire at the target area. Impacts would be less than significant.

- **Surface Danger Zone:** On BMGR West, the line of fire and the associated 26 km-wide SDZ would cross areas east of the Copper Mountains. This area is open to public recreational uses. State and federal agencies such as the US Border Patrol and the Arizona Department of Game and Fish also use the land and airspace for ongoing operations and training. The SDZ size and shape is designed/established to contain the munition impact in the event it veers off course or fragments midflight as a result of a launch or flight malfunction. Debris strikes as well as kinetic energy associated with impacts pose hazards for military and non-military personnel within the SDZ. Thus, both military and non-military uses in this area would be temporarily suspended for the duration of each test. The proposed line of fire would also traverse an air-to-air training range on BMGR East. Thus, air-to-air training would be temporarily suspended during the

course of each test in order to avoid midair strikes. Both ground-based military and non-military uses in this area within the air-to-air range would be temporarily suspended. The use of manned roadblocks, on all major roads traversing the SDZ will be implemented to prevent personnel from entering the SDZ during active test times. In order to maximize safety at BMGR East, test firings would likely be limited to weekends when air-to-air training is at a minimum or such training is not scheduled. With implementation of these measures, potential for hazards would be avoided or minimized. Impacts would be less than significant. In order to address the possibility of U.S. Border Patrol pursuit leading into the SDZ during active firing times, YPG will assign an operational liaison that can be reached by USBP if a cease-fire is required. In the event that the munition veers off course, the test team will use tracking radar data to determine impact location. The decision to recover the munition will depend on terrain, physical accessibility, technical requirement for failure analysis and any other protocol directed by BMGR West or East.

3.8.2.4 Preferred Alternative - Operation 3 (BMGR Narrow SDZ)

Impacts to safety would be similar to those characterized for Preferred Alternative - Operation 2. However, the smaller, 6 km-wide SDZ associated with a spin-stabilized projectile would further decrease potential impacts to safety when compared to the 26 km-wide SDZ associated with Operation 2. With implementation of safety measures from Operation 2, there would be no substantial increases in health and safety risks for public and military personnel. Use of inert projectiles greatly reduces the risk of ignition of wildfire at the target area. Impacts would be less than significant.

3.8.3 Avoidance, Minimization, and Mitigation Measures

YPG

Sfty-1: Coordinate with Kofa NWR prior to test firings and determine mitigations required to address the potential for personnel to be within the SDZ for the duration of each test.

Sfty-2: Schedule test firing to coincide with periods of low traffic on Highway 95 and low visitation periods on Kofa NWR to the extent practicable.

Sfty-3: Implement safety protocols pursuant to Yuma Proving Ground Standing Operating Procedure for Range Operations YPY-RO-P-1000; Yuma Proving Ground Regulation 385-1; and Army Regulation 385-63 for all ERCA activities.

Sfty-4: Coordinate all scheduled tests with respective range management office at YPG.

Sfty-5: Coordinate with Arizona Department of Transportation for temporary closure of Highway 95 during times of active testing.

BMGR

Sfty-6: Limit test firings to days when air-to-air training is at a minimum or such training is not scheduled.

Sfty-7: Temporarily suspend air-to-air or air-to-ground training during test firings within affected military airspace.

Sfty-8: Coordinate all scheduled tests with respective range management office at LAFB and MCASY.

Sfty-9: Implement manned roadblocks on all roads traversing the SDZ during active firing times.

Sfty-10 Assign an operations liaison between YPG test officer and U.S. Border Patrol (USBP) for cease fire in the event active USBP pursuit requires entry into SDZ.

Sfty-11: In the event of wildland fire, implement BMGR response protocols.

Sfty-12: Implement safety protocols pursuant to LAFB Operation Instruction 13-212 for all ERCA activities.

3.9 Soils

3.9.1 Affected Environment

3.9.1.1 Topography

YPG and BMGR are located in the Basin and Range Physiographic Province of Arizona, which is distinguished by broad alluvial valleys separated by steep, discontinuous, northwest to southeast trending mountain ranges.

The Colorado River and the Gila River are in the vicinity of both YPG and BMGR. Their confluence is located in the city of Yuma, just east of Interstate 8. The Colorado River is located west of the installations, flowing north to south while the Gila River and the associated river valley bisects both areas. YPG is located immediately to the north while BMGR is located immediately to the south.

Within the Kofa Region of YPG, the Castle Dome Plain and King Valley are the dominant landscape features. The Castle Dome Plains are composed of broad slopes that radiate outward from the Castle Dome Mountains, an irregular aggregate of mountains centered in the Kofa Refuge. The slopes terminate at the northern face of the Muggins Mountains. Feeder washes on the slopes drain into large collector washes that circumscribe the northern face of the Muggins Mountains. The collector washes convey storm flows into the Gila River. King Valley is formed by adjoining slopes from Castle

Dome Mountains and the Palomas Mountains. The east arm of Kofa Region encompasses the Tank Mountains and the Palomas Mountains and their associated slopes. The proposed impact area is located on the southern slopes of Palomas Mountains.

In BMGR West, four northwest to southeast trending mountain ranges, separated by broad, low-gradient alluvial valleys characterize the landscape. The Gila Mountains and the Tinajas Mountains are the western most mountain ranges and are connected. The Lechuguilla Desert lies to the east-northeast of the connected ranges; to the west lies the Yuma Desert. The Copper Mountains, located near the center of BMGR West are adjacent to the eastern flank of the Lechuguilla Desert. The Mohawk Valley is lies east of the Copper Mountains. The Mohawk Mountains intersect the boundary between BMGR West and East.

In BMGR East, five northwest to southeast trending mountain ranges, separated by broad, low-gradient alluvial valleys characterize the landscape. The ranges increase in size from west to east. The Mohawk, Granite, and Aguila Mountains, located to the western half of BMGR East are narrow and linear in form. In contrast, the Crater Range and Sauceda Mountains, respectively located in the middle and east, are large and irregular aggregate of mountains. Each of the ranges are separated by valleys. The San Cristobal Valley is located between the Aguila and Mohawk Mountains. Childs Valley is located between the Aguila and the Crater Range.

3.9.1.2 Soils

The soils throughout the area are quite variable ranging from fine-grained sands and silts on the valley floors to very gravelly soils in the mountainous regions. Soil depths range from very deep in alluvial basins to very shallow in the mountain regions where bedrock is often exposed. Mountains regions are composed of well to excessively drained, gravelly loam. Alluvial fans (or *bajadas*) are generally composed of well drained, gravelly to sandy loam. Valleys and washes are generally composed of coarse-loamy to sandy loam soils. Within washes, the streambed alluvium ranges from 10 feet thick in the smaller washes to as much as 110-feet thick in the Gila River floodplain.

Most soil types within the project area exhibit low to moderate water and water erosion potential with limited exceptions (YPG 2015). However, topography influences relative erosion potential. Water erosion potential typically increases with greater slope while wind erosion potential is greatest where soils are fine-grained sands and silts. Many of the valley soils are subject to moderate or high wind erosion potential. Rill and gully erosion are also common in some of the valleys.

Within YPG, the dominant soil is gravelly loam due to the large footprint occupied by the Muggins Mountains, Castle Dome Mountains, and the Laguna Mountains, as well as their associated slopes. Soil types in the mountainous areas include Lithic Torriorthents and Typic Torriorthents (YPG 2015b). Soil types in the *bajadas* (i.e., alluvial fans)

include Gunsight, Chuckwalla, Tuscon, Tremant, and Cristobal (YPG 2015b). Soil types in the valleys include Gilman, Harqua, and Glenbar (YPG 2015b). Streambeds and beaches are composed of Superstition, Rositas, Riverbend and Carizzo (YPG 2015b). Soil types on the east arm of the Kofa Range where the new impact area is proposed include Chuckawalla, Gunsight family, Tucson, and Tremant.

Mountains within BMGR are narrower and the alluvial valleys are broader relative to the topography on YPG. On BMGR West, GSA 71 and 76 are located within Mohawk Valley on the *bajadas* on the eastern flank of the Copper Mountains. Typical of the regional area, soils on the *bajadas* are composed of Gunsight, Growler, Chuckwalla, and Tuscon. On BMGR East, South and North TAC encompass portions of Aguila, Granite, and Growler Mountains as well as the Crater Range and their associated *bajadas*. The remaining areas encompass the San Cristobal Valley. Soils in the valley are relatively more susceptible to wind and water erosion relative to those on the mountains and *bajadas*. Soils on BMGR East are generally composed of the following soil complexes (LAFB 2010):

- Mountains: Guvo, Laposa, Lajitas, Lomitas
- *Bajadas*: Coolidge, Denure, Growler, Gunsight, Hyder, Mohall, Momoli, Rillito, Superstition, Why
- Valleys: Casa Grande, Cherioni, Gilman, Glenbar, Riverwash

3.9.2 Environmental Consequences

Impacts would be considered significant if the alternative results in:

- Substantial increase in wind or water erosion of soils, either on or off the site

3.9.2.1 No Action Alternative

Under the No Action Alternative the ERCA Project would not conduct long-range test firings at YPG or BMGR.

At YPG, the existing gun position at the southern terminus of Cibola Range would continue to be used for other test missions as needed. Minimal surface disturbances are anticipated. The proposed 495-acre impact area on the eastern end of Kofa Region and the associated observation mounds would not be established. Thus, there would be no munitions-related surface disturbances in the impact area. Munitions-related surface disturbances associated with use of existing impact areas within Kofa Region are expected to continue.

At BMGR, temporary gun positions would not be established at BMGR West. Neither would the ERCA Project fire at selected targets NTAC and STAC. However, there would be continued munitions-related surface disturbances within NTAC and STAC associated with on-going training operations.

3.9.2.2 Preferred Alternative - Operation 1 (YPG Narrow SDZ)

Long-range test firings would be conducted from an existing gun position on the southern edge of Cibola Range. The line of fire would be directed eastward to the proposed 495-acre impact area on the eastern end of Kofa Region. The gun position would be established on an existing site on previously disturbed soils. Ground disturbing activities such as grading would not be required at the gun position.

Construction of the earthen observation mounds would result in disturbance of surface soils around the perimeter of the observation mound. Construction would mix soil layers and disturb consolidated soils. The disturbed area would be subject to wind and water erosion. However, the erosional and sediment transport processes associated with surface flows during periods of rain would restore disturbed surfaces over time. Water infiltration would also cause loose soils to settle and consolidate. Construction may result in disturbance of surface area greater than one acre and thus may be subject to AZDEQ Construction General Permit requirements. Implementation of Soils-1 would minimize wind and water erosion around the disturbed area during construction.

Ordnance impacts within the impact area would result in varying levels of surface impacts such as craters throughout the impact area. Levels of surface disturbance would be commensurate with the types and sizes of munitions tested. For example, explosive rounds would result in craters that are wider and deeper than inert rounds. Surface disturbances would result in mixing of soil layers at the area of impact. For example, desert pavement would mix with the alluvial soils underneath. Disturbance of soils consolidated over time via geologic processes would result in localized erosion from wind and rain. However, the erosional and sediment transport processes associated with surface flows during periods of rain would partially fill in craters and restore disturbed surfaces over time. Water infiltration would also cause loose soils to settle and consolidate. Thus, impacts would be localized. Wind and slow erosion would decrease over time as the same processes work to consolidate loose soils. There would be no substantial increase in wind or water erosion of soils, either on or off the site. Impacts would be less than significant.

The new impact area would function as a multi-purpose, multi-use impact area for other test missions that may run concurrently with or subsequent to the ERCA Project. In general, the impacts characterized for ERCA would also characterize impacts associated with other testing activities.

3.9.2.3 Preferred Alternative - Operation 2 (BMGR Wide SDZ)

A temporary gun position would be established within GSA 76 close to existing roads and previously disturbed areas. Vehicles and supporting equipment would be staged at the gun position. The disturbed area would be subject to wind and water erosion. However, the erosional and sediment transport processes associated with surface flows during periods of rain would restore surface disturbances over time. Water infiltration would also cause loose soils to settle and consolidate.

Inert ordnance impacts would result in varying levels of surface impacts such as craters within the vicinity of the target, ranging from 36 inches to 54 inches in diameter. However, the areas within the vicinity of existing targets are disturbed. LAFB conducts explosive ordnance disposal operations every two years around each target to a radius of 500 feet. Every 10 years, explosive ordnance disposal operations are conducted to a radius of 1,000 feet from each target.

Disturbance of soils consolidated over time via geologic processes would result in localized erosion from wind and rain. However, the erosional and sediment transport processes associated with surface flows during periods of rain would partially fill in craters and restore disturbed surfaces over time. Water infiltration would also cause loose soils to settle and consolidate. Thus, impacts would be localized. Wind and slow erosion would decrease over time as the same processes work to consolidate loose soils. There would be no substantial increase in wind or water erosion of soils, either on or off the site. Impacts would be less than significant.

3.9.2.4 Preferred Alternative - Operation 3 (BMGR Narrow SDZ)

Impacts would be similar to those characterized for Preferred Alternative - Operation 2 (BMGR Wide SDZ).

3.9.3 Avoidance, Minimization, and Mitigation Measures

Soils-1 Minimize surface disturbance, minimize off-road travel, avoid vegetation.

3.10 Water Quality

3.10.1 Affected Environment

3.10.1.1 Surface Water

YPG and BMGR are located within a highly arid environment within southwest Arizona. Average rainfall for the area is generally less than 5 inches. Evaporation rates, ranging from 72 to 107 inches exceed precipitation rates. Most of the annual rainfall occurs in mid-winter and in the late summer, often as intense rainfall. Soils in the area are permeable alluvium consisting of gravelly or cobbly sand, to very fine, sandy loam located in deep alluvial basins (YPG 2010). The combination of low precipitation, high evaporation, and permeable soils effectively counter surface water build-up. Thus, there are no perennial, intermittent streams, or wetlands present within the area. Surface waters with hydrological connection to other major waterways are ephemeral and flow only immediate response to sizable rainfall events. However, the Sonoran Desert supports other types of surface waters such as charcos, *playas*, and *tinajas,* which are depressions that hold water rain events. Furthermore, springs, seeps are also present.

The Colorado River and the Gila River are in the vicinity of both YPG and BMGR. Their confluence is located in the city of Yuma, just east of Interstate 8. The perennial Colorado River, originating from the Rocky Mountains, is located west of the installations, flowing north to south. The Gila River, originating from the Black Range in New Mexico, is ephemeral through its lower reach and flows to the southwest. The riverbed is dry except for local ponds and discharge from agricultural drainage. Rainfall and water releases from Painted Rock Dam cause occasional flows in the river. YPG is located immediately to the north while BMGR is located immediately to the south. Thus, surface waters on the BMGR flow northward to the Gila River. Surface waters within the Kofa Region of YPG flow south toward the lower Gila River while those within the Cibola Region and Laguna Region flow west toward the Colorado River. A matrix of braided washes cover the landscape throughout both ranges, draining water and concentrating flows into a number of large washes.

Major washes on BMGR East traversing through NTAC and STAC include Ten Mile Wash, Growler Wash, and Daniels Arroyo (LAFB 2010, p. 3-10). At YPG, major washes on in the Cibola and Laguna Region include Mohave Wash, Trigo Wash, McAllister Wash, Indian Wash, and Los Angeles Wash (YPG 2013); major washes in the Kofa Region include Yaqui Wash, Gravel Wash, Big Eye Wash, Fuzzy Belly Wash, Winston Wash, Cedric Wash, and Rutherford Wash.

- **Jurisdictional Waters of the United States:** The Colorado River and Gila Rivers are waters of the U.S. and are subject to the Clean Water Act. Major washes and their tributaries that are hydrologically connected to these rivers and present sufficient evidence of ordinary high water mark (i.e., physical evidence of surface flows such incised banks, sediment transport, etc.) are likely waters of the U.S. However, due to the arid desert environment there are no wetlands within operational areas on YPG, BMGR East, and BMGR West. Discharges of fill in waters of the U.S. and adjacent wetlands are subject to Sections 401 and 404 of the Clean Water Act.

- **Floodplains:** Floodplains are protected by Executive Order 11988, Floodplain Management, which instructs federal agencies to consider the risks, danger, and potential impacts of locating projects within floodplains. The Federal Emergency Management Agency (FEMA) defines floodplains as areas subject to a one percent chance of flooding in any given year (often referred to as the 100-year floodplain). All ERCA operational areas on YPG, BMGR East, and BMGR West have not been mapped by FEMA for the 100-year floodplains. There are almost no intermittent streams in the ERCA operational areas; operational areas consists mostly of femoral water. In executing the Preferred Alternative the appropriate Section 404 of the Clean Water Act determination will be accomplished for anything resembling a wash.

- **Water Quality:** The matrix of braided washes as well as the major washes are highly erosive due to the sandy alluvium. Thus, during the infrequent heavy

rainfall events, the braided drainages carry highly turbid waters into the main wash beds.

Surface flows across training ranges could transport MCOCs off range into the lower Gila River. MCOCs are munitions constituents that have the potential to migrate from a source area to a receptor (human or ecological) in sufficient quantity to cause an unacceptable risk to human health or the environment (Department of Defense Instruction 4715.14, 30 November 2005). However, studies of MCOCs on ranges at YPG and BMGR have concluded that concentrations were below detectable levels and that surface water does not represent a viable pathway for migration of MCOC off of the range complex (LAFB 2010, p. 3-116; YPG 2010, p.17).

Water in the lower Gila River is unsuitable for most uses including irrigation and human consumption due to the presence of pesticides, metals, inorganics, and nutrients (ADWR 2015). Pesticide contamination in the Gila River is some of the most significant in the western United States (ADWR 2015). The use of DDT was prevalent in the lower Gila River Valley from 1945 to 1969. The pesticide toxaphene was also used in the valley in the mid-1960s. Most domestic use of toxaphene and DDT was on cotton crops. Before the suspension of both products, toxaphene-DDT mixtures were frequently used to control insect pests. The total farmland irrigated by DDT- and toxaphene-contaminated drain water exceeded 100,400 acres. Agricultural drain water canals have transported an estimated 4,917 tons of DDT to the river (ADHS 2015). Multiple studies conducted over the previous four decades indicate substantial bioaccumulation of DDT, DDT-derivatives, toxaphene, and metals in tissues of birds and fish. Currently, the lower Gila River from Coyote Wash to Fortuna Wash is designated as an impaired water pursuant to Section 303(d) of the Clean Water Act due to the presence of selenium and boron, byproducts of agricultural operations in the river valley.

3.10.1.2 Ground Water

YPG and BMGR are located within the western half of the Lower Gila groundwater basin. Sources of recharge in the basin in decreasing order of volume are: Infiltration of irrigation water; surface and subsurface flows from washes during rain events; and periodic large flood flows from the Gila River. Use of Colorado River water for irrigation in the river valley dominates the recharge rate. Recharge from rainfall is small because of the arid climate and high evaporation rates. Inconsistent flow in the Gila River causes recharge from the river usually to be negligible.

Depth of alluvium within washes range from 10 feet thick in the smaller washes to as much as 110-feet thick in the Gila River floodplain (ADWR 2015). Depth to groundwater on the BMGR, ranges from about 50 feet below ground surface along major wash tributaries near the Gila River to nearly 600 feet below ground surface near mountain

ranges (LAFB 2010). On YPG, depths to groundwater range from 30 feet to more than 1,000 feet (in north Cibola Region).

Groundwater in the Lower Gila basin has high concentrations of dissolved solids and is generally unsuitable for most uses including irrigation and human consumption. Recycling of irrigation water in the floodplain gradually increased the salinity of the local groundwater and rendered it unsuitable for irrigation and domestic use by the late 1940's.

Sources of discharge in decreasing order of volume are evapotranspiration from crops and ground water pumping. Ground water is pumped to relieve excess recharge stemming from agricultural irrigation. Excessive recharge from irrigation can have adverse impacts on groundwater quality because the recharge water may contain leached nutrients or other agrichemicals.

BMGR East: Groundwater within BMGR East occurs primarily in tertiary volcanic rocks and alluvial deposits. Groundwater recharge occurs from infiltration of rainfall runoff in stream channels and along mountain fronts, and underflow from adjacent alluvial basins. Depth to groundwater on the BMGR, based on limited water level data from wells, ranges from about 50 feet below ground surface along major wash tributaries near the Gila River to nearly 600 feet below ground surface near the mountain ranges. Depth to groundwater is typically on the order of several hundred feet below ground surface. The quality of groundwater within BMGR East has been found to be poor. It typically has high concentrations of total dissolved solids, boron, and fluoride. Approximately 50 wells occur in BMGR East. Most of these wells are abandoned or are no longer in use. Existing production wells supply water for construction, dust control, and potable water supply for selected facilities as well as water for Sonoran pronghorn forage plots (LAFB 2010)

3.10.2 Environmental Consequences

Impacts would be considered significant if the alternative results in:

- Substantial long term impairment of surface and ground water quality

3.10.2.1 No Action Alternative

Under the No Action Alternative the ERCA Project would not conduct long-range test firings at YPG or BMGR. At YPG, the proposed 495-acre impact area on the eastern end of Kofa Region and the associated observation mounds would not be established. The existing gun position at Cibola Range may be used for other types of test firings into existing impact areas. Use of equipment such as generators and instrumentation vehicles at the gun position may periodically result in fuel and oil leaks. Due to the infrequency of surface flows sufficient enough to convey to flows into nearby rivers as well as the depth of alluvial fill in the washes, oil and fuel leaks would entail negligible impacts to surface water quality.

Likewise, other elements of the ERCA Project may continue at YPG under previously authorized programs on existing facilities. Presence of spent munitions within other impacts areas would not degrade surface water quality. As noted above, surface water does not represent a viable pathway for migration of MCOC off of the range complex. Other ERCA activities would not require the use of ground water or discharge of water that would infiltrate into the ground water basin.

At BMGR, a new TGP would not be established at BMGR West. Neither would the ERCA Project fire at selected targets within existing air-to-ground target areas (NTAC and STAC).

3.10.2.2 Preferred Alternative - Operation 1 (YPG Narrow SDZ)

Under Preferred Alternative - Operation 1, long-range test firings would be conducted from an existing gun position on the southern edge of Cibola Range. Firings would be directed eastward to the proposed 495-acre impact area on the eastern end of Kofa Region.

Placement of equipment such as generators and instrumentation vehicles would be required for the duration of long-range firing tests at the gun position and the observation mound. Vehicular maintenance is not anticipated. However, vehicle and equipment fueling may be required due to the remoteness of the site. Furthermore, generators and instrumentation vehicles may periodically leak fuel and oil. Due to the infrequency of surface flows sufficient enough to convey pollutants into nearby rivers as well as the depth of alluvial fill in the washes, the potential for conveyance of oils and fuels off range would be minimal. With implementation of WQ-1 and WQ-2, potential impacts to surface water quality would be avoided or further minimized.

Presence of spent munitions within the impact area would not degrade surface water quality. As noted above, surface water does not represent a viable pathway for migration of MCOC off of the range complex.

The approximately 27 meter by 100 meter (0.7 acre) earthen observation mound may contribute to turbidity during surface flows. Runoff from the observation berm could carry fine silts and sands integrated with the sand and gravel material into nearby washes. Impacts would be localized since sand and cobbles tend to settle out of the water column quickly. Furthermore, the washes are highly erosive due to the sandy alluvium and typically carry turbid waters into the main wash beds. Thus, fine sand and silts from the observation mound would result in negligible impacts to turbidity.

ERCA activities would not require the use of ground water or discharge of water that would infiltrate into the ground water basin.

Potential Discharges of Fill in waters of the U.S.

Use of an existing gun position would not require earthmoving activities that would result in discharges of fill. Construction of observation berms would avoid discharges in waters of the U.S. Artillery rounds landing within washes would change the cross sectional contour of the affected wash, an activity deemed to be a discharge of fill. However, impacts would be temporary since sediment loads from surface flows would reestablish smooth contours associated with surface flows. Potential discharges would be subject to Section 401 and Section 404 of the Clean Water Act. Implementation of WQ-3 would ensure compliance with the Clean Water Act.

Based on the above, there would be no impacts to ground water. Impacts to surface water quality would be negligible or avoided with implementation of minimization and avoidance measures as appropriate.

The new impact area would function as a multi-purpose, multi-use impact area for other test missions that may run concurrently with or subsequent to the ERCA Project. In general, the impacts characterized for ERCA would also characterize impacts associated with other testing activities.

3.10.2.3 Preferred Alternative - Operation 2 (BMGR Wide SDZ)

In general, impacts would be similar to those characterized for Preferred Alternative - Operation 1 (YPG Narrow SDZ). Under Operation 2, an observation mound would not be constructed. Thus, potential discharges of fill into waters of the U.S. associated with construction would be avoided.

3.10.2.4 Preferred Alternative - Operation 3 (BMGR Narrow SDZ)

In general, impacts would be similar to those characterized for Preferred Alternative - Operation 1 (YPG Narrow SDZ. Under Operation 3, an observation mound would not be constructed. Thus, potential discharges of fill into waters of the U.S. associated with construction would be avoided.

3.10.3 Avoidance, Minimization, and Mitigation Measures

WQ-1: Place drip pans under all vehicles parked for over two hours at temporary gun positions on BMGR West.

WQ-2: Provide secondary containment for all hazardous materials and POLs at temporary gun positions on BMGR West.

WQ-3: Provide secondary containment for all generators at temporary gun positions on BMGR West.

WQ-4: Obtain Section 401 and Section 404 permits as needed and implement terms and conditions therein.

WQ-5: Obtain an Arizona Pollutant Discharge Elimination Construction General Permit if disturbance exceeds 1 acre and implement applicable terms and conditions including preparation of a Storm Water Pollution Prevention Plan as well as implementation of best management practices therein.

4.0 Cumulative Impacts

The ERCA Project would conduct tests on YPG and BMGR across three jurisdictions: MCASY, LAFB, and YPG. The scope of analysis for cumulative impacts encompasses all three installations as well as adjacent lands including the cities of Yuma as well as the towns of Ajo and Gila Bend.

Most land uses surrounding YPG and BMGR are primarily undeveloped open space and sparsely populated areas. Most of the land is owned by the federal government, primarily under the control of the BLM, BOR, and USFWS. BLM-managed lands circumscribe YPG on the west, north, and east. Kofa NWR is located between Cibola Region and the Kofa Region east arm. YPG is located immediately to the north of the Gila River while BMGR is located immediately to the south. Private lands used for agriculture, BLM and BOR-managed lands, and State Trust Lands are interspersed throughout the Gila River Valley. Residential, commercial, agricultural, industrial land uses are principally concentrated within the vicinity of the city of Yuma, west of both YPG and BMGR, at the confluence of the Colorado River and the Gila River. Cabeza Prieta NWR is located immediately adjacent to the south of BMGR. The Tohono O'odham Nation is located to the southeast of the BMGR East. Most land use within tribal lands is typically associated with ranching and the grazing of livestock, and may include seasonal cattle camps. The Sonoran Desert National Monument is located along the northeast corner of BMGR East near East TAC. To the north east of BMGR East lies the town of Gila Bend. Much like the city of Yuma, residential, commercial, agricultural, industrial land uses characterize the land uses in the town. The town of Ajo, near the eastern border of BMGR East consists of primarily of residential land uses as well as shuttered mining lands.

Most non-Federal lands through the Gila River Valley corridor and Yuma Valley are used for agriculture since agriculture is central to the economy of Yuma County. The county ranks in the top 1 percent in sales of all crop and livestock products combined among U.S. counties (YCAWC 2015). Furthermore, it ranks in the 0.1 percent and 0.2 percent for vegetable acreage and lettuce acreage, respectively (YCAWC 2015). Thus, the extent of agricultural land use is expected to remain largely unchanged. Incremental increases in acreage used for agriculture is expected in the foreseeable future. For example, from 2007 to 2012, the acreage of land used for agriculture increased from 210,480 acres to 214,675 acres (USDA 2015).

Due to the contribution of agriculture and military installations to the local and regional economy, the general area within the vicinity of YPG and BMGR, including the city of Yuma, has increased in population. The general population of the city of Yuma, where 48% of the county population resides, increased from 77,515 in the year 2000 to 93,064 in the year 2010 (COY 2012). The population is expected to increase to somewhere between 164,142 and 276,000 by the year 2055 (COY 2012). As a result, continued development in the areas of housing, transportation, and utilities are expected in the foreseeable future through the Gila River Valley corridor and Yuma Valley. Other regional economic element is the renewable energy sector. Due to the weather and climate, the area is suitable for solar energy. For example, the town of Gila Bend has land uses dedicated for solar energy development and currently hosts six solar energy operations within its planning area (GB 2017).

On BLM-managed lands, existing grazing practices and mineral developments are expected to continue. In addition, increased recreational uses associated with increases in the general population; border control operations; and development of solar energy projects such as the Quartzsite Solar Energy project and transmissions lines are expected in the foreseeable future (BLM 2008).

On lands under the jurisdiction of YPG, LAFB, and MCASY, support areas (cantonment areas, airfields, support facilities, etc.) and associated infrastructure would likely be redeveloped or repurposed in accordance with evolving training and testing needs. Incremental expansions of existing support areas and structure are also likely in the foreseeable future. Operation areas such as impact areas on YPG as well as tactical ranges on BMGR would continue to be subject to testing and training uses. As in the case of the new impact area at YPG, incremental increases in operational areas are likely in the foreseeable future. However, disturbances within these areas are expected to be limited. For example, less than 10 percent of the range area on the BMGR has been subjected to low to high levels of disturbance (LAFB 2010).

Lands under the jurisdiction of all three installations are subject to authorized and unauthorized non-military uses. For example, energy transmission corridors traverse YPG and BMGR. Maintenance, upgrades, and establishment of new energy transmission lines are likely in the foreseeable future. The southern border of BMGR is part of the international border between the US and Mexico. Thus, unauthorized cross-border traffic and Border Patrol training and interdiction operations are likely to continue on the BMGR.

4.1 Air Quality

Yuma County is in attainment for all criteria pollutants with the exception of PM_{10}. Portions of Yuma County were designated a moderate nonattainment area for the 24-hour standard of PM_{10}. Mobile emission sources, such as vehicular and agricultural equipment emissions, and blowing dust are the primary contributors to PM_{10} emissions in this region. The Yuma PM_{10} nonattainment area is located in the southwestern potion

of Yuma County comprising about 300,000 acres. The nonattainment area encompass primarily agricultural areas near the city of Yuma, west of the proposed action area.

Military training and testing activities as well as continued development of the surrounding area as summarized above would result in continued emissions of criteria pollutants from stationary and mobile sources including PM_{10}. However, due to the larger regional trends in increased agriculture and development which represent the major contributors to PM_{10} within the cumulative impact assessment area, contribution from military training and testing activities to cumulative impacts would be minor. Thus, with the exception of PM_{10}, the region would likely continue to be in attainment for all NAAQS. Cumulatively, an increase in the ambient levels of PM_{10} over the long term is expected. Operations 1 through 3 of the Preferred Alternative whether implemented individually or in combination would result in no change to the regional trend.

4.2 Biological Resources

4.2.1 General Fauna and Flora

Due to use restrictions on federally-managed lands including YPG and BMGR, these lands would continue to harbor a representative cross section of indigenous Sonoran Desert natural communities and biodiversity. Furthermore, in conjunction with other large masses of protected lands such as BLM-managed lands and the Kofa NWR circumscribing YPG, Sonoran Desert and Organ Pipe Cactus National Monuments, Cabeza Prieta NWR, and El Pinacate Biosphere Reserve, the ecology of YPG and BMGR is expected to retain much of the natural process and function only attainable across large protected landscapes.

However, regional trends discussed above may have long-term ramifications to species and habitats on YPG and the BMGR as continued expansion of industrial, residential, and agricultural development along the Interstate 8 corridor encroach on the borders of YPG and BMGR. Restrictions on wildlife movement patterns intensify as roads, canals, railroads, border barriers, fencing, and patrols further limit intra-species contact in a regional context. Other edge effects at the interface of development and protected lands may include an increase baseline noise levels, increased predation, and increase potential for dispersal of non-native species onto YPG and BMGR.

The ongoing military training and testing activities on YPG and BMGR would entail continuation disturbances within the landscape. On BMGR, non-military activities such as unauthorized cross-border traffic and Border Patrol training and interdiction operations would contribute to on-going disturbances. Incremental expansions of existing support areas and structure are also likely in the foreseeable future. However, disturbances within these areas are expected to be limited. For example, less than 10 percent of the range area on the BMGR has been subjected to low to high levels of disturbance (LAFB 2010). Furthermore, all three installations would continue to implement their respective integrated natural resources management to minimize impacts to native Sonoran Desert flora and fauna. The ERCA Project would utilize

existing operational areas on BMGR, limiting impacts to previously disturbed areas. On YPG a new impact area would be established. However, given the small size of the disturbed area relative to the larger vegetated landscape in the Kofa Region, cumulative impacts to flora and fauna would be minimal whether Operations 1 through 3 of the Preferred Alternative are implemented individually or in combination.

4.2.2 Threatened and Endangered Species

The current range of the pronghorn is mostly located on military lands or public lands managed by federal agencies such as the BLM, USFWS, or BOR. The geographical distribution is due to the loss of the habitats adjacent to and within the former Gila River riparian corridor is one of the most critical affecting its continued survival. The availability of these habitats have been irreversibly lost to this species as a result of the development of the railroad and interstate highway that block its north-south movements, conversion of river corridor habitats to agriculture and other economic uses, and dewatering of the river itself. As a result of these and other additive impacts, range of the pronghorn would mostly be limited to public lands managed by federal agencies in the foreseeable future.

Relatively small parcels of private and State lands occur within the currently occupied range of the pronghorn near Ajo and Why, north of the BMGR from Dateland to Highway 85, and from the Mohawk Mountains to Tacna. State inholdings in the BMGR were acquired by the USAF. Continuing rural and agricultural development, recreation, vehicle use, grazing, and other activities on private and State lands adversely affect pronghorn and their habitat. MCAS-Yuma (2001) reports that 2,884 acres, on lands outside the BMGR, have been converted to agriculture near Sentinel and Tacna. These activities on State and private lands and the effects of these activities are expected to continue into the foreseeable future. Historical habitat and potential recovery areas currently outside of the current range are also expected to be affected by these same activities on lands in and near the action area in the vicinity of Ajo, Why, and Yuma.

Military training and testing activities on YPG and BMGR would continue in the foreseeable future. Thus, most activities that could potentially affect pronghorn are Federal activities. On YPG, the Sonoran pronghorn population on Kofa Region is part of a Nonessential Experimental Population established under Section 10(j) ESA. Thus, they are treated as a proposed species for the purpose of Section 7 consultation. Furthermore, Federal activities on BMGR would not result in cumulative impacts to the pronghorn since they are subject to Section 7 consultation and the terms and conditions of issued BOs. Likewise, the ERCA Project would be located on the pronghorn's current range on BMGR and would be subject to Section 7 consultation. However, with the implementation of the terms and conditions of the program specific BO as well as avoidance and minimization measures contained therein, the proposed activities on BMGR would not result in cumulative impacts.

Of most significant concern to pronghorn is the high level of border related activity in the action area resulting from illegal border crossing and interdiction efforts. Border activity

has resulted in route proliferation, off-highway vehicle activity, increased human presence in backcountry areas, discarded trash, abandoned vehicles, cutting of firewood, illegal campfires, and increased chance of wildfire. Habitat degradation and disturbance of pronghorn have resulted from these activities. Though border activity levels are still high, the trend in overall border apprehensions and drive-throughs has declined in recent years within the action area likely due to increased law enforcement presence, the border fence, and the status of the economy in the U.S. Despite high levels of border activity and law enforcement response throughout the action area, pronghorn in the U.S. have managed to increase since 2002, although their use of areas subject to high levels of border use and law enforcement appear to have declined. Operations 1 through 3 of the Preferred Alternative whether implemented individually or in combination would result in no change to the regional trend.

4.3 Cultural Resources

Land use in Yuma County is characterized by vast open spaces under the management of Federal agencies as well as concentrations of development along the Interstate 8 corridor in the Gila River Valley and Yuma Valley. Due to the importance of agriculture and associated industrial, commercial, and residential developments to the economy of Yuma County, incremental increase in development of open space areas along the Interstate 8 corridor is expected in the foreseeable future. As a result, incremental impacts to cultural resources commensurate with the rate of development is expected on non-Federally managed lands.

Lands on YPG and BMGR are designated for military training and testing. The overall land use on these two ranges is not expected to change. However, as military training and testing needs evolve, there may be incremental development resulting in the conversion of open space to active operational areas. On BMGR, the ERCA Project would use existing operational areas. On YPG, a new 495-acre impact area would be established on Kofa Region in addition to the 11 existing impact areas. Though there are nine cultural sites within the new impact area, they are not eligible for the NRHP. Nine sites, all determined to be not eligible for listing on the NRHP, have been identified within the proposed boundary of the proposed impact area. In addition, there are five sites located within 500 feet of the proposed impact area, all determined to be not eligible for the NRHP. Cumulative impacts may include increased ground disturbance which may accelerate the rate of erosion within and just outside of the proposed impact area, both uncovering and covering cultural resources. In general, cumulative impacts to cultural resources on YPG and BMGR would be de miminis and would result in No Adverse Effects under the NHPA whether Operations 1 through 3 of the Preferred Alternative are implemented individually or in combination.

4.4 Hazardous Materials and Waste

Increased agriculture and industrial development along the Interstate 8 corridor as well as mineral developments on BLM-managed lands would result in increased use of hazardous materials in the vicinity of YPG and BMGR. Military training and testing activities on YPG and BMGR would continue to occur in the foreseeable future. Thus, there would be continued transport, use, and storage of hazardous materials at administration and support facilities on YPG and BMGR. Required compliance with federal, state, and local regulations would reduce the potential release of these materials and wastes to the environment with continued implementation of pollution prevention, waste minimization, and spill response programs.

The ERCA Project would not result in construction of new permanent facilities that would consume and generate hazardous wastes. Hazardous materials at the gun position and observation mounds such as fuels, oils, and lubricants would be managed via best management practices. Transport, use, storage, and disposal of these and other hazardous materials would be managed in compliance with RCRA. Solid waste would be stored in containers and transported to an approved landfill. Human sewage from temporary field facilities would be contained in portable toilets and removed by a commercial contractor and discharged in approved sewage treatment facilities. Thus, contributions to cumulative impacts would be de minimis.

Continued military training and testing activities on YPG and BMGR would result in increased concentration of MCOCs. However, migration of MCOC off-range at sufficient concentrations and amounts to affect human and environmental receptors is unlikely based on MCOC assessments conducted pursuant to DODI 4715.11. Furthermore, ongoing EOD clearance operations and periodic evaluation of the potential for munitions constituents to be transported off-range would have countervailing impacts. Given that ERCA is not a permanent program and the large volume of munitions used on YPG and BMGR for ongoing testing and training activities, the contribution to cumulative impacts would be minimal whether Operations 1 through 3 of the Preferred Alternative are implemented individually or in combination.

4.5 Land Use

Land use in Yuma County is characterized by vast open spaces under the management of Federal agencies as well as concentration of development along the Interstate 8 corridor in the Gila River Valley and Yuma Valley. Due to the importance of agriculture and associated industrial, commercial, and residential developments to the economy of Yuma County, incremental increase in development of open space areas along the Interstate 8 corridor is expected in the foreseeable future.

Lands on YPG and BMGR are designated for military training and testing. The overall land use on these two ranges is not expected to change. However, as military training and testing needs evolve, there may be incremental development resulting in the conversion of open space to active operational areas. On BMGR, the ERCA Project

would use existing operational areas. On YPG, a new 495-acre impact area would be established on Kofa Region in addition to the 11 existing impact areas. The new impact area would not result in the loss of open space since there would be no loss of land to development. With the exception of access roads, observation mounds, or targets, most elements of the existing open space would remain unchanged. Operations 1 through 3 of the Preferred Alternative whether implemented individually or in combination would result in no change to the regional trend.

4.6 Noise

Military training and testing activities on YPG and BMGR would continue in the foreseeable future. Military sources include aircraft operations and munitions training; munitions and equipment testing; and other military training activities. On BMGR, the noise environment also includes non-military uses such as traffic and aircraft operations associated with US Border Patrol activities. Noise sources on other Federally-managed lands outside of YPG and BMGR would include those associated with recreation and mineral developments.

The most audible noise source from YPG and BMGR are noise associated with aircraft since they may overfly populated areas in route to the technical ranges. In contrast, weapons testing and live munitions used are generally confined to the interior of YPG and BMGR where the operational ranges are located. Thus, noise associated with cannon fire or munition detonation are typically muted due to atmospheric attenuation. The ERCA Project would not result in additional aircraft overflights across populated areas, but would result in cannon fire and munition detonations. Thus, there would be minor contributions to the existing noise environment whether Operations 1 through 3 of the Preferred Alternative are implemented individually or in combination.

4.7 Recreation

Due to the contribution of agriculture and military installations to the local and regional economy, the general area within the vicinity of YPG and BMGR, including the city of Yuma, has increased in population. The general population of the city of Yuma, where 48% of the county population resides, increased from 77,515 in the year 2000 to 93,064 in the year 2010 (COY 2012). The population is expected to increase to somewhere between 164,142 and 276,000 by the year 2055 (COY 2012). As a result, recreational use within Federally-managed lands are expected to increase. For example, recreational use of BMGR has increased steadily. From the reporting season of 2006-2007 to the 2010-2011season, there has been a 62 percent increase in the number of recreation permits that have been issued (LAFB 2012).

Though lands on YPG and BMGR are designated for military training and testing, recreational uses are allowed in designated areas. The overall land use on these two ranges is not expected to change. However, as military training and testing needs evolve, there may be incremental development resulting in the conversion of open space to active operational areas. However vast amounts of open space would

continue to remain available for recreation on both ranges in addition to those available on adjacent NWR and BLM-managed lands. Within this regional context, the ERCA Project would result in temporary closure of recreational areas within the SDZ footprint of range lands. There would be no permanent loss of recreational opportunities. Thus, there would be little to no cumulative impacts to recreation whether Operations 1 through 3 of the Preferred Alternative are implemented individually or in combination.

On BMGR, the ERCA Project would use existing operational areas. On YPG, a new 495-acre impact area would be established on Kofa Region in addition to the 11 existing impact areas. The new impact area would not result in a loss of recreational opportunities since there is no general public access to Kofa Region.

4.8 Safety

Military training and testing activities on YPG and BMGR would continue in the foreseeable future. By their very nature, military operations and weapons testing on YPG and BMGR pose some level of hazard. The primary ground-based hazard on both locations are unexploded ordnance. Thus, there would be an incremental increase of unexploded ordnances commensurate with the level and intensity of military operations over time. The ERCA Project would result in minor contributions to the overall increase through the use of inert and high explosive rounds on YPG, and inert rounds on BMGR whether Operations 1 through 3 of the Preferred Alternative are implemented individually or in combination. Impacts to safety would be avoided or attenuated through implementation of range safety protocols.

4.9 Soils

Land use in Yuma County is characterized by vast open spaces under the management of Federal agencies as well as concentration of development along the Interstate 8 corridor in the Gila River Valley and Yuma Valley. Due to the importance of agriculture to the economy of Yuma County, incremental increase in conversion of open space to agriculture lands is expected. The associated soil disturbances would increase wind and water erosion. Yuma County is a nonattainment area for PM_{10} due to wind erosion from agricultural operations.

The ongoing military training and testing activities on YPG and BMGR would entail continuation disturbances within the landscape. On BMGR, non-military activities such as unauthorized cross-border traffic and Border Patrol training and interdiction operations would contribute to on-going disturbances. Incremental expansions of existing support areas and structure are also likely in the foreseeable future. The associated soil disturbances would increase wind and water erosion. However, disturbances are expected to be limited. For example, less than 10 percent of the range area on the BMGR has been subjected to low to high levels of disturbance (LAFB 2010). In consideration of the size of soils disturbance associated with agriculture, contribution to the cumulative impacts of soil erosion from the ERCA Project would be

de minimis whether Operations 1 through 3 of the Preferred Alternative are implemented individually or in combination.

4.10 Water

Surface flows from YPG and BMGR drain into the Gila River. Both surface and ground water in the lower Gila River is unsuitable for most uses including irrigation and human consumption. Pesticides, metals, inorganics, and nutrients associated with runoff from agricultural operations in the Gila River Valley have impaired surface water quality. Recycling of irrigation water in the floodplain gradually increased the salinity of the local groundwater.

Most of non-Federal lands through the Gila River Valley corridor and Yuma Valley are used for agriculture since agriculture is central to the economy of Yuma County. Thus, the extent of agricultural land use is expected to remain largely unchanged. Incremental increases in acreage used for agriculture is expected in the foreseeable future. Thus, both surface and ground water quality in the Gila River are unlikely to improve in the foreseeable future.

Military training and testing activities on YPG and BMGR would continue in the foreseeable future. There would be continued storage and use of hazardous materials that support facilities; ground disturbing activities on the operational areas; and presence of MCOCs on the firing and testing ranges. Due to the infrequency of surface flows sufficient enough to convey pollutants into nearby rivers as well as the depth of alluvial fill in the washes, the potential for conveyance of oils and fuels off range would be minimal. Presence of MCOCs would not degrade surface water quality. Surface water does not represent a viable pathway for migration of MCOC off of the range complex. Last, implementation of RCRA and CERCLA requirements would minimize the potential transport of hazardous materials into the Gila River. Thus, contribution to further impairment of water quality from military testing and training operations including the ERCA Project would be minimal whether Operations 1 through 3 of the Preferred Alternative are implemented individually or in combination.

5.0 List of Agencies Consulted

Arizona Game and Fish Department
Bureau of Land Management, Yuma Field Office
US Air Force 56th Range Management Office Luke Air Force Base
US Marine Corps Air Station Yuma
US Fish and Wildlife Service, Ecological Services, Tucson AZ
US Fish and Wildlife Service, Kofa National Wildlife Refuge

6.0 List of Preparers and Reviewers

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ERCA

Appendix A

Air Quality Calculations

ERCA: Estimated Emissiosn per one 7-day test YPG and BMGR.

Equipment	MaxHP	Hours	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4
Generator Sets Composit		EmFac (lbs/hr)	0.0527	0.2821	0.4052	0.0007	0.0216		61.0	0.0048
		Total Hours	168	168	168	168	168	168	168	168
		Equipment #	13	13	13	13	13	13	13	13
		Emission	**115.0768**	**616.0795**	**885.0644**	**1.5244**	**47.0663**	**41.8890**	**133208.0367**	**10.3832**
Van round trip to gun pos		EmFac (lbs/mi)	**0.00150242**	**0.00998101**	**0.01070034**	**0.00002723**	**0.00043131**	**0.00034605**	**2.84005015**	**0.00006663**
		Total Miles	100	100	100	100	100	100	100	100
		Equipment #	4	4	4	4	4	4	4	4
		Emission	**0.6010**	**3.9924**	**4.2801**	**0.0109**	**0.1725**	**0.1535**	**1136.0201**	**0.0267**
Pick Up Truck Gun Positi		EmFac (lbs/mi)	**0.00060109**	**0.00537891**	**0.00051297**	**0.00001079**	**0.00009446**	**0.00006192**	**1.10627489**	**0.00005300**
		Total Miles	100	100	100	100	100	100	100	100
		Equipment #	10	10	10	10	10	10	10	10
Van Remote		EmFac (lbs/mi)	**0.00150242**	**0.00998101**	**0.01070034**	**0.00002723**	**0.00043131**	**0.00034605**	**2.84005015**	**0.00006663**
		Total Miles	200	200	200	200	200	200	200	200
		Equipment #	4	4	4	4	4	4	4	4
		Emission	**1.2019**	**7.9848**	**8.5603**	**0.0218**	**0.3450**	**0.3071**	**2272.0401**	**0.0533**
Pick Up Truck (1 remote		EmFac (lbs/mi)	**0.00060109**	**0.00537891**	**0.00051297**	**0.00001079**	**0.00009446**	**0.00006192**	**1.10627489**	**0.00005300**
		Total Miles	200	200	200	200	200	200	200	200
		Equipment #	5	5	5	5	5	5	5	5
		Emission	**0.6011**	**5.3789**	**0.5130**	**0.0108**	**0.0945**	**0.0841**	**1106.2749**	**0.0530**
		Emission (lbs)	**0.0042**	**0.0307**	**0.0224**	**0.0001**	**0.0011**	**0.0008**	**7.8927**	**0.0002**
Annaul Total (metric tons) = six tests per year			**0.0000**	**0.0001**	**0.0001**	**0.0000**	**0.0000**	**0.0000**	**0.0215**	**0.0000**

total work days = 7 8-hour days.

1. generators at gun position operate 24 hrs for 7 days = 168
2. trucks at gun position travel 100 miles round trip for 1 round trip
3. survey and remote trucks travel 100 round trip for 2 round trips (or two test firing days).
4. emission factors: van = delivery truck; pu truck = passenger
5. remotes and survey vehicles travel 100 mil round trip/day over two firing days = 2x100 = 200.
6. total work days = seven 8-hour days

VEHICLE INVENTORY

Gun Position

7 generators
4 instrumentation vans - assume same as generators parked but but engines running
10 p/u trucks

Remote

1	instrumentation vans - van functions as generator + also travelling miles
1	p/u

Survey 4 p/u

At the gun position during a test:

1) Instrumentation vans: 4 ea.
2) Generators: 4 ea.
3) pickup trucks: 10 ea.
4) additional equipment include: 4 bombproofs, 4 blastshields, 3 temperature conditioning trailers (for ammunition) each with its own generator

At remote locations during a test:

1) we anticipate 2 tracking radar locations, each location would have 1 instrumentation van and 1 pickup truck
2) we anticipate 1 communication relay antenna location, this location would have 1 pickup truck

At target during survey trip:

1) for survey trip it would be 4 pickup trucks

ERCA: Berm Construction on YPG

Equipment	MaxHP	Hours	ROG	CO	NOX	SOX	PM10	PM2.5	CO2	CH4
Grader Composite		EmFac (lbs/hr)	0.1121	0.5844	0.8008	0.0015	0.0397		133	0.0101
		Total Hours	16	16	16	16	16	16	16	16
		Equipment #	1	1	1	1	1		1	1
		Emission	**1.7935**	**9.3500**	**12.8127**	**0.0239**	**0.6345**	**0.5647**	**2123.8881**	**0.1618**
Rubber Tired Loaders Co		EmFac (lbs/hr)	0.0920	0.4510	0.6446	0.0012	0.0336		109	0.0083
		Total Hours	16	16	16	16	16	16	16	16
		Equipment #	1	1	1	1	1		2	2
		Emission	**1.4717**	**7.2155**	**10.3140**	**0.0192**	**0.5379**	**0.4787**	**3475.5582**	**0.2656**
tractor composite		EmFac (lbs/hr)	0.0559	0.3666	0.3681	0.0008	0.0222		66.8	0.0050
		Total Hours	16	16	16	16	16	16	16	16
		Equipment #	1	1	1	1	1	1	1	1
		Emission	**0.8943**	**5.8661**	**5.8889**	**0.0124**	**0.3549**	**0.0000**	**1068.7545**	**0.0807**
water & dump truck		EmFac (lbs/mi)	**0.00650533**	**0.01690387**	**0.00145203**	**0.00004033**	**0.00084894**	**0.00069721**	**4.20820129**	**0.00006722**
		Total Miles	100	100	100	100	100	100	100	100
		Equipment #	1	1	1	1	1	1	1	1
		Emission	**0.6505**	**1.6904**	**0.1452**	**0.0040**	**0.0849**	**0.0697**	**420.8201**	**0.0067**
		Total Emissions	**0.1544**	**0.8345**	**1.0141**	**0.0020**	**0.0566**	**0.0007**	**179.6166**	**0.0134**
		Metric Tons/year	**0.0001**	**0.0004**	**0.0005**	**0.0000**	**0.0000**	**0.0000**	**0.0815**	**0.0000**

FUGITIVE DUST (EPA METHOD AP42)

	PM2.5 EF (lb/hr)	Hours	Equipment	
	0.39	8	3	9.36
PM10				
	0.75	8	3	18

The AZDEQ does not publish emission factors for on road and off-road vehicles. As a result, emissions were estimated using the South Coast Air Basin (SCAB) Fleet Average Emission Factors (diesel) published by the South Coast Air Quality Management District in Los Angeles County, California. Due to the regional vicinity of Arizona to California the fleet mix was assumed to be similar. Fleet emissions factors for the year 2016 were used in the calculations. The factors were then multiplied by the estimated predicted hours and miles for each unit of equipment to produce an estimated emission.

ERCA

Appendix B

Biological Opinion

Biological Assessment

United States Department of the Interior
Fish and Wildlife Service
Arizona Ecological Services Office
9828 North 31st Avenue
Phoenix, Arizona 85051
Telephone: (602) 242-0210 Fax: (602) 242-2513

In Reply Refer to:
AESO/SE
02EAAZ00-2017-F-0039

May 3, 2017

Mr. Gordon Rogers
Garrison Manager
U.S. Army Garrison Yuma Proving Ground
301 C Street, Building 307
Yuma, Arizona 85365

RE: Formal Section 7 Consultation on the U.S. Army Yuma Proving Ground's Extended Range Cannon Artillery Test Program, Yuma and Maricopa Counties, Arizona

Dear Mr. Rogers:

Thank you for your request for formal consultation/conference with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. § 1531-1544), as amended (Act). Your request was dated October 4, 2016, and received by us on October 5, 2016. At issue are impacts that may result from the proposed Extended Range Cannon Artillery (ERCA) Test Program on Barry M. Goldwater Range (BMGR) East and West located in Yuma and Maricopa Counties, Arizona. The proposed action may affect Sonoran pronghorn (*Antilocapra americana sonoriensis*).

One component of the ERCA will occur on the United States Army Yuma Proving Ground (YPG). Sonoran pronghorn at YPG are part of a nonessential experimental population under section 10(j) of the Act. The proposed ERCA program at YPG is covered by an existing Biological Opinion on Activities and Operations on YPG (# 02EAAZ00-2014-F-0161, dated September 9, 2014); therefore there will be no further analysis of ERCA program actions located on YPG in this document.

In your letter, you requested our concurrence that the proposed action is not likely to adversely affect the lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*). We concur with your determination. The basis for our concurrence is found in Appendix A.

This biological opinion is based on information provided in YPG's September 6, 2016 Biological Assessment of the Effects of the Extended Range Cannon Artillery (BA), telephone conversations, field investigations, and other sources of information. Literature cited in this

biological opinion is not a complete bibliography of all literature available on the species of concern, military activities and its effects, or on other subjects considered in this opinion. A complete record of this consultation is on file at this office.

Consultation History

- October 5, 2016: We received your request for formal consultation.
- October 2016 to March 2017: Our office regularly corresponded regarding the proposed action.
- March 31, 2017: We sent you the draft biological opinion.
- April 25, 2017: We received your comments on the draft biological opinion.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

A complete description of the proposed action is found in the BA and is summarized below. As part of the ERCA program, YPG proposes to test fire long-range artillery projectiles approximately 70 kilometers (km) (43.5 miles) within the BMGR (Figure 1). The BMGR is jointly administered by Marine Corps Air Station Yuma (MCASY), who manages the western portion of BMGR (BMGR West), and Luke Air Force Base (LAFB) 56th Range Management Office, who manages the eastern portion of the BMGR (BMGR East). Artillery projectiles will be fired from BMGR West and land in BMGR East. Test firings will be aimed at selected targets within existing air-to-ground target areas in the North Tactical Range (NTAC) and South Tactical Range (STAC) at BMGR East. Possible targets include: NTAC 106 and 111; STAC 208, 211, and 215. Target selection for each firing event will be based on allowable ordnance, surface danger zone, and Sonoran pronghorn presence. No target will be selected if the surface danger zone extends outside the boundaries of BMGR. Also, YPG will follow Operation Instruction (OI) 13-01 for monitoring Sonoran pronghorn near targets. If, during a pronghorn monitoring session at NTAC or STAC, any pronghorn are observed within 1.0 km (0.62 mile) of a target, that target will be closed for the day and a different target will be selected. During any firing event only one target will be impacted. All rounds fired for the ERCA test on BMGR will contain inert warheads.

The impulse (firing) noise from the cannon at 1 mile (1.6 km) is similar to that of thunder, but of shorter duration. This noise reduces over distance and at distances around 3 miles the sound is barely audible. Noise associated with the incoming rounds at BMGR East will be audible (sound like a “whoosh”) at less than 1 mile (1.6 km) from the flight line, but not nearly as loud as and shorter in duration than aircraft that regularly use the area. The sound of the impact of the round at the target will be limited to the sound of a large piece of solid metal hitting the ground. The projectile would have a very high elliptical trajectory (up to 75,000 feet) except on firing and landing.

On BMGR the duration of the test is indefinite, but will initially be 2 years and could only be extended with additional authorization from the Air Force and Marine Corps. The test firings will occur approximately 3 times per year. Testing may occur any time of year as range scheduling allows. Testing is preferred to occur during the day, but occasional night testing is possible. The duration of each test will be approximately 7 days, including 3 days for setup, 2 days for firing, and 2 days for teardown (setup and teardown activities will only occur on BMGR West). Approximately 12 rounds will be fired each of the two test-firing days. Consequently, about 24 rounds will be fired per event, for a total of 72 rounds fired per year. A survey crew consisting of YPG test personnel will access the target (on BMGR East) subsequent to the conclusion of each firing, if possible. In total, the survey crew will access targets approximately 3 times per year. Access will be by vehicle along authorized roads.

One new temporary gun position (TGP) will be established on BMGR West near Baker Peak. TGPs are generally semicircular in shape with an equipment footprint radius of approximately 60 meters (197 feet), encompassing about 1.5 acres. A TGP can be established anywhere with enough space to accommodate the equipment footprint and will preferably be in an area with previous surface disturbance. Establishment of a TGP may require some grading, leveling and/or backfilling. The same TGPs will be used for each test to the maximum extent possible. YPG will use existing Ground Support Areas (GSA) 71 or 76 as sites for TGPs and use previously disturbed areas as much as possible. One TGP will be established in each GSA. GSA 71 is located just west of the Sonoran pronghorn range, while GSA 76 is located just within the pronghorn range; however, both GSAs are over 3 miles from the nearest pronghorn location as documented from 2000 to 2016 (Figure 2). The temporary gun position at BMGR West will be used for a variety of test activities such as emplacement and firing of weapons systems; emplacement/operation of data collection equipment such as Kineto Tracking Mounts (KTMs), radars, metrological instrumentation, sensors (i.e. telemetry antennae) and staging of support vehicles and other test support equipment (i.e. blastshields). Additional areas may be used near the gun emplacements for multiple mobile temperature conditioning chambers for the artillery projectiles. No permanent infrastructure or utilities will be established at the TGPs for this project.

The cannon will be transported to and from the GSA during setup and teardown for each test on a trailer pulled by a truck (a total of 3 times per year). Transport vehicles will obey speed limits and stay on authorized roads at all times. Ingress and egress to/from the GSA will be from the north on authorized roads. Up to 2 mobile radar tracking devices may be deployed on roadsides in BMGR West or East along the trajectory of the projectile. The tracking units consist of a van with a trailer and generator. The vans may be parked near the roadside and on-board instruments will be operated from within the van to track the projectile during flight.

Conservation Measures

As part of the ERCA project, in addition to some new measures, all applicable conservation measures will be implemented as identified in the Biological Opinion for Ongoing Activities at the Barry M. Goldwater Range by the Marine Corps Air Station-Yuma (2015), and in the Biological Opinion for Military Training on the Barry M. Goldwater Range East (2010). These measures include but are not limited to:

1. All ground personnel will be briefed on the Sonoran pronghorn. The briefings cover the status of the species, the importance of reducing impacts to the species, and any mitigation measures the users must comply with while on the range, specifically OI 13-01.
2. All vehicles will be restricted to designated roads except as required by Explosive Ordnance Disposal (EOD), maintenance, emergency response, and environmental sciences personnel including authorized contractors while conducting required mission support activities. Vehicles will stay within pre-existing EOD clearance areas.
3. Every effort will be made to minimize surface disturbance and to restore the area to the previous condition when restoration is practicable.
4. The YPG 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 Biological Opinions 22410-1995-F-0114-R007 and 22410-1996-F-0094-R003.
5. All YPG personnel and any personnel associated with the ERCA project will obey speed limits on roadways to minimize the probability of a vehicle-pronghorn collision. 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 Sonoran pronghorn habitat are 45 mph on paved roads, 35 mph on major graded roads, and 25 mph on all other roads. If a vehicle is 1-2 km from a Sonoran pronghorn, the speed limit is 15 mph; if a vehicle is less than 1 km from a Sonoran pronghorn, every effort is made to use an alternate route; if none are available and movement is essential, then the speed limit is 15 mph; and if Sonoran pronghorn are observed running due to ground disturbance, vehicles near Sonoran pronghorn will stop until the animals have stopped running.
6. All discarded matter (including but not limited to human waste, trash, garbage, and chemicals) that is generated by test personnel will be disposed of and removed in a manner consistent with federal and State of Arizona regulations. All work sites will be maintained in a sanitary condition.
7. Vehicles or stationary equipment from which hazardous materials may be spilled or leaked that are parked for longer than 2 days will be placed over temporary containment as appropriate. Hazardous or toxic materials that are generated will be disposed of in a manner consistent with federal and State of Arizona guidelines.
8. ERCA testing will represent about 1% of the total munitions delivery on NTAC and STAC on BMGR East. Therefore, YPG will annually contribute 1% (about $2,100) of the funding that the Air Force provides annually (about $210,000) for Sonoran pronghorn recovery. These funds will be provided to the FWS or AGFD to implement priority Sonoran pronghorn recovery actions. Funding will be provided annually as long as the ERCA program is in effect on BMGR (annual funding may be combined in any given year to cover a number of years of ERCA testing).

Reporting

YPG will submit a report to the FWS-Arizona Ecological Services Office (AESO) annually; this report will, at a minimum, include: 1) the number of testing iterations on BMGR and the duration, number of shots, and dates and times (am or pm) of each test; 2) a description of

interactions with or observations of Sonoran pronghorn; and 3) a summary of conservation measures implemented.

STATUS OF THE SPECIES - SONORAN PRONGHORN

A. Description, Legal Status, and Recovery Planning

The Sonoran subspecies of pronghorn (*Antilocapra americana sonoriensis*) was first described by Goldman (1945) and is the smallest of the four subspecies of pronghorn (Nowak and Paradiso 1983, Brown and Ockenfels 2007). The subspecies was listed throughout its range as endangered on March 11, 1967 (32 FR 4001) under the Endangered Species Preservation Act of October 15, 1966 without critical habitat. Five populations (three in the U.S. and two in Mexico) of the Sonoran pronghorn are extant: 1) a population in southwestern Arizona on Cabeza Prieta National Wildlife Refuge (CPNWR), Organ Pipe Cactus National Monument (OPCNM), Bureau of Land Management (BLM) – Ajo Block, and BMGR (endangered population; known as the "Cabeza" population), 2) a population in southwestern Arizona on Kofa NWR, YPG, and surrounding areas (nonessential experimental 10(j) population; known as the "Kofa population") (established in 2013), 3) a population in southwestern Arizona on BMGR-East, east of Highway 85 (nonessential experimental 10(j) population; known as the "Sauceda" population) (initiated in December 2015); 4) a population in the Pinacate Region of northwestern Sonora (known as the "Pinacate" population), and 5) a population on the Gulf of California west and north of Caborca, Sonora (known as the "Quitovac" population (Figured 3 and 4). The five populations are predominantly geographically isolated due to barriers such as roads and fences; however, some animals have crossed highways.

The 1982 Sonoran Pronghorn Recovery Plan (U.S. Fish and Wildlife Service 1982) was revised in 1998 (U.S. Fish and Wildlife Service 1998) and again in 2016 (U.S Fish and Wildlife Service 2016). The 2016 plan (which can be accessed at https://www.fws.gov/southwest/es/arizona/Documents/SpeciesDocs/SonoranPronghorn/FINAL_Sonoran_Pronghorn_Recovery%20Plan_2nd%20Revision_11-16-16.pdf) addresses Sonoran pronghorn populations both in Mexico and the U.S. and identifies demographic and threats-based recovery criteria. The final recovery plan contains recovery criteria based on maintaining and protecting all current populations in the wild, expanding the size of populations, and managing or eliminating threats to meet the plan's goal of downlisting and delisting the species. To downlist the Sonoran pronghorn to threatened, six criteria must be met. These criteria are abbreviated below.

1) At least three free-ranging populations are viable for at least five out of seven years.
2) A minimum of 90% of current Sonoran pronghorn habitat is retained and contiguous. This Sonoran pronghorn habitat is protected.
3) Threats to Sonoran pronghorn habitat quality in three units are stable or decreasing.
4) Human disturbance is alleviated such that a minimum of 90% of Sonoran pronghorn habitat can be occupied by Sonoran pronghorn.
5) Genetic diversity for three populations has been retained.
6) Laws are in place to ensure that killing of Sonoran pronghorn is prohibited or regulated.

After accomplishing all criteria for downlisting to threatened, Sonoran pronghorn can be delisted when at least three free-ranging populations are viable for at least 10 out of 14 years, and the other downlisting criteria have also been met.

B. Life History and Habitat

Life history and habitat is discussed extensively in the 2016 Final Recovery Plan for the Sonoran Pronghorn, Second Revision as well as in YPG's 2014 Biological Opinion.

C. Distribution and Abundance

United States

Endangered Wild Population

Historically, the Sonoran pronghorn ranged in the U.S. from approximately the Santa Cruz River in the east, to the Gila Bend and Kofa Mountains to the north, and to Imperial Valley, California, to the west (Mearns 1907, Nelson 1925, Monson 1968, Wright and deVos 1986, Paradiso and Nowak 1971; Figure 3). The current range of the endangered Sonoran pronghorn in Arizona is described in the 2016 Final Recovery Plan and depicted in Figure 4.

Abundance and population trends are described in the 2016 Final Recovery Plan. In summary, however, the endangered population in Arizona declined from an estimated 99 animals in 2000 to 21 animals in 2002, due primarily to severe drought. The December 2016 aerial surveys resulted in an estimated 228 individuals in the endangered wild population in Arizona. Table 1 includes population estimates from 1992 to 2016.

10(j) Wild Population

A final Environmental Assessment and final 10(j) rule (FWS 2011) were published in April and May, 2011, respectively, to establish a nonessential experimental population of Sonoran pronghorn in Arizona. See Figure 5 for a map of 10(j) Nonessential Experimental Population area for Sonoran pronghorn in southwestern Arizona. In 2013, the first wild population was established under the 10(j) rule on Kofa NWR with captive-bred animals from CPNWR. The population continues to be augmented with captive bred animals and additionally, fawns have been born in the wild population. As of January 2017, there are about 70 animals in the 10(j) population on and near Kofa NWR.

To establish a third population in Arizona, in December 2015, 26 Sonoran pronghorn were released on BMGR East, east of Highway 85, under the 10(j) rule. As of January 2017, there are about 41 animals in the Sauceda population.

Semi-captive Breeding Facilities

Cabeza Prieta National Wildlife Refuge

As part of a comprehensive emergency recovery program, a total of 11 adult pronghorn (10 females and one male) were initially captured (from Sonora and Arizona) and placed into a semi-captive breeding pen at CPNWR in 2004. The breeding program has been very successful and as of January 2017 there were 58 pronghorn in the enclosure at CPNWR (note this number changes frequently with births and releases). Since establishing the program, a number of pronghorn have died in the pen due to various causes, including epizootic hemorrhagic disease, malnutrition (prior to the introduction of alfalfa hay in the pen), bobcat predation, entanglement in the fence, and capture operations. Sonoran pronghorn have been released from the pen every year since 2006, many into the endangered population and others to establish the two nonessential experimental populations.

The objective is to produce at least 20 fawns each year to be released into the endangered U.S. population; supplement 10(j) populations at Kofa NWR and BMGR East, east of Highway 85; and establish any additional populations needed for pronghorn recovery.

Kofa National Wildlife Refuge

In December 2011, 13 Sonoran pronghorn were moved from the CPNWR breeding pen to the newly built breeding pen in the King Valley on Kofa NWR to initiate the breeding program on the refuge. As with the CPNWR pen, the Kofa breeding program has been successful and produced pronghorn for release into the wild. As of January 2017, the Kofa pen contains 15 pronghorn (note this number changes frequently with births and releases).

Mexico

Historically, Sonoran pronghorn ranged in Sonora from the Arizona border south to Hermosillo and Kino Bay, west to at least the Sierra del Rosario, and east to the area south of the Baboquivari Valley on the Tohono O'odham Nation (Nelson 1925, Carr 1974, Monson 1968) (Figure 3). The distribution in Baja California is less clear, but observations by Mearns (1907) indicate they occurred in the Colorado Desert west of the Colorado River, as well (Figure 3). The current range of the endangered Sonoran pronghorn in Sonora is described in the 2016 Final Recovery Plan and depicted in Figures 3 and 4.

Abundance and population trends are described in the 2016 Final Recovery Plan. The November 2015 aerial surveys resulted in an estimated 979 (845 observed) individuals combined for both populations (including 862 pronghorn [749 observed] in the area southeast of Mexico Highway 8 known or the Quitovac population and 117 [96 observed] to the west of the highway or the Pinacate population) (Table 2). Table 1 includes population estimates from 2000 to 2015.

D. Threats

Sonoran pronghorn face numerous threats throughout their range. These threats are discussed in detail in the Reasons for Listing/Threats Assessment of the 2016 Final Recovery Plan for the Sonoran Pronghorn, Second Revision, and are summarized below.

Barriers that Limit Distribution and Movement
Barriers that limit the distribution and movement of pronghorn, such as highways, fences, railroads, developed areas, and canals, are considered a major threat to the species and are discussed extensively in the 2016 Recovery Plan.

Vehicular Collision with Sonoran Pronghorn
Although vehicle collisions with Sonoran pronghorn are rare, they have been documented, primarily on paved highways. These documented cases are discussed in the 2016 Recovery Plan.

Human-caused Disturbance
A variety of human activities occur throughout the range of the pronghorn that have the potential to disturb pronghorn or its habitat, including livestock grazing in the U.S. and Mexico; military activities; recreation; poaching and hunting; clearing of desert scrub and planting of buffelgrass (*Pennisetum ciliare*) in Sonora; gold mining southeast of Sonoyta, dewatering and development along the Gila River and Río Sonoyta; cross-border violator (CBV) activity across the international border and associated required law enforcement response; and roads, fences, canals, and other artificial barriers. Human disturbance of Sonoran pronghorn is discussed at length in the 2016 Recovery Plan and in YPG's 2014 Biological Opinion (the 2014 opinion can be accessed at https://www.fws.gov/southwest/es/arizona/Documents/Biol_Opin/140161_YPG.pdf).

Since the Recovery Plan was published, a study on the effects of human activities on Sonoran pronghorn was completed. As reported in Christianson (2017), initial analysis of the data collected during the study showed evidence for several anthropogenic effects on Sonoran pronghorn suggesting the species is sensitive to human activity in the U.S. portion of its range. Responses to sources of disturbance such as roads and vehicles were widespread across the landscape and this study confirms that managers should consider impacts of vehicles on Sonoran pronghorn when resource planning (Christianson 2017). Behavioral observations confirmed that interactions with vehicles occur frequently and elicit strong behavioral responses while interactions with humans on foot occur far less often (Christianson 2017).

Habitat Disturbance
A number of threats, including livestock grazing, mining (in particular, La Herradura mine in the range of the Quitovac population in Sonora), and off-road vehicle and pedestrian activity can alter, destroy, and fragment Sonoran pronghorn habitat. These are discussed in the 2016 Final Recovery Plan and in YPG's 2014 Biological Opinion.

Fire
Fire, which can be a threat to Sonoran pronghorn and their habitat, is discussed in the 2016 Final Recovery Plan.

Drought and Climate Change
Drought limits the availability of quality forage and water. Drought may be a major factor in the survival of adults and fawns (Bright and Hervert 2005) as demonstrated by the major decline in 2002, which was driven by drought. Drought and climate change and their effects on Sonoran pronghorn are discussed in the 2016 Final Recovery Plan.

Disease
Sonoran pronghorn can potentially be infected by a variety of viral and bacterial diseases, as well as parasites. Epizootic hemorrhagic disease and Bluetongue virus are the most common cause of disease-caused die-offs in wild pronghorn (Brown and Ockenfels 2007). Blood testing has shown pronghorn exposure to these diseases by increases in antibody titers over time. The diseases relevant to pronghorn can be transmitted indirectly through vectors, such as infected midges or ticks, or directly via aerosolized or direct contact of infected fluids or tissues. Diseases that potentially infect pronghorn are all serious diseases of cattle, which can act as vectors. Cattle within the current range of the pronghorn have not been tested for these diseases. See the 2016 Final Recovery Plan for more information on disease in Sonoran pronghorn.

E. Recovery Actions

Many critically important recovery projects have been implemented in an attempt to reverse the decline of the Sonoran pronghorn throughout their range. See the section on Previous and Ongoing Conservation Efforts in 2016 Final Recovery Plan for the Sonoran Pronghorn for a comprehensive discussion of recovery actions. For example, developed and emergency water sources and forage enhancement plots (developed to irrigate the desert and produce forage for pronghorn) have been constructed in recent years throughout the range of the U.S. endangered population and developed waters have also been constructed in the range of the Kofa population. These projects are designed to increase availability of green forage and water during dry periods and to offset to some extent the effects of drought and barriers that prevent pronghorn from accessing greenbelts and water, such as the Gila River and Río Sonoyta.

Plots and waters located in areas with little human activity and better range conditions appear to be more effective (i.e., contribute to fawn and adult survival to a greater degree) than those located in areas of high human activity and poor range condition (i.e., experiencing drought) (personal communication with John Hervert, Arizona Game and Fish Department [AGFD], September 16, 2009). Therefore, to ensure success of these measures, it is critical that human activity is avoided or significantly minimized near the plots and waters.

As described above, semi-captive breeding facilities at CPNWR and Kofa NWR were established and are being used to augment and establish new populations. These crucial projects, which are helping pull the U.S. population back from the brink of extinction, have been cooperative efforts among many agencies and organizations, including FWS, AGFD, MCASY, LAFB, OPCNM, CBP, Arizona Desert Bighorn Sheep Society, Arizona Antelope Foundation, the Yuma Rod and Gun Club, the University of Arizona, the Los Angeles and Phoenix Zoos, and others.

In Mexico, a recovery plan for pronghorn was developed in 2009 and is currently being implemented. For example, in 2015, the Comisión Nacional de Areas Naturales Protegidas (CONANP; National Commission of Natural Protected Areas) installed waters for Sonoran pronghorn in Sonora, although pronghorn use of these waters has not been documented likely due to cattle exclusion fences around the tanks. CONANP is continuing to experiment with the waters until pronghorn can successfully use them. CONANP is also working with the local communities to educate people about pronghorn and the highway department to improve

undercrossings of Highway 2 to encourage pronghorn passage. CONANP and the Comisión de Ecologies y Desarrollo Sustentable del Estado de Sonora (CEDES; Commission of Ecology and Development of the State of Sonora) also conduct Sonoran pronghorn surveys and work with the La Herradura mine and other landowners to reduce their impacts on pronghorn and their habitat.

ENVIRONMENTAL BASELINE – SONORAN PRONGHORN

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

Description of the Action Area

The "action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. Within the U.S. portion of the endangered Sonoran pronghorn's range, pronghorn interact to form one population in which interbreeding may occur. The U.S. endangered or "Cabeza" population is effectively separated from the Kofa and Sauceda populations by Interstate 8 and Highway 85, respectively; and the Pinacate and Quitovac populations by Mexico Highways 2 and 8. Activities that may affect animals in any portion of the U.S. range of the endangered pronghorn may affect the size or structure of the U.S. endangered population, or habitat use within the U.S. endangered population range. Therefore, the action area for this biological opinion is defined as the current range of the endangered pronghorn population in the U.S. (Figures 3 and 4).

Management within the endangered Sonoran pronghorn range portion of the action area is almost entirely by Federal agencies. The BMGR (roughly 1.6 million acres) is managed by LAFB and the MCASY primarily for military training. OPCNM manages 329,000 acres in the southeastern corner of the action area for scenic, ecological, natural, and cultural values. CPNWR lies along the border west of OPCNM and encompasses 860,000 acres. CPNWR is managed to protect, maintain, and restore the diversity of the Sonoran Desert. Most of the refuge and OPCNM are designated as wilderness. The BLM manages lands near Ajo for recreation, grazing, and other multiple uses in accordance with the Lower Gila Resource Management Plan. OPCNM and CPNWR are critically important for Sonoran pronghorn recovery because of their management for protection of natural resources. Lands on the BMGR are managed primarily for military training, however, important recovery is ongoing on these lands and the Department of Defense has generously contributed to the recovery program both on and off the BMGR.

A. Status of Sonoran pronghorn within the action area

Distribution, Abundance, and Life History

The distribution and abundance of the Sonoran pronghorn in the action area is the same as that described above in the Status of the Species for the U.S. endangered population, referred to as

the Cabeza population. Sonoran pronghorn occupy nearly all of BMGR East (including NTAC and STAC) and the eastern portion of BMGR West (see Figure 4). In recent years, up to a third of the Cabeza population may occupy NTAC and STAC at any given time.

Life history, including demographics, chronology of breeding and movements, diet, and other factors are discussed extensively in the 2016 Final Recovery Plan for the Sonoran Pronghorn, Second Revision as well as in YPG's 2014 Biological Opinion.

Climate Change and Drought

The threats of climate change and drought on Sonoran pronghorn are discussed extensively in the 2016 Final Recovery Plan for the Sonoran Pronghorn, Second Revision. In summary, however, the most significant potential impact of global climate change on Sonoran pronghorn is its potential to increase the frequency and severity of drought. More dry days, warming temperatures, and increased evapotranspiration are expected to result in more severe drought in the Southwestern United States (Gershunov 2013). Future droughts are expected to become more frequent and severe, with 100-year droughts common in the second half of this century (Gershunov 2013). Drought was the factor causing the extreme mortality event of Sonoran pronghorn in 2002, and drought is the most important predictor of survivorship and recruitment (FWS 2016). From 2003 to 2017, rainfall and Sonoran pronghorn range conditions have varied, but have improved overall when compared to 2002. The February 2017 short-term and the January 2017 long-term drought status maps indicate that southwestern Arizona is experiencing conditions of moderate drought to abnormally dry conditions (http://www.azwater.gov/azdwr/StatewidePlanning/drought/DroughtStatus2.htm). However, current conditions of the endangered Sonoran pronghorn range, as of March 2017, are good.

Historically, pronghorn populations must have weathered severe droughts in the Sonoran Desert, including many that were more severe and longer term than what has occurred recently. Given that pronghorn populations survived the droughts of the 1890s, 1950s, 1970s, and others before, it is unreasonable to solely attribute recent declines in the U.S. pronghorn population to drought. OPCNM (2001) concluded, "If (individual) recent dry years have had an impact on Sonoran pronghorn, it is most likely because in recent decades Sonoran pronghorn have much more limited options for coping with even brief moderate drought. Because of restrictions on their movements and range, and increasing human presence within their range, pronghorn are less able to employ their nomadic strategy in search of relief. It is not that drought itself is an impact, but possibly that drought has *become* an impact, due to other factors confounding the species' normal ecological strategy."

Recovery Actions

As explained above, many critically important recovery projects have been successfully implemented in an attempt to reverse the decline of the U.S. endangered population of the Sonoran pronghorn. See the section on Previous and Ongoing Conservation Efforts in 2016 Final Recovery Plan for the Sonoran Pronghorn for a comprehensive discussion of recovery actions in the range of the U.S. endangered population. For example, many developed and emergency water sources and forage enhancement plots (developed to irrigate the desert and

produce forage for pronghorn) have been constructed in recent years throughout the range of the U.S. endangered population. These projects are designed to increase availability of green forage and water during dry periods and to offset to some extent the effects of drought and barriers that prevent pronghorn from accessing greenbelts and water, such as the Gila River and Río Sonoyta. Additionally, the semi-captive breeding at CPNWR has been successful at augmenting existing and helping to establish new populations of Sonoran pronghorn.

B. Factors affecting species environment and critical habitat within the action area

Past and Ongoing Non-Federal Actions in the Action Area

Many non-Federal activities that have affected the Sonoran pronghorn are historical in nature, and pronghorn have been all but extirpated from private, state, and Tribal lands. As explained in the Status of the Species, highways, fences, railroads, developed areas, and irrigation canals can block access to essential forage or water resources. Highways and railroads can also lead to vehicular and train collisions with Sonoran pronghorn. Additionally, canals can lead to Sonoran pronghorn drowning. In the endangered Sonoran pronghorn range in the U.S., illegal border activities have likely had a significant impact on Sonoran pronghorn in the U.S. in recent times, particularly since the turn of the millennium. Disturbance of Sonoran pronghorn and their habitat by illegal border activities is discussed in the 2016 Recovery Plan.

Because of the extent of Federal lands in the action area, with the exception of CBV activities, most activities that currently, or have recently, affected the U.S. populations or their habitat are Federal actions. The primary Federal agencies involved in activities in the action area include the MCAS-Yuma, LAFB, FWS (CPNWR), BLM, NPS (OPCNM), and USBP. In the lists below, we have categorized Federal actions affecting the pronghorn as: 1) those actions that have not yet undergone section 7 consultation (although in some cases consultation has been completed on components of the Federal activity), and 2) Federal actions that have undergone consultation.

Federal Actions For Which Consultation Has Not Been Completed

Examples of Federal actions for which consultation has not been completed include:

1) U.S. Border Patrol Activities in the Tucson and Yuma Sectors, Arizona
2) CBP Hybrid Fence on BMGR and Vehicle Fence on CPNWR
3) CBP Vehicle Fence on CPNWR (another small portion of the fence)

Federal Actions Addressed in Section 7 Consultations

As part of our discussion of all past and present actions affecting pronghorn within the action area, we list below all biological opinions issued to date on actions that may affect the pronghorn; we also explain any incidental take associated with the opinions. All of these formal consultations can be viewed on our website at http://www.fws.gov/arizonaes/Biological.htm.

1. Capture and collaring of pronghorn for research purposes, consultation number 02-21-83-F-0026. No incidental take was anticipated.
2. Capture and collaring of pronghorn for research purposes, consultation number 02-21-88-F-00060. No incidental take was anticipated.
3. Installation of a water source in the Mohawk Valley for pronghorn, consultation number 02-21-88-F-0081. No incidental take was anticipated.
4. Implementation of the CPNWR Comprehensive Conservation Plan, consultation number 22410-2006-F-0416, with reinitiations issued on November 21, 2013 and March 14, 2014. No incidental take was anticipated.
5. Change in aircraft type from the F-15A/B to the F-15E on BMGR-East [F-15E Beddown Project], consultation number 02-21-89-F-0008. Incidental take was anticipated only for the Beddown Project in the form of harassment as a result of aircraft overflights. This project was later incorporated into the biological opinion on LAFB's activities on the BMGR, listed below.
6. Widening of North Puerto Blanco Road, consultation number 02-21-01-F-0109, with a reinitiation issued on March 14, 2014. No incidental take was anticipated.
7. Improvements to SR 85 roadway and drainages, consultation 02-21-01-F-0546. No incidental take was anticipated.
8. Construction of a vehicle barrier on OPCNM, consultation number 02-21-02-F-237. No incidental take was anticipated.
9. U.S. Border Patrol Activities in the Yuma Sector, Wellton Station, Yuma, Arizona, consultation number 02-21-96-F-0334, issued September 5, 2000. Incidental take was anticipated in the form of harassment that is likely to injure up to one pronghorn in 10 years.
10. The BLM Lower Gila South Resource Management Plan-Goldwater Amendment, consultation number 02-21-90-F-0042, issued April 25, 1990. No incidental take was anticipated.
11. The BLM Lower Gila South Habitat Management Plan, consultation number 02-21-89-F-0213 issued on May 15, 1990. No incidental take was anticipated.
12. BLM Lower Gila South Resource Management Plan and Amendment, consultation number 02-21-85-F-0069, issued on March 27, 1998. No incidental take was anticipated.
13. BLM grazing allotments in the vicinity of Ajo, Arizona, consultation number 02-21-94-F-0192, issued on December 3, 1997, with reinitiations issued on November 16, 2001, September 30, 2002, June 21, 2004, March 3, 2005, March 8, 2007, and March 14, 2014. No incidental take was anticipated.
14. Organ Pipe Cactus National Monument General Management Plan, consultation number 02-21-89-F-0078, issued June 26, 1997, with reinitiations issued on November 16, 2001, April 7, 2003, March 10 and August 23, 2005, March 8, 2007, December 10, 2009, and March 14, 2014. In the latest versions of the opinion, no incidental take of pronghorn was anticipated.
15. U.S. Marine Corps Air Station-Yuma in the Arizona Portion of the Yuma Training Range Complex (Barry M. Goldwater Range West), consultation number 02-21-95-F-0114, issued on April 17, 1996, with reinitiations issued on November 16, 2001, August 6, 2003, October 21, 2009, and November 3, 2015. In the 2003 and 2009 versions of the biological opinion, no incidental take of pronghorn was anticipated. In the 2015 opinion,

we anticipated take of one Sonoran pronghorn every 10 years in the form of direct mortality or injury and one pronghorn every 7 years in the form of harassment.

16. Luke Air Force Base Use of Ground-Surface and Airspace for Military Training on the BMGR, consultation number 02-21-96-F-0094, issued August 27, 1997, with reinitiations issued on November 16, 2001, August 6, 2003, May 3, 2010, and March 2014. In 2010 opinion, we anticipated take of one wild Sonoran pronghorn every 10 years, one pen-raised (free ranging) female pronghorn every 10 years, and four pen-raised (free ranging) male pronghorn every 10 years in the form of direct mortality or injury; and one wild Sonoran pronghorn of either sex, one pen raised (free ranging female) every 10 years, and two pen-raised (free ranging) male pronghorn every 10 years in the form of harassment.
17. Western Army National Guard Aviation Training Site Expansion Project, consultation number 02-21-92-F-0227, issued on September 19, 1997; however, Sonoran pronghorn was not addressed in formal consultation until reinitiations and revised opinions dated November 16, 2001 and August 6, 2003. No incidental take was anticipated.
18. BMGR Integrated Natural Resources Management Plan, consultation number 22410-2005-F-0492, issued on August 26, 2005, with reinitiations issued on January 7, 2013 and March 14, 2014.
19. CBP and USBP Permanent Vehicle Barrier from Avenue C to OPCNM, Arizona, consultation number 22410-2006-F-0113, issued September 15, 2006. No incidental take was anticipated. Subsequent to issuing the biological opinion, the action was changed to include the installation of a section of hybrid-style fence designed to prevent the passage of pedestrians. Because all environmental laws were waived (as permitted by the Real ID Act of 2005) by Secretary of the Department of Homeland Security, CBP never reinitiated consultation with us regarding this change to their proposed action.
20. CBP and USBP 5.2-Mile Primary Fence near Lukeville, Arizona, consultation number 22410-2008-F-0011, issued February 11, 2008. No incidental take was anticipated.
21. SBI*net* Ajo-1 Tower Project, Ajo Area of Responsibility, USBP Tucson Sector, Arizona, consultation number 22410-F-2009-0089, issued December 10, 2009, with reinitations issued on March 15, 2010, April 29, 2011, September 16, 2011, and December 15, 2011. We anticipated take of three Sonoran pronghorn due to harassment within the first year of towers becoming operational and two every 5 years thereafter; and one due to direct mortality over the life of the project.
22. Tactical Infrastructure Maintenance and Repair Program (TIMR) along the U.S./Mexico international border in Arizona, consultation number 02EAAZOO-2012-F-0170, issued on November 6, 2012, with a reinitiation issued on July 13, 2016. In the 2012 opinion, we anticipated incidental take of one Sonoran pronghorn every 10 years for the duration of the TIMR Program in the form of harassment; and one Sonoran pronghorn over the total duration of the TIMR Program in the form of direct mortality. Incidental take remained the same in the 2016 opinion.
23. Land Mobile Radio Modernization for Tactical Communications at Buck Peak, Christmas Pass, Granite Mountain (CPNWR), and Cobre along the U.S./Mexico international border in Pima, Santa Cruz, and Yuma counties, Arizona, consultation number 02EAAZOO-2012-F-0200, issued April 23, 2013. No incidental take was anticipated.
24. Activities and Operations at the United States Army Garrison Yuma Proving Ground, Yuma and La Paz Counties, Arizona, consultation number 02EAAZ00-2014-F-0161,

issued on September 9, 2014. We anticipated incidental take of four Sonoran pronghorn over the life of the project (10-20 years), including two in the form of direct mortality or injury and two in the form of harm.

25. Implementation of the Ecological Restoration Plan on OPCNM, CPNWR, and BLM Ajo Block, Pima County, Arizona, consultation number 02EAAZ00-2014-F-0538, issued on October 2, 2014, with a reinitiation issued on August 28, 2015. No incidental take was anticipated.
26. Granting of Wildlife and Sport Fish Restoration (WSFR) Program Funds to the Arizona Game and Fish Department to Implement Aspects of Sonoran Pronghorn Recovery, consultation number 02EAAZ00-2015-F-0045, issued on November 18, 2014. We anticipated incidental take of 26 Sonoran pronghorn over the life of project (5 years), including: 1) incidental take of a total of 20 pen-raised Sonoran pronghorn over the life of the project in the form of directly mortality or injury due to capture and release operations associated with the captive breeding pens; 2) incidental take of a total of 4 Sonoran pronghorn over the life of the project in the form of directly mortality or injury due to capture and release operations of wild pronghorn; and 3) incidental take of two wild Sonoran pronghorn over the life of the project in the form of harassment from project activities that disturb Sonoran pronghorn (e.g., surveys, monitoring, pen maintenance) and/or direct injury or mortality from collision with a vehicle associated with the project.

In summary, the current biological opinions that anticipate incidental take are:

1. the Yuma Sector opinion, in which we anticipated take in the form of harassment that is likely to injure up to one pronghorn in 10 years;

2. the Ajo 1 Tower opinion, in which we anticipated take of three Sonoran pronghorn due to harassment within the first year of towers becoming operational and two every 5 years thereafter; and one due to direct mortality over the life of the project;

3. the Luke Air Force Base Opinion, in which we anticipated take of one wild Sonoran pronghorn every 10 years, one pen-raised (free ranging) female pronghorn every 10 years, and four pen-raised (free ranging) male pronghorn every 10 years in the form of direct mortality or injury; and one wild Sonoran pronghorn of either sex, one pen raised (free ranging female) every 10 years, and two pen-raised (free ranging) male pronghorn every 10 years in the form of harassment;

4. the TIMR opinion, in which we anticipated take of one Sonoran pronghorn every 10 years for the duration of the TIMR Program in the form of harassment; and one Sonoran pronghorn over the total duration of the TIMR Program in the form of direct mortality;

5. the Yuma Proving Ground opinion, in which we anticipated take of four pronghorn in the form of direct mortality or injury and harm;

6. the WSFR opinion in which we anticipated take of 26 Sonoran pronghorn, including 20 pen-raised and 6 wild animals, over 5 years, and

7. the U.S. Marine Corps Air Station-Yuma opinion, in which we anticipated take of one Sonoran pronghorn every 10 years in the form of direct mortality or injury and one pronghorn every 7 years in the form of harassment.

With the exception of likely capture-related deaths during telemetry studies (which were addressed in 10(a)(1)(A) recovery permits), we are unaware of any confirmed incidental take in the form of direct mortality or injury resulting from the Federal actions described here. That said, we are aware of numerous instances of harassment of Sonoran pronghorn. For example, Christianson (2017) reported that behavioral observations of Sonoran pronghorn confirmed that interactions with vehicles occur frequently and elicit strong behavioral responses and responses to sources of disturbance such as roads and vehicles were widespread across the landscape. Action agencies, as part of their proposed actions, have committed to implementing or providing funding to implement a variety of recovery projects recommended by the Sonoran Pronghorn Recovery Team. For example, these significant commitments have helped the Sonoran Pronghorn Recovery Team construct pronghorn waters and forage enhancement plots, build a captive breeding pen at Kofa NWR, and collar and monitor pronghorn.

C. Summary of Activities Affecting Sonoran Pronghorn in the Action Area

The Cabeza population is isolated from other populations by highways and interstates, and access to the greenbelts of the Gila River and Río Sonoyta, which likely were important sources of water and forage during drought periods, has been blocked. Since 2002, due to improved drought status and implementation of emergency recovery actions, the Cabeza population increased to 228 in 2016. At 228, however, the wild population is still as risk due to, among other factors, human-caused impacts and drought and climate change.

Although obstacles to recovery remain, since 2002, numerous crucial recovery actions have been implemented in the Cabeza population range of the species, including pronghorn waters and forage enhancements plots. These projects help to offset the effects of drought and barriers that prevent movement of pronghorn to greenbelts such as the Gila River and Río Sonoyta. The semi-captive breeding facility on CPNWR helps provide pronghorn to augment the existing endangered population and establish and augment additional U.S. nonessential experimental (10(j)) populations. Additionally, vehicle barriers on the international border on CPNWR and OPCNM are facilitating recovery of pronghorn by reducing the amount of CBV vehicle traffic in pronghorn habitat.

The current range of the endangered pronghorn in the U.S. is almost entirely comprised of lands under Federal jurisdiction; thus, authorized activities that currently affect the pronghorn in the action area are almost all Federal actions. Action agencies have worked with us to include significant conservation measures that reduce and offset adverse effects to the pronghorn and its habitat. The current opinions that anticipate incidental take are listed above.

We believe the aggregate effects of limitations or barriers to movement of Sonoran pronghorn and continuing stressors, including habitat degradation and disturbance within the Cabeza pronghorn population's range resulting from a myriad of human activities, exacerbated by periodic dry seasons or years, are responsible for the endangered status of the Sonoran pronghorn. However, collaborative, multi-agency and multi-party efforts to develop forage

enhancement plots and waters and reduce human disturbance of pronghorn and their habitat, combined with the success of the semi-captive breeding facility at CPNWR and recently established 10(j) populations, provide hope that recovery of the Sonoran pronghorn in the U.S. is achievable. Key to achieving recovery in Arizona will be a reduction in human disturbance to pronghorn and their habitat caused by CBV and corresponding enforcement activities.

EFFECTS OF THE PROPOSED ACTION

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

The proposed ERCA project on BMGR may result in intermittent disturbance to Sonoran pronghorn and their habitat for the duration of the proposed project (the duration of the test is indefinite, but will initially be 2 years and could only be extended with additional authorization from the Air Force and Marine Corps). For example, ground support activities and artillery fire may result in visual and/or auditory disturbance of Sonoran pronghorn and projectiles or vehicles associated with the project could strike and injure or kill pronghorn. Conservation measures included in the proposed action, however, will help avoid and minimize potential impacts to Sonoran pronghorn.

Summary of Effects of Human Activities on Sonoran Pronghorn

It has been well documented that human presence in wildlands can disturb animals, causing them to unnecessarily expend energy avoiding people, thereby potentially reducing reproductive success (e.g., Manville 1983, van Dyke et al. 1986, Goodrich and Berger 1994, Primm 1996; as cited by Kerley et al. 2002) or increasing the likelihood of fatal encounters with humans (Kasworm and Manley 1990, Saberwal et al. 1994, Khramtsov 1995, Mattson et al. 1996; as cited by Kerley et al. 2002). Range abandonment has been documented in response to human disturbance (Jorgenson 1988), and investigators have shown that heart rate increases in wildlife in response to auditory or visual disturbance in the absence of overt behavioral changes (Thompson et al. 1968, Cherkovich and Tatoyan 1973, Moen et al. 1978).

A number of studies have specifically investigated the effects of human activities on Sonoran pronghorn (Hughes and Smith 1990, Landon et al. 2003, Krausman et al. 2004 and 2005, OPCNM 2013, and the ongoing study by Doerries 2014). Landon et al. (2003) evaluated whether Sonoran pronghorn used areas, as defined by noise levels produced by military aircraft, in proportion to their availability on the BMGR. Using 15% of the Arizona Sonoran pronghorn population, they studied pronghorn use of areas with varying sound pressure (ambient sound) levels and found that pronghorn did not use the areas with different ambient sound levels in proportion to their availability. In general, they found that Sonoran pronghorn select areas with the lower noise levels and avoid areas with the higher noise levels; however, they did not

consider habitat in their analysis. Whether pronghorn avoid these areas because of the noise or because of some other human-related factor is unknown; however, the various potential factors (i.e. noise levels, human presence, reduced vegetation or cover, disturbance) are interrelated. Hughes and Smith (1990) found that Sonoran pronghorn immediately ran 1,310- 1,650 feet from a vehicle, and that military low-level flights (less than 500 feet above the ground) over three pronghorn caused them to move about 330 feet from their original location.

Krausman et al. (2004) examined effects of military aircraft and ground-based activities on Sonoran pronghorn at the North and South tactical ranges (TACs) on the BMGR and concluded that military activities, both ground-based and aerial, were associated with some changes in behavior (e.g., from standing to trotting or running, or bedded to standing). On days with stimuli, adult pronghorn bedded more than they foraged (Krausman et al. 2004). On days without stimuli, adult pronghorn foraged more and bedded less. Ground stimuli, including the presence of vehicles or people, comprised the majority (65%) of all anthropogenic stimuli. Ground stimuli were associated with 866 instantaneous changes in behavior (39%), with 56 of these changes resulting in trotting or running (2.6%). During direct overflights (less than or equal to 100 m to the side of animals), pronghorn changed behavior (e.g., from bedded to standing, walking to bedded, foraging to bedded) 45 times (41%) with 4 changes from any other activity to trotting or running (3.7 %). During overflights greater than 100 m to the side of animals, pronghorn changed behavior 105 times (34%), with 5 changes to trotting or running (1 .6%). In response to stimuli, Krausman et al. (2004) only considered a change in behavior to trotting or running in response to stimuli as biologically significant. The authors concluded that these changes were not likely to be detrimental to the animals; however, sightings of Sonoran pronghorn were biased towards disturbed habitats on the TACs and other areas of military activities, which also corresponded to areas of favorable ephemeral forage production (Krausman et al. 2005). No specific conclusions could be drawn about effects of military activities on fawns during the Krausman et al. (2004) study, but the data suggests that fawns and their mothers may be more sensitive to anthropogenic stimuli than other pronghorn. In general, the study did not detect differences in the behavior of pronghorn with and without military stimuli; however, Krausman et al. (2004) recommends that all ground stimuli and activities that alerts or startles females and their fawns should be terminated.

Wright and deVos (1986) noted that Sonoran pronghorn exhibit “a heightened response to human traffic” as compared to other subspecies of pronghorn. They noted that “once aware of an observer, Sonoran pronghorn are quick to leave the area. One herd was observed 1.5 hours later 11 miles north of the initial observation in October 1984. Other pronghorn have run until out of the observer’s sight when disturbed.” Hughes and Smith (1990) noted that on all but one occasion, Sonoran pronghorn ran from the observer’s vehicle and continued to run until they were out of sight.

Staff at OPCNM (2013) documented that during their typical morning activity period (post-sunrise), pronghorn on OPCNM experienced some form of potential disturbance once every 4 hours 10 minutes. Actual disturbance responses took place once every 6 hours 15 minutes. Potential disturbance events resulted in the pronghorn running, about once every 8 hours 20 minutes. Helicopter overflights took place once every 6 hours 15 minutes; one out of four overflights resulted in pronghorn running, and one in four resulted in vigilance (standing, alert,

watching disturbance source). Vehicles approaching within one mile occurred once every 12 hours 30 minutes. Half of these resulted in pronghorn running, but for the other half, the driver was contacted by radio and advised to drive slowly (<10 mph) past the observation area.

Sonoran pronghorn have been documented to exhibit responses to human activity, particularly vehicles traveling on a road within several kilometers (email from Stephanie Doerries, University of Arizona, May 7, 2014). Although some instances were noted where a pronghorn did not exhibit a visual response (for example, one buck did not appear disturbed by three vehicles driving at least 25 miles per hour about 1.5 kilometers away); most observations indicate that pronghorn exhibit a spectrum of responses, from standing vigilant to running from the stimulus. For example, eight Sonoran pronghorn were observed running a short distance and then remaining vigilant towards the utility vehicle noise 3.4 kilometers away. Another eight Sonoran pronghorn were observed running from several trucks traveling fast (> 25 mph). Pronghorn were initially vigilant when the vehicles were 1.3 kilometers away but soon started running, travelling over 3.6 kilometers in under five minutes until they were out of sight of the observers (email from Stephanie Doerries, University of Arizona, May 7, 2014).

As reported in Christianson (2017), initial analysis of the data collected during the study showed evidence for several anthropogenic effects on Sonoran pronghorn suggesting the species is sensitive to human activity in the U.S. portion of its range. Responses to sources of disturbance such as roads and vehicles were widespread across the landscape and this study confirms that managers should consider impacts of vehicles on Sonoran pronghorn when resource planning (Christianson 2017). Behavioral observations confirmed that interactions with vehicles occur frequently and elicit strong behavioral responses while interactions with humans on foot occur far less often (Christianson 2017).

Disturbance and flight of ungulates are known to result in a variety of physiological effects that are adverse, including elevated metabolism, lowered body weight, reduced fetus survival, and withdrawal from suitable habitat (Geist 1971, Harlow et al. 1987). Frequent disturbance imposes a burden on the energy and nutrient supply of animals (Geist 1971), which may be exacerbated in harsh environments such as those occupied by Sonoran pronghorn. Human presence may cause Sonoran pronghorn to move from an area, thereby denying pronghorn access to that specific site for what may be crucial behaviors or functions (e.g. foraging, bedding, breeding, fawning, avoiding predators). Causing pronghorn to move also increases their physiological demands by expending calories and metabolic water. These may be critical stressors in seasonal hot-dry periods and in extended periods of low forage availability. Disturbance may also lead to mortality. Causing a pronghorn to be alarmed or agitated, or to flee from a disturbance, may also make it vulnerable to predation. This is especially true for fawns and females during the fawning season. Krausman et al. (2004) found that fawns and their mothers were more sensitive to human disturbance than other Sonoran pronghorn.

Effects to Sonoran Pronghorn from ERCA on BMGR West

The effects of ERCA activities on BMGR West may include intermittent disturbance for the duration of the project to Sonoran pronghorn from ground-based activities, as well as from noise produced by the cannon fire. Ground-based activities may also degrade Sonoran pronghorn

habitat. In the past, military interaction with Sonoran pronghorn was rather limited. However, due to recent pronghorn population growth, the likelihood of interactions has increased. That said, most ground-based activities outside or on the edge of the Sonoran pronghorn range are less likely to create exposure to pronghorn and, therefore, less likely to impact them.

Disturbance – Noise and Visual

Noise associated with the firing rounds may intermittently disturb pronghorn and could cause them to flee and temporarily avoid areas affected by noise of the artillery being fired. As discussed above, pronghorn may use select areas with the lower noise levels and avoid areas with the higher noise levels. Additionally, the presence of work crews and vehicles associated with the project may result in visual and auditory disturbance of Sonoran pronghorn. Testing may occur any time of the year; if testing occurs during the fawning season or during seasons or years that are hot and dry, effects of possible disturbance could have more severe consequences for Sonoran pronghorn as explained above. Because testing will occur indefinitely, it is likely that testing will fall during the fawning season or during extreme heat or drought conditions at some point in the future.

Use of GSAs 71 or 76 should reduce potential visual and noise impacts to Sonoran pronghorn because these GSAs are at the western edge of pronghorn range. According to historical pronghorn locations (1994-2015) most pronghorn occur south and west of GSAs 71 and 76. Pronghorn have not been observed within 3 miles of GSA 71 or 76 since 2000; however, this could change if the Cabeza pronghorn population continues to grow and possibly expand its range or if climate factors cause a shift in the pronghorn range. YPGs use of these areas three times per year (7 days per test, for a total of 21 days of total activity) does not represent a large increase in activity on BMGR West or a substantial change in how the GSAs are used. Additionally, vehicles will use authorized roads that already receive regular use.

Habitat disturbance

The ERCA program on BMGR West may result in some Sonoran pronghorn habitat disturbance, however, the amount of disturbance should be minimal. Establishment of the new temporary gun position (TGP) may impact about 1.5 acres per TGP; however, to the extent possible, the TGPs will be placed in previously disturbed areas (within existing GSAs) and same TGPs will be used for each test. Additionally, no permanent infrastructure or utilities will be established at the TGPs for this project. Furthermore, only existing, authorized roads will be used for project implementation.

Collision with vehicles

Vehicles associated with setup and teardown at GSAs on BMGR West could collide with pronghorn during ingress and egress to the target site. However, the risk of collisions should be reduced as all access will be on authorized roads that already see regular use and crews will follow speed limits (see Conservation Measure #5). Additionally, the survey crew will access targets approximately 3 times per year which does not represent a large increase in vehicle traffic on BMGR West compared to baseline levels. The mobile tracking van could also collide with

pronghorn, however, it will also follow speed limits and use authorized roads, thereby reducing risk of collision. The duration of the proposed project is indefinite and we anticipate the Cabeza pronghorn population will grow beyond the current estimated size. Therefore, the likelihood of a pronghorn being struck by a vehicle could increase over time as the population increases.

Effects to Sonoran Pronghorn from ERCA on BMGR East

The effects of ERCA activities on BMGR East may include intermittent disturbance to Sonoran pronghorn for the duration of the project from the sound of the artillery in the air and hitting the target and from the mobile tracking van and vehicles accessing the targets. Additionally, there is a small likelihood that the artillery or a vehicle associated with the project may strike a pronghorn. In the past, military interaction with Sonoran pronghorn was rather limited. However, due to recent pronghorn population growth, the likelihood of interactions has increased.

Disturbance – Noise and Visual

Noise impacts associated with the incoming rounds at BMGR East will be audible (sound like a "whoosh") at less than 1 mile (1.6 km) from the flight line, but not nearly as loud as and shorter in duration aircraft that regularly use the area. The sound of the impact of the round at the target will be limited to the sound of a large piece of solid metal hitting the ground. Firing of the gun will barely be audible from BMGR East depending on atmospheric conditions. Noise associated with the incoming rounds may intermittently disturb pronghorn and could cause them to temporarily avoid areas affected by noise of the artillery. As discussed above, pronghorn may use select areas with the lower noise levels and avoid areas with the higher noise levels. That said, the BMGR is already subject to a considerable amount of military noise. Currently, the airspace and targets on BMGR East are used on a daily basis, with aircraft and munitions that are much louder than the proposed ERCA. Additionally, the ERCA project will fire six days per year which does not represent a large increase in activity on BMGR East.

Vehicle and personnel access to targets may cause intermittent visual and auditory disturbance of Sonoran pronghorn. Vehicles can cause pronghorn to startle and/or flee, potentially reducing fitness. However, accessing targets approximately 3 times per year will not represent a large increase in ground-based activities that already occur at BMGR East.

Testing may occur any time of the year; if testing occurs during the fawning season or during seasons or years that are hot and dry, effects of possible disturbance (from projectile noise, vehicles, and personnel) could have more severe consequences for Sonoran pronghorn as explained above. Because testing will occur indefinitely, it is likely that testing will fall during the fawning season or during extreme heat or drought conditions at some point in the future.

Habitat disturbance

The ERCA program will fire at selected existing targets within existing air-to-ground target areas (NTAC and STAC). Therefore, there will be no additional habitat disturbance within the Sonoran Pronghorn range on BMGR East associated with the targets. Projectile impact will be

limited to a 3 to 6 foot (0.91 to 1.8 meter) crater and there will be little risk of fire ignition because the rounds will be inert. Additionally, all access to the targets will be along authorized, existing roads. Therefore, the ERCA project will have no to little additional impact to Sonoran pronghorn compared to baseline levels.

Collision with vehicles

The survey crew accessing the target in a vehicle subsequent to the conclusion of each firing could collide with pronghorn during ingress and egress to the target site. However, the risk of collisions should be reduced as all access will be on authorized roads and crews will follow speed limits (see Conservation Measure #5). Additionally, the survey crew will access targets approximately 3 times per year which will not represent a large increase in vehicle traffic on BMGR East. The mobile tracking van could also collide with pronghorn, however, it will also follow speed limits and use authorized roads, thereby reducing risk of collision. That said, the duration of the proposed project is indefinite and we anticipate the Cabeza pronghorn population will grow beyond the current estimated size. Therefore, the likelihood of a pronghorn being struck by a vehicle could increase over time as the population increases.

Strikes with artillery

At BMGR East, in 2015, there were 6,742 munitions drops into targets in NTAC and 7,051 drops on STAC. While ordnance delivery varies by target and ordnance type, some individual target arrays received as many as 1,000 rounds annually. Assuming that a single ordnance delivered from the ERCA program is comparable to one munitions drop, the proposed action under ERCA will deliver up to 72 rounds annually onto existing targets, contributing approximately 1% to munitions deliveries in NTAC and STAC (Berry 2016).

Firing inert artillery projectiles (about 72 rounds per year) into the existing targets on NTAC and STAC poses a risk to pronghorn using the tactical ranges. Artillery projectiles could strike and injure or kill pronghorn; however, we believe the likelihood of this occurring is low because 1) the munitions are inert (i.e., ordnance or pieces thereof would have to fall on or otherwise strike an animal to kill or injure it), and 2) OI 13-01 specific to target closures will be followed. No known incidents of pronghorn being struck by inert artillery on BMGR East have occurred. That said, the duration of the proposed project is indefinite and we anticipate the Cabeza pronghorn population will grow beyond the current estimated size. Therefore, the likelihood of a pronghorn being struck by a projectile could increase over time as the population increases.

<u>Effects to Sonoran Pronghorn Recovery with the Project</u>

The recovery criteria in the 2016 Recovery Plan for the Sonoran Pronghorn, Second Revision are:

1. At least three free-ranging populations are viable. Two of these must be the Cabeza Prieta population and either the Quitovac or Pinacate population. The Recovery Team defines a viable population as one that has less than a 10% probability of extinction over 50 years and a growth rate that is stable or increasing. Furthermore, at least one new population must have been established, in addition to the Kofa subunit (e.g., Sauceda subunit). Established means

that the population is stable and is no longer in need of augmentation from a captive breeding program.

A Population Viability Analysis (PVA) estimated abundance targets to meet the Recovery Team's definition of viability, which is different for each management unit due to different environmental conditions. To be considered viable, a population estimate must meet or exceed the abundance targets and demonstrate a population growth rate that is stable or increasing ($r \geq 0$) for at least 10 of 14 years. Abundance targets for each management unit are estimated from the PVA to be: a) 225 in the Cabeza Prieta Management Unit; b) 150 in the Kofa subunit or a new subunit (Sauceda or other future established subunit); c) 150 in the Pinacate Management Unit; and d) 450 in the Quitovac Management Unit. These population sizes must be estimated by monitoring (i.e., aerial surveys).

2. Within the Cabeza Prieta Management Unit, Pinacate Management Unit, Quitovac Management Unit and the Kofa and Sauceda subunits of the Arizona Reintroduction Management Unit, a minimum of 90% of current Sonoran pronghorn habitat within each unit is retained and contiguous. This Sonoran pronghorn habitat is protected through agency policies, land use regulations and plans, landowner agreements, incentives, and/or other programs and agreements. The 90% of retained and contiguous Sonoran pronghorn habitat includes key habitat features such as water sources.

3. Threats to Sonoran pronghorn habitat quality in three units are stabilized or decreasing as measured by indicators described in Appendix E. Threats must be stabilized or decreased in the three management units that correspond to the three populations that meet the population viability criteria in Recovery Criteria number 1. In particular, the threats of overgrazing; unauthorized routes, roads and trails; invasive plant and animal species threatening Sonoran pronghorn habitat; and spread of shrubby vegetation are minimized through agency policies, land use regulations and plans, landowner agreements, incentives, and/or other programs and agreements.

4. Within the Cabeza Prieta Management Unit, Pinacate Management Unit, Quitovac Management Unit, and the Kofa and Sauceda subunits of the Arizona Reintroduction Management Unit, human disturbance is alleviated such that a minimum of 90% of Sonoran pronghorn habitat can be occupied by Sonoran pronghorn.

5. Genetic diversity for three populations, as measured by heterozygosity and allelic richness[1] for nuclear DNA markers, has been retained from levels indicated in Culver and Vaughn (2015). These three populations must meet the threshold of viability as described in Downlisting Criterion 1. The minimum level of heterozygosity[2] of any of the three populations must be 49% (i.e., within 20% of the average heterozygosity of population segments (10) estimated by Culver and Vaughn (2015)). The minimum level of allelic

[1] Allelic richness is a measure of the average number of alleles that takes into account rarity and commonness of alleles and provides an additional measure of genetic diversity that complements heterozygosity.
[2] Heterozygosity is a measure of the proportion of individuals in a population having two different alleles of the same gene.

richness of any of the three populations must be 1.96 (i.e., within 20% of the average allelic richness of population segments (10) estimated by Culver and Vaughn (2015)).

6. Effective federal, state, tribal, and/or local laws are in place in the recovery conservation units that ensure that killing of Sonoran pronghorn is prohibited or regulated such that viable populations of Sonoran pronghorn can be maintained and are highly unlikely to need the protection of the ESA again.

The proposed action may or may not affect the recovery criteria from the Recovery Plan for the Sonoran Pronghorn, Second Revision in the following ways:

1. The proposed action may adversely affect Sonoran pronghorn, including possibly injuring or killing and disturbing (stressing) pronghorn. However, ongoing conservation measures help to minimize many of those effects. Therefore, the action should not affect the ability of the Cabeza Prieta Management Unit (i.e., the action area) to sustain a viable population of 225 Sonoran pronghorn.

2. The proposed action does not include new construction or roads in Sonoran pronghorn habitat; therefore it should not reduce the amount of, nor fragment current Sonoran pronghorn habitat.

3. The proposed action does not include activities that will affect Sonoran pronghorn habitat quality beyond baseline levels (i.e., threats to habitat quality with the project would be considered stable).

4. The proposed action does not include activities that will considerably increase the amount of human disturbance in Sonoran pronghorn habitat and the action will occur in areas with regular military activity; therefore, proposed activities by YPG that may disturb Sonoran pronghorn are considered stable.

5. The proposed action will not significantly affect the retention of genetic diversity of the endangered U.S. Sonoran pronghorn, as it will not further fragment the Sonoran pronghorn populations or significantly reduce population size.

6. The proposed action will have no effect on laws that prohibit the killing of Sonoran pronghorn.

Therefore, while the proposed action may result in some adverse effects, including possible mortality, to Sonoran pronghorn, the proposed action is not anticipated to appreciably reduce the likelihood of recovery of the Sonoran pronghorn.

Summary

In summary, the proposed action is anticipated to have some adverse effects on Sonoran pronghorn, but not a substantial amount above existing baseline levels. As the Sonoran pronghorn population continues to grow, the likelihood of encounters between pronghorn and YPG activities (which will occur for an indefinite amount of time) will increase, as well as the possibility that incidental take will result from these activities. The most significant potential

adverse effects to the endangered U.S population from YPG activities include fleeing, increased stress, and exclusion from habitat due to project activities, and the possible injury or death from munitions delivery and vehicle strikes. A number of conservation measures reduce the potential for adverse effects from these activities.

CUMULATIVE EFFECTS - SONORAN PRONGHORN

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

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

Of most significant concern to pronghorn is the high level of CBV activity in the action area. CBV activity and its effects to pronghorn are described in the 2016 Final Recovery Plan for the Sonoran Pronghorn. CBV activity has resulted in route proliferation, off-highway vehicle activity, increased human presence in backcountry areas, discarded trash, abandoned vehicles, cutting of firewood, illegal campfires and arson fires, and increased chance of wildfire. Habitat degradation and disturbance of pronghorn have resulted from these CBV activities. Although CBV activity levels are still high, the trend in overall CBV apprehensions and drive-throughs has declined in recent years within the action area likely due to increased law enforcement presence, the border fence, and the status of the economy in the U.S. Despite high levels of CBV activity and law enforcement response throughout the action area, pronghorn in the U.S. have managed to increase since 2002 in part due to releases from the captive breeding pen and the construction of forage plots and waters. However, pronghorn use of areas subject to high levels of CBV and law enforcement activity appear to have declined. We expect CBV activities and their effects on pronghorn to continue for the foreseeable future.

CONCLUSIONS - SONORAN PRONGHORN

After reviewing the current status of the Sonoran pronghorn, the environmental baseline for the action area, the effects of the proposed ERCA action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of

the Sonoran pronghorn. No critical habitat has been designated for this species; therefore, none will be affected. We base this conclusion on the following:

1. There is a risk that project-related activities may disturb, injure, or kill Sonoran pronghorn (from vehicular activity or artillery). However, measures included in the proposed action help reduce disturbance to Sonoran pronghorn and their habitat, as well as the risk of injury or death of Sonoran pronghorn on BMGR from project-related activities. Among these measures are adherence to speed limits and OI 13-01.

2. The proposed project will not result in new impacts to or further fragment Sonoran pronghorn beyond baseline levels.

3. Although populations throughout the species' range continue to be at risk, the proposed project will not have an appreciable impact on the population at the rangewide scale. Thus, the proposed action is not expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of the Sonoran pronghorn in the wild by reducing the reproduction, numbers, or distribution of the species.

4. Recovery is the process that stops the decline of an endangered or threatened species by removing or reducing threats. Recovery ensures the long-term survival of the species in the wild. At that point, the species is recovered, and protection of the ESA is no longer necessary. As discussed above, we do not anticipate that the proposed project will appreciably reduce the likelihood of recovery of the Sonoran pronghorn.

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

INCIDENTAL TAKE STATEMENT – SONORAN PRONGHORN

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

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

AMOUNT OR EXTENT OF TAKE

The FWS anticipates one Sonoran pronghorn on BMGR will be taken as result of this proposed action (the length of the action is indefinite). We anticipate take in the form of direct mortality or injury from strikes with vehicles or artillery **or** in the form of harassment from project activities that may disturb Sonoran pronghorn (artillery fire, vehicle and human presence).

We anticipate the above incidental take will be difficult to detect because: 1) dead or impaired individual Sonoran pronghorn are very difficult to find unless they are radio-collared, and even when they are radio-collared, cause of death is difficult to determine because remains are usually highly-scavenged; 2) the status of the species is changing over time through births and natural loss; and, 3) the species ranges over a relatively large area, and thus the same individual can be difficult to re-detect unless it is radio-collared or ear-tagged. However, monitoring and reporting requirements will allow us to assess the effects of proposed project activities on Sonoran pronghorn. In addition, YPG will report to us any mortality or injury of Sonoran pronghorn due to activities carried out or authorized by YPG.

EFFECT OF THE TAKE

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

REASONABLE AND PRUDENT MEASURES and TERMS AND CONDITIONS

Because YPG has incorporated into their proposed action many design, conservation, and reporting measures to minimize impacts to Sonoran pronghorn, no Reasonable and Prudent Measures and Terms and Conditions are deemed necessary to further minimize the effects of take.

Review requirement: If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures. YPG must immediately provide an explanation of the causes of the taking and review with the FWS-AESO the need for possible addition of reasonable and prudent measures.

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS's Law Enforcement Office, 4901 Paseo del Norte NE, Suite D, Albuquerque, NM 87113; 505-248-7889) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

In addition to the above, the 2015 Final Incident Response Protocol for Sonoran pronghorn will be followed.

CONSERVATION RECOMMENDATIONS – SONORAN PRONGHORN

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. We recommend implementing the following actions:

1. Continue to participate on the Sonoran Pronghorn Recovery Team as staffing and funding permit.

2. Participate in the implementation of the Sonoran Pronghorn Recovery Plan, including providing or pursuing financial support, subject to the availability of funds, to implement recovery actions that are identified by the Sonoran Pronghorn Recovery Team as military mission allows.

3. Avoid and minimize adverse effects to Sonoran pronghorn from military and other activities to the extent practicable.

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

REINITIATION NOTICE

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that

causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Certain project activities may also affect species protected under the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. sec. 703-712) and/or bald and golden eagles protected under the Bald and Golden Eagle Protection Act (Eagle Act). The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when authorized by the FWS. The Eagle Act prohibits anyone, without a FWS permit, from taking (including disturbing) eagles, and including their parts, nests, or eggs. If you think migratory birds and/or eagles will be affected by this project, we recommend seeking our Technical Assistance to identify available conservation measures that you may be able to incorporate into your project.

For more information regarding the MBTA and Eagle Act, please visit the following websites. More information on the MBTA and available permits can be retrieved from http://www.fws.gov/migratorybirds and http://www.fws.gov/migratorybirds/mbpermits.html. For information on protections for bald eagles, please refer to the FWS's National Bald Eagle Management Guidelines (72 FR 31156) and regulatory definition of the term "disturb" (72 FR 31132) published in the Federal Register on June 5, 2007 (http://www.fws.gov/southwest/es/arizona/BaldEagle.htm), as well at the Conservation Assessment and Strategy for the Bald Eagle in Arizona (SWBEMC.org).

In keeping with our trust responsibilities to American Indian Tribes, we encourage you to continue to coordinate with the Bureau of Indian Affairs in the implementation of this consultation and, by copy of this biological opinion, are notifying the Tohono O'odham Nation of its completion. We also encourage you to coordinate the review of this project with the Arizona Game and Fish Department.

We appreciate the YPG's efforts to identify and minimize effects to listed species from this project. Please refer to the consultation number, 02EAAZ00-2017-F-0039, in future correspondence concerning this project. Should you require further assistance or if you have any questions, please contact Erin Fernandez (520) 670-6150 (x238) or Scott Richardson (x242).

Sincerely,

Steven L. Spangle
Field Supervisor

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

cc (electronic copy):
Christa Weise, Refuge Manager, Kofa National Wildlife Refuge, Yuma, AZ
Sid Slone, Refuge Manager, Cabeza Prieta National Wildlife Refuge, Ajo, AZ
James Atkinson, Sonoran Pronghorn Recovery Coordinator, Cabeza Prieta National Wildlife Refuge, Ajo, AZ
Charles Buchanan, Director, 56th Fighter Wing Range Management Office, Luke Air Force Base, AZ
Randy English, Conservation Manager, Marine Corps Air Station Yuma, Yuma, AZ

Marlay Kay Henry, Assistant Director, Department of Natural Resources, Tohono O'odham Nation, Sells, AZ

Chief, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ, pep@azgfd.gov
Regional Supervisor, Arizona Game and Fish Department, Yuma, AZ (Attn: John Hervert)
Raul Vega, Regional Supervisor, Arizona Game and Fish Department, Tucson, AZ

Filename: Final BO ERCA 5.3.17.ef.docx

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TABLES AND FIGURES

Table 1. Wild and captive Sonoran pronghorn estimates after adoption of standard field surveys and sightability model for wild population estimations (numbers in parentheses are 95% confidence intervals) (USFWS 2016; AGFD Data).

Year	Sonora, Mexico (Pinacate)	Sonora, Mexico (Quitovac)	Arizona, U.S. (Cabeza wild)	Arizona, U.S. (Nonessential Experimental Population wild)	Arizona, U.S. (Captive)[a]
1992	-	-	179 (147-234)		-
1994	-	-	282 (205-489)		-
1996	-	-	130 (114-154)		-
1998	-	-	142 (125-167)		-
2000	34 (27-48)	311 (261-397)	99 (69-392)		-
2001	-	-	-		-
2002	25 (21-33)	260 (216-335)	21 (18-33)		-
2003	-	-	-		-
2004	59 (32-171)	624 (454-2079)	58 (40-175)		7
2005	-	-	-		15
2006	67 (54-195)	567 (445-1530)	68 (52-117)		25
2007	50 (36-162)	354 (327-852)	-		37
2008	-	-	68		51
2009	101 (57-321)	381 (268-1158)	-		73
2010	-	-	76 (58-210)		70
2011	52 (32-183)	189 (168-435)	-		75
2012	-	-	159 (111-432)		98
2013	No survey	434 (376-1105)	-	9	117
2014	122 (79-464)		202 (171-334)	30	119
2015	117 (98-224)	862 (759-2129)			130
2016			228 (196-616)	70 at Kofa 41 at Sauceda	

Figure 1. Map of the proposed ERCA project on BMGR and YPG, Arizona (credit: YPG).

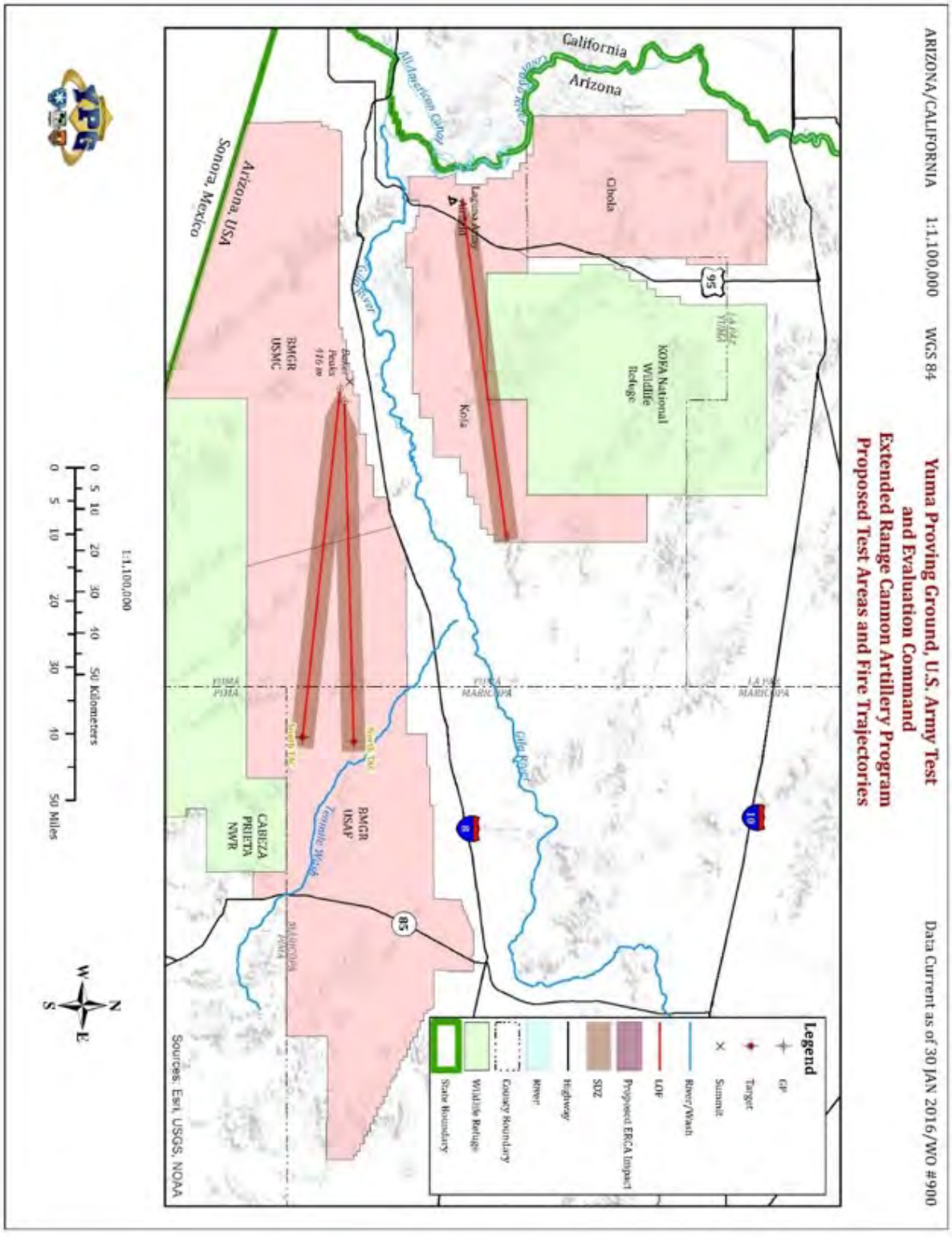


Figure 2. GSAs 71 and 76 on BMGR West, Arizona (credit: YPG).

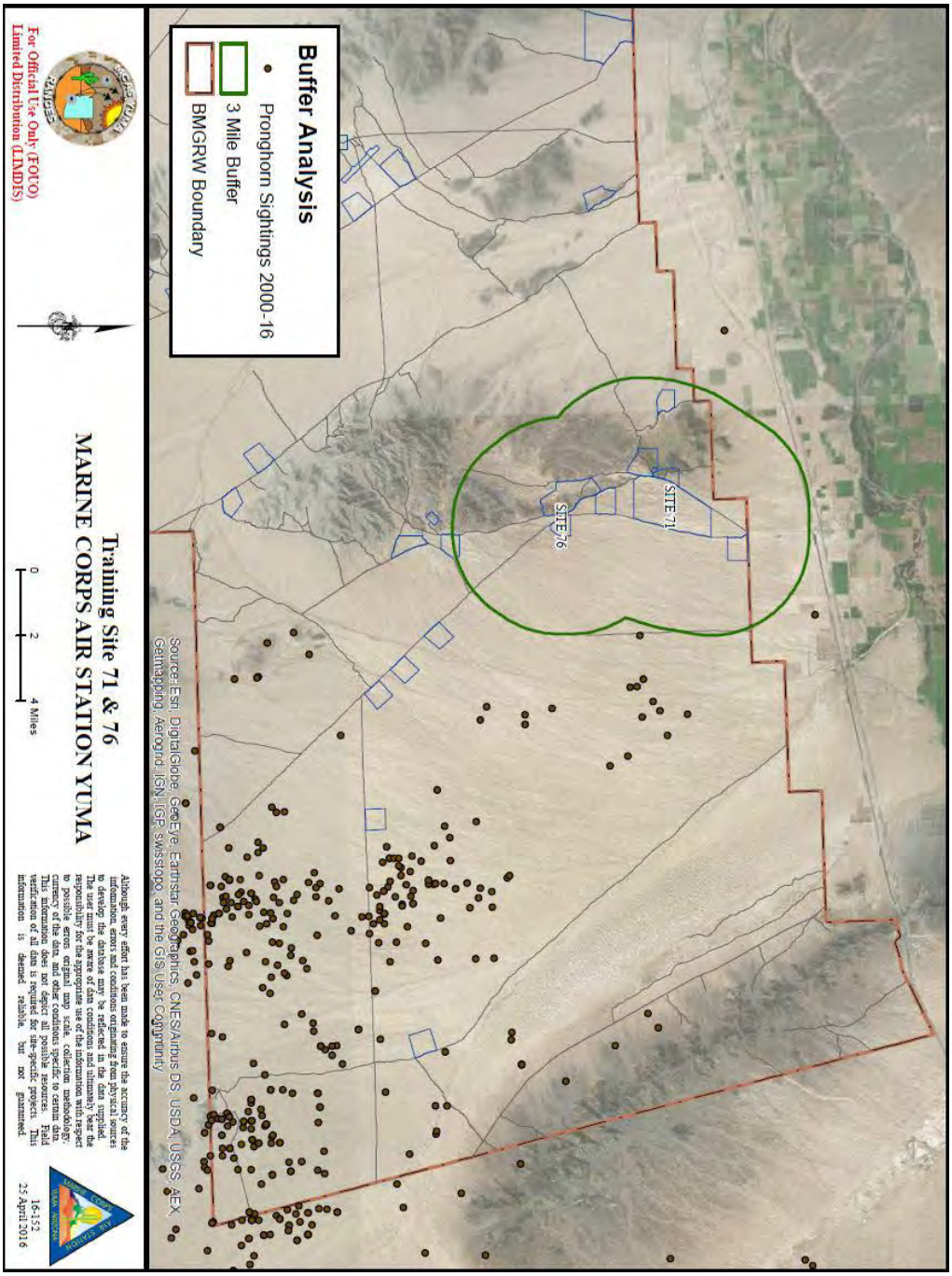


Figure 3. Historical and current ranges of Sonoran pronghorn in the United States and Mexico (USFWS 2016).

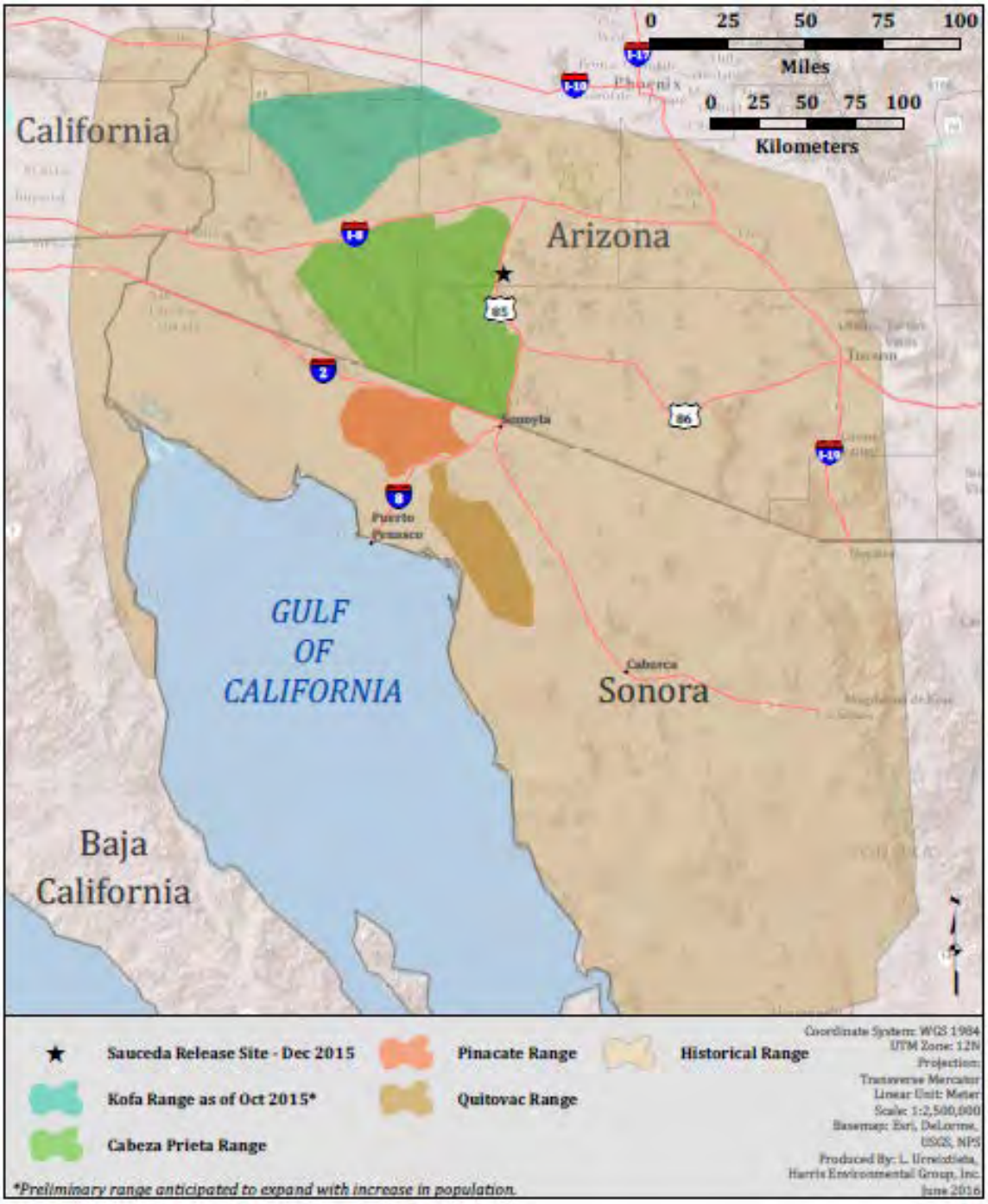


Figure 4. Endangered Sonoran pronghorn range in southwestern Arizona, United States, depicted in yellow cross-hatching (USFWS 2016).

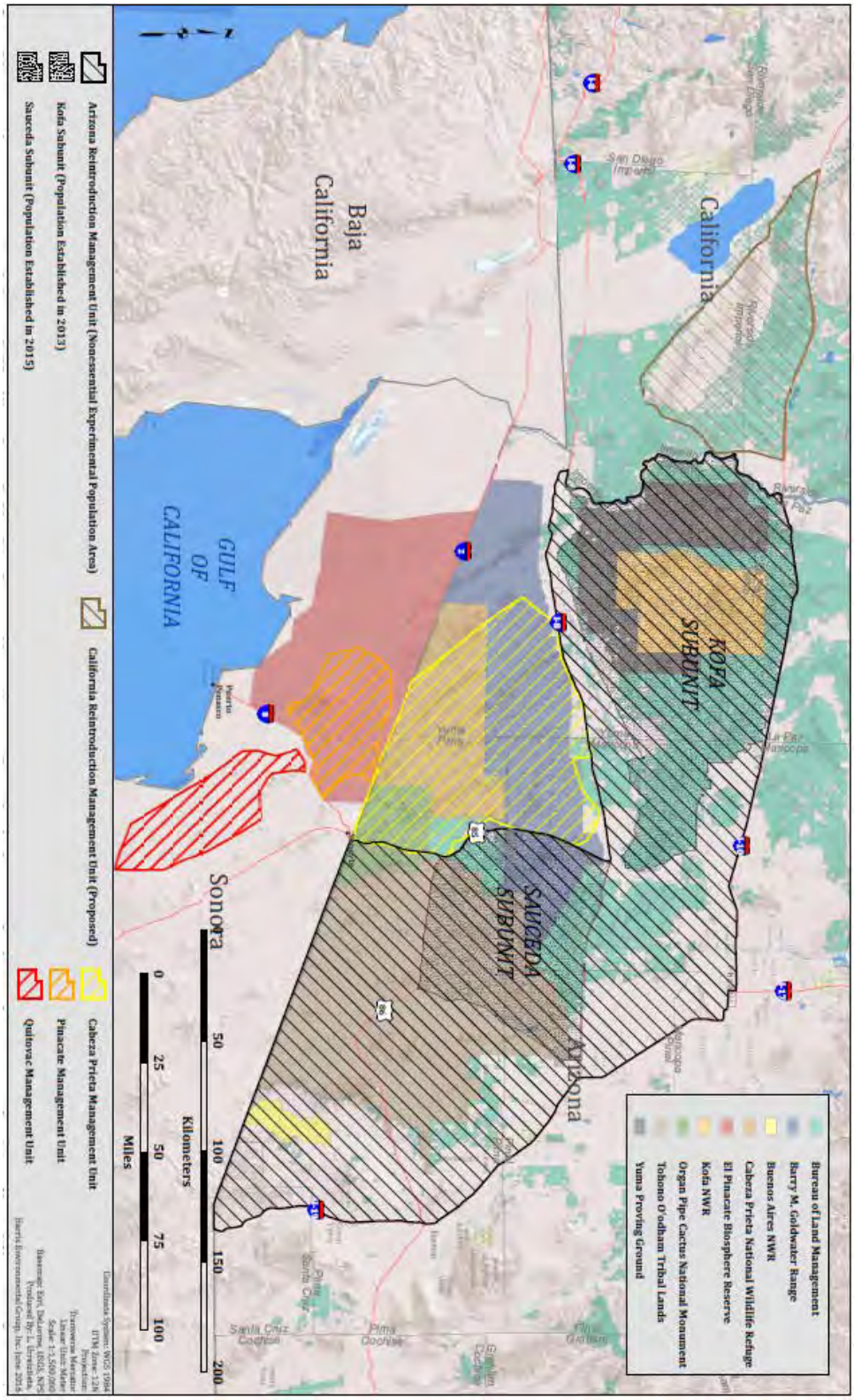
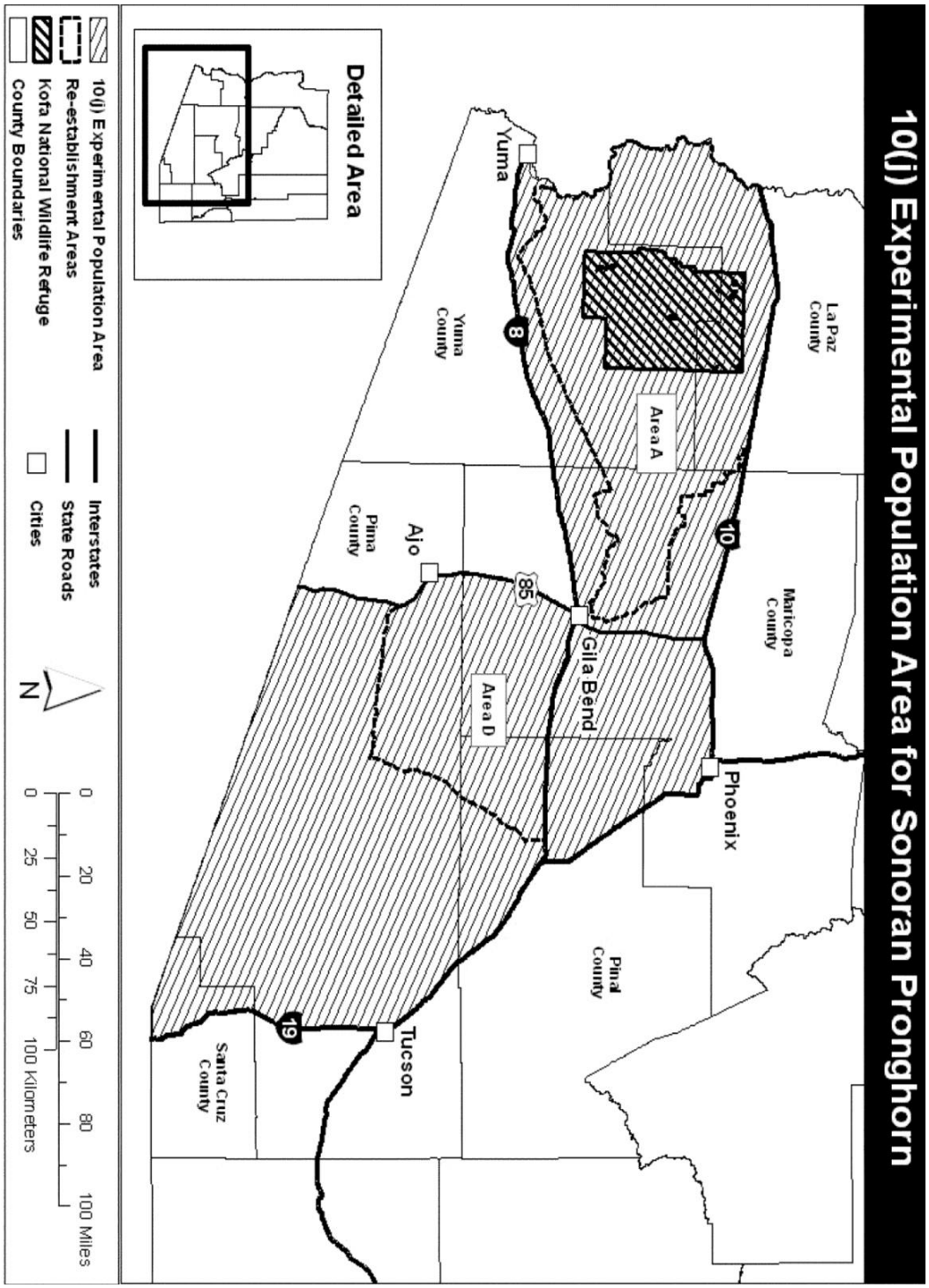


Figure 5. 10(j) Nonessential Experimental Population area for Sonoran pronghorn in southwestern Arizona, United States (USFWS 2011).



Appendix

Concurrences

Lesser long-nosed bat

We concur with your determination that the proposed action may affect, but is not likely to adversely affect the lesser long-nosed bat for the following reasons:

- Although some test firing could occur at night when lesser long-nosed bats are foraging, it is highly unlikely that a projectile would strike and kill a foraging lesser long-nosed bat because, except on firing and landing, the projectile will have flight trajectory well above the flight level of bats. Therefore, potential direct effects to lesser long-nosed bats from begin struck by a projectile are discountable.

- The selected gun positions, target areas, and access roads do not contain any lesser long-nosed bat roosts or foraging habitat. Therefore, potential effects to lesser long-nosed bats in the form of habitat destruction or alteration are discountable.

- It is possible that foraging lesser long-nosed bats could hear the projectile in flight (primarily on firing and landing) if shots are fired at night; however, such noise will occur infrequently and will be short in duration. Therefore, potential effects to bats in the form of noise and auditory disturbance from projectile noise are insignificant.

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND HEADQUARTERS
UNITED STATES ARMY GARRISON, YUMA
301 C STREET
YUMA AZ 85365-9498

October 4, 2016

Environmental Sciences Division

Jean Calhoun
United States Fish and Wildlife Service
Arizona Ecological Services Office
201 North Bonita Avenue, Suite 141
Tucson, Arizona 85745

Dear Ms. Calhoun:

The purpose of this letter is to request consultation under Section 7(a)(2) of the Endangered Species Act (ESA) for the Extended Range Cannon Artillery (ERCA). We seek formal consultation on potential impacts to Sonoran pronghorn on Barry M. Goldwater Range (BMGR) East and West. We also ask for your concurrence with our determination that the proposed project may affect, but is not likely to adversely affect, the lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*).

The United States Army Yuma Proving Ground (USAYPG) will manage the ERCA test program. The Marine Corps Air Station Yuma (MCAS Yuma) and the 56th Range Management Office (56 RMO), at Luke Air Force Base, are cooperating agencies. The western portion of BMGR, known as BMGR West, is administered by Marine Corps Air Station Yuma (MCAS Yuma). The eastern portion of BMGR, known as BMGR East, is managed by the 56th Range Management Office (56 RMO) at Luke Air Force Base.

The following activities are proposed:

a. Long-range artillery projectiles (155 mm) would be fired approximately 70 kilometers from an existing gun position located at USAYPG's Cibola Range toward a proposed impact area in the eastern portion of USAYPG's Kofa Firing Range at USAYPG. In support of this test, USAYPG would open a new multipurpose impact area of approximately 495 acres. The new impact area may be used for other testing purposes in the future.

b. Long-range artillery projectiles would be fired approximately 70 kilometers from west to east within the BMGR. A temporary gun position (TGP) would be established on BMGR West at existing ground support area 71 or 76. Projectiles would be fired at existing air-to-ground targets in the North and South Tactical Ranges in BMGR East.

After coordinating with natural resource managers with the cooperating agencies and searching the U.S. Fish and Wildlife Service (USFWS) Information, Planning, and Consultation System (IPAC) database, we determined that three federally endangered species - Sonoran pronghorn (*Antilocapra americana sonoriensis*), lesser long-nosed bat, and acuña cactus (*Echinomastus erectocentrus var. acunensis*) - may occur within the proposed action area.

Sonoran pronghorn at USAYPG are part of a nonessential experimental population under section 10(j) of the ESA. USAYPG previously conducted section 7 consultation with USFWS on

Activities and Operations on USAYPG and received Biological Opinion BO # 02EAAZ00-2014-F-0161. The proposed ERCA test at USAYPG is covered by our existing BO.

We prepared a Biological Assessment to analyze the impacts to listed species from the ERCA program at BMGR West and BMGR East. We also reviewed the existing Biological Opinions on BMGR West (22410-1995-F-0114-R007) and BMGR East (22410-1996-F-0094-R003) to identify potential impacts of the proposed project.

Based on the analysis in the Biological Assessment, USAYPG makes the following determinations of effect for the ERCA project.

Species	**Determination**	**Reason**
Acuña Cactus	No Effect	Does not occupy the proposed project area.
Lesser Long-nosed Bat	May Affect, Not Likely to Adversely Affect.	Proposed gun positions and impact targets are not within roosting or foraging areas. Projectile overflight would cause negligible disturbance.
Sonoran pronghorn	May Affect, Likely to Adversely Affect	The effects of the proposed project do not cause effects not already considered in existing biological opinions for BMGR West and East. All conservation measures and terms and conditions would apply to the proposed action.

The USAYPG installation Wildlife Biologist, Daniel Steward (daniel.m.steward.civ@mail.mil 928-328-2125), will be the primary point of contact for this consultation.

Sincerely,

Gordon K. Rogers
Garrison Manager

Enclosure

Biological Assessment of the Effects of the Extended Range Cannon Artillery (ERCA)

Test Program Managed by U.S. Army Yuma Proving Ground

September 6, 2016

BA Prepared By: Daniel Steward, Wildlife Biologist, Yuma Proving Ground

Aaron Alvidrez, 56th Range Management Office, Luke Air Force Base

Randy English, Range Manager, Marine Corps Air Station Yuma

Introduction

The purpose of this Biological Assessment is to determine the extent that the US Army Yuma Proving Ground's (YPG) proposed test of the Extended Range Cannon Artillery (ERCA) at the Barry M. Goldwater Range (BMGR) and YPG may affect the federally endangered Sonoran pronghorn (*Antilocapra americana sonoriensis*), lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), and acuña cactus (*Echinomastus erectocentrus var. acunensis*) and its proposed critical habitat. The impacts of this project are consistent with the impacts previously analyzed in the Biological Opinions (BOs) for Ongoing Operations and Proposed Enhancements of the BMGR East (2010) and Ongoing Activities at the Barry M. Goldwater Range by the Marine Corps Air Station–Yuma, Yuma and Maricopa Counties, Arizona apply to YPG's proposed action.

The ERCA test would also involve gun positions and a new impact area on YPG (Figure 1). The Sonoran Pronghorn population at YPG is designated nonessential experimental under the provisions of section 10(j) of the Endangered Species Act (ESA). The U.S. Fish and Wildlife Service (USFWS) issued a Biological Opinion on Activities and Operations at the US Army Yuma Proving Ground which addresses impacts to pronghorn on Kofa National Wildlife Refuge (where the species is treated as a threatened species for the purpose of section 7 consultation) from military activities including artillery fire, munitions impact, and potential impacts due to wildland fire. There are no other federally-listed species on YPG that would be affected by the proposed action. Because ERCA activity on YPG is already covered by an existing BO and there are no additional listed species that would be affected on YPG there will be no further analysis of actions located on YPG in this document.

Critical Habitat is not designated for Sonoran pronghorn; therefore it will not be a component of this analysis. This initiation package is prepared in accordance with legal requirements set forth under regulations implementing Section 7 of the Endangered Species Act (50 CFR 402; 16 U.S.C. 1536 (c)).

Proposed Action

The ERCA program would test fire long-range artillery projectiles approximately 70 kilometers within the Barry M. Goldwater Range (BMGR) (Figure 1). The BMGR is jointly administered

by Marine Corps Air Station Yuma (MCASY), who manage the western portion of BMGR (BMGR West), and Luke Air Force Base (LAFB) 56th Range Management Office, who manage the eastern portion of the BMGR (BMGR East).

Artillery projectiles would be fired from BMGR West and land in BMGR East. Test firings would be aimed at selected targets within existing air-to-ground target areas in the North Tactical Range (NTAC) and South Tactical Range (STAC) at BMGR East. Possible targets include: on NTAC 106 and 111; on STAC 208, 211, and 215. All rounds fired for the ERCA test on BMGR would contain inert warheads. During any firing event only one target would be impacted.

Target selection for each firing event would be based on allowable ordnance, surface danger zone, and pronghorn presence. No target would be selected if the surface danger zone would extend outside the boundaries of BMGR. Also, YPG would follow Operation Instruction (OI) 13-01 for monitoring pronghorn near targets. If, during a pronghorn monitoring session at NTAC or STAC, any pronghorn are observed within 1.0 km of a target, that target will be closed for the day and a different target will be selected.

On YPG this test may occur for an indefinite period. On BMGR the duration of the test would initially be 2 years and would only be extended with authorization from the Air Force and Marine Corps. The test firings would occur approximately three times per year. Testing may occur any time of year as range scheduling allows. Testing is preferred to occur during the day, but occasional night testing is possible. The duration of each test would be approximately 7 days: 3 days for setup, 2 days for firing, and 2 days for teardown. Approximately 12 rounds would be fired each of the two test-firing days. Consequently, approximately 24 rounds would be fired per event and 72 rounds would be fired per year. A survey crew consisting of YPG test personnel would access the target subsequent to the conclusion of each firing, if possible. In total, the survey crew would access targets approximately 3 times per year.

One new temporary gun position (TGP) would be established on BMGR West near Baker Peak. TGPs are generally semicircular in shape with an equipment footprint of approximately 60m radius, encompassing approximately 1.5 acres. A TGP can be established anywhere with enough space to accommodate the equipment footprint and would preferably be in an area with previous surface disturbance. Establishment of a TGP may require some grading, leveling and/or backfilling. The same TGPs would be used for each test to the maximum extent possible. YPG would use existing Ground Support Areas (GSA) 71 or 76 as sites for TGPs and use previously disturbed areas as much as possible. One TGP would be established in each GSA. GSA 71 is located just west of Sonoran pronghorn range, while GSA 76 is located just within the pronghorn range (Figure 3a); however, both GSAs are over 3 miles from the nearest pronghorn location documented from 2000 to 2016 (Figure 3). The temporary gun position at BMGR West would be used for a variety of test activities such as emplacement and firing of weapons systems; emplacement/operation of data collection equipment such as Kineto Tracking Mounts (KTMs), radars, metrological instrumentation, sensors (i.e. telemetry antennae) and staging of support vehicles and other test support equipment (i.e. blastshields). Additional areas may be used near the gun emplacements for multiple mobile temperature conditioning chambers for the artillery projectiles. No permanent infrastructure or utilities would be established at the TGPs for this project.

The cannon would be transported to and from the GSA during setup/teardown for each test on a trailer pulled by a truck (a total of 3 times per year). Transport vehicles would obey speed limits and stay on authorized roads at all times. Ingress and egress to/from the GSA would be from the north.

Up to two mobile radar tracking devices may be deployed along roadsides in BMGR West or East along the trajectory of the projectile. The tracking units consist of a van with a trailer and generator. The vans can be parked near the roadside and on-board instruments operated from within the van, in order to track the projectile during flight.

Conservation Measures

The proposed ERCA project would implement all applicable conservation measures identified in the Biological Opinion for Ongoing Activities at the Barry M. Goldwater Range by the Marine Corps Air Station-Yuma (2015), and in the Biological Opinion for Military Training on the Barry M. Goldwater Range East (2010). Implementation of these measures includes but is not limited to:

- All ground personnel would be 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.
- 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. Vehicles will stay within pre-existing EOD clearance areas.
- Every effort will be made to minimize surface disturbance and to restore the area to the previous condition when restoration is practicable.
- The YPG 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 BO 22410-1995-F-0114-R007 and BO 22410-1996-F-0094-R003
- All YPG personnel would obey speed limits on roadways to minimize the probability of a vehicle-pronghorn collision. 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. If a vehicle is 1-2 km from a Sonoran pronghorn, the speed limit is 15 mph; if a vehicle is less than 1 km from a Sonoran pronghorn, every effort is made to use an alternate route; if none are available and movement is essential, then the speed limit is 15 mph; and if Sonoran pronghorn are observed running due to ground disturbance, vehicles near Sonoran pronghorn will stop until the animals have stopped running.
- All discarded matter (including but not limited to human waste, trash, garbage, and chemicals) that is generated by test personnel would be disposed of and removed in a manner consistent with federal and State of Arizona regulations. All work sites would be maintained in a sanitary condition.

- Vehicles or stationary equipment from which hazardous materials may be spilled or leaked that are parked for longer than 2 days would be placed over temporary containment as appropriate. Hazardous or toxic materials that are generated would be disposed of in a manner consistent with federal and State of Arizona guidelines.

Status/Description of Listed Species

Three federally-listed species occur in the project area. In the following section we describe the status, biology, and distribution of the Sonoran pronghorn, lesser long-nosed bat and acuña cactus.

Sonoran Pronghorn (*Antilocapra americana sonoriensis*)

Status

Sonoran Pronghorn is a subspecies of the American pronghorn. The species exhibits conspicuous white areas on the rump, face, and belly, and also white bands on the throat. The hooves have 2 toes and lack the dewclaw common to most ungulates. Males are distinguished from females by the presence of pronged horns exhibited by males and a black cheek patch. The Sonoran Pronghorn is the smallest subspecies of pronghorn with an average height of 3 feet and weight between 75 and 130 lbs. It is also generally paler in coloration than the other subspecies. (AZGFD HDMS)

The Sonoran Pronghorn was included on the first list of endangered species in 1967 under the Endangered Species Preservation Act of 1966. With the passage of the Endangered Species Act (ESA) this subspecies was listed as endangered.

In 2010 the FWS designated the Sonoran Pronghorn as a nonessential experimental population, as defined under section 10(j) of the ESA within a portion of their historic range. This area is located north of Interstate 8 and south of Interstate 10 and encompasses all of YPG and KNWR. In order to restore pronghorn to their historic breeding range, the USFWS has been releasing pronghorn from semi-captive breeding pens on CPNWR and KNWR into portions of the CPNWR, KNWR, BMGR East/West, and OPNM.

No Critical Habitat has been established for Sonoran Pronghorn.

Life History

Sonoran Pronghorn inhabit one of the hottest and driest portions of the Sonoran Desert. They forage on a large variety of perennial and annual plant species (Hughes and Smith 1990, Hervert *et al.* 1997b, U.S. Fish and Wildlife Service 1998). During drought years, Hughes and Smith (1990) reported cacti were the major dietary component (44 percent). Consumption of cacti, especially chain fruit cholla (*Cylindropuntia fulgida*, Pinkava 1999), provides a source of water during hot, dry conditions (Hervert *et al.* 1997b). Other important plant species in the diet of the pronghorn include pigweed (*Amaranthus palmeri*), ragweed (*Ambrosia* sp.), locoweed (*Astragalus* sp.), brome (*Bromus* sp.), and snakeweed (*Gutierrezia sarothrae*) (U.S. Fish and

Wildlife Service 1998). Pronghorn will move in response to spatial limitations in forage availability (Hervert *et al.* 1997a). At times, water intake from forage is not adequate to meet minimum water requirements (Fox *et al.* 2000), hence pronghorn need and readily use both natural and artificial water sources (Morgart *et al.* 2005).

Sonoran Pronghorn rut from July to September. Does have been observed with newborn fawns from February to May. Parturition corresponds with annual spring forage abundance. Does usually have twins, and fawns suckle for about two months. Does gather with fawns sometimes forming nursery groups (U.S. Fish and Wildlife Service 1998). Sonoran Pronghorn may form small herds of more than 20 animals (Wright and deVos 1986).

Habitat and Occurrence

Historic records show Sonoran Pronghorn ranged as far north as present-day Interstate 10 and as far south as Kino Bay and Hermosillo in Sonora, Mexico. Pronghorn ranged westward to the Imperial Valley, California, and Baja California, Mexico, and eastward to the Baboquivari Mountains and the Santa Cruz River in Arizona. In the1800s, habitat alteration from fencing and livestock, coupled with unregulated hunting and drought lead to massive declines in the distribution and number of Sonoran Pronghorn (USFWS 2010).

The current distribution of Sonoran Pronghorn encompasses about 4,210 square miles, or about 7.6 percent of its historic range. The current distribution includes about 2,750 square miles in the United States and 1,460 square miles in Mexico. In the U.S., Sonoran Pronghorn inhabit the region southeast of YPG encompassed by BMGR, Cabeza Prieta National Wildlife Refuge (CPNWR), and Organ Pipe Cactus National Monument (OPCNM); pronghorn occasionally occur on Bureau of Land Management and Tohono O'odham Nation lands (Figure 2). In Mexico, Sonoran Pronghorn currently only occur in northwestern Sonora.

From YPG, the closest natural population of Sonoran Pronghorn is on the BMGR, which is south of I-8 and approximately 10 miles south of YPG. The interstate highway and the extensive farming along the Gila River Valley effectively prevent movement of this population onto YPG. The USFWS maintains captive breeding pens for Sonoran Pronghorn in Kofa NWR (KNWR) and CPNWR. The USFWS havs released pronghorn from these pens into KNWR, CPNWR, BMGR and OPCNM. Some of these pronghorn released on KNWR, and their wild-born offspring, are observed regularly on the East Kofa Range on YPG. One individual has been observed west of Highway 95 near Stone Cabin.

The preferred habitat of Sonoran pronghorn is creosote bush-bursage, paloverde-mixed cacti and ephemeral (xeroriparian) washed in broad intermountain alluvial valleys on flat to rolling topography (YPG, 2012). According to a model by USFWS, more than 55 percent of YPG (approximately 757 square miles) is potentially suitable habitat for this species (USFWS, 2009). Generally, bajadas are fawning areas and sandy dune areas provide food on a seasonal basis.

The most recent survey of Sonoran Pronghorn in Arizona took place in November 2014 within CPNWR, BMGR, and portions of OPCNM. During this survey, 186 pronghorn were observed. After statistical corrections, the estimated pronghorn population in this area is 202 (AZGFD 2014). Based on surveys in 2015, the pronghorn population in Mexico is estimated to be 979

(AZGFD 2015). There are approximately 72 pronghorn in the Kofa/YPG population (Bright pers comm 2016).

In Arizona, pronghorn populations are currently increasing due to successful releases from the captive breeding pens and habitat enhancements such as forage plots and waters, and generally more favorable climatic conditions in the past few years. (AZGFD 2014).

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

Status

The lesser long-nosed bat is a medium-sized, leaf-nosed bat. It has a long muzzle and a long tongue, and is capable of hover flight. These features are adaptations for feeding on nectar from the flowers of columnar cacti (e.g., saguaro; cardon [*Pachycereus pringlei*]; and organ pipe cactus) and from paniculate agaves (e.g., Palmer's agave [*Agave palmeri*]) (Hoffmeister 1986). The lesser long-nosed bat was listed (originally, as *Leptonycteris sanborni*; Sanborn's long-nosed bat) as endangered in 1988 (U.S. Fish and Wildlife Service 1988). No critical habitat has been designated for this species. A recovery plan was completed in 1997 (U.S. Fish and Wildlife Service 1997). Loss of roost and foraging habitat, as well as direct taking of individual bats during animal control programs, particularly in Mexico, have contributed to the current endangered status of the species. Recovery actions include roost monitoring, protection of roosts and foraging resources, and reducing existing and new threats. The draft recovery plan states that the species will be considered for delisting when three major maternity roosts and two post-maternity roosts in the U.S., and three maternity roosts in Mexico have remained stable or increased in size for at least five years. A five-year review has been completed and recommends downlisting to threatened (U.S. Fish and Wildlife Service 2007).

Life history

Lesser long-nosed bats appear to be opportunistic foragers and extremely efficient fliers. They are known to fly long distances from roost sites to foraging sites. Night flights from maternity colonies to foraging areas have been documented in Arizona at up to 25 miles and in Mexico at 25 miles and 36 miles (one way) (Ober *et al*. 2000; Dalton *et al*. 1994, Ober and Steidl 2004, Lowery *et al*. 2009). Lowery *et al*. 2009 and Steidl (personal communication, 2001) found that typical one-way foraging distance for bats in southeastern Arizona is roughly 6 to 18 miles. A substantial portion of the lesser long-nosed bats at the Pinacate Cave in northwestern Sonora (a maternity colony) fly 25-31 miles each night to foraging areas in OPCNM (U.S. Fish and Wildlife Service 1997). Horner *et al.* (1990) found that lesser long-nosed bats commuted 30-36 miles round trip between an island maternity roost and the mainland in Sonora; the authors suggested these bats regularly flew at least 47 miles each night. Lesser long-nosed bats have been observed feeding at hummingbird feeders many miles from the closest known potential roost site (Lowery *et al*., 2009; personal communication with Yar Petryszyn, University of Arizona, 1997).

Lesser long-nosed bats, which often forage in flocks, consume nectar and pollen of paniculate agave flowers and the nectar, pollen, and fruit produced by a variety of columnar cacti. Nectar of these cacti and agaves is high energy food. Concentrations of some food resources appear to be patchily distributed on the landscape, and the nectar of each plant species used is only seasonally available. Cacti flowers and fruit are available during the spring and early summer; blooming agaves are available primarily from July through October. In Arizona, columnar cacti occur in lower elevational areas of the Sonoran Desert region, and paniculate agaves are found primarily in higher elevation desert scrub areas, semi-desert grasslands and shrublands, and into the oak and pine-oak woodlands (Gentry 1982). Lesser long-nosed bats are important pollinators for agave and cacti, and are important seed dispersers for some cacti.

Roosts in Arizona are occupied from late April to September (Cockrum and Petryszyn 1991) and, on occasion, as late as November (Sidner 2000); the lesser long-nosed bat has only rarely been recorded outside of this time period in Arizona (U. S. Fish and Wildlife Service 1997, Hoffmeister 1986, Sidner and Houser 1990). In spring, adult females, most of which are pregnant, arrive in Arizona and gather into maternity colonies in southwestern Arizona. These roosts are typically at low elevations near concentrations of flowering columnar cacti. After the young are weaned these colonies mostly disband in July and August; some females and young move to higher elevations, primarily in the southeastern parts of Arizona near concentrations of blooming paniculate agaves. Adult males typically occupy separate roosts forming bachelor colonies. Males are known to occur from the Chiricahua Mountains and recently the Galiuro Mountains (personal communication with Tim Snow, Arizona Game and Fish Department, 1999) but also occur with adult females and young of the year at maternity sites (U. S. Fish and Wildlife Service 1997). Throughout the night between foraging bouts, both sexes will rest in temporary night roosts (Hoffmeister 1986).

Habitat and Occurrence

The lesser long-nosed bat is migratory and found throughout its historical range, from southern Arizona and extreme southwestern New Mexico, through western Mexico, and south to El Salvador. It has been recorded in southern Arizona from the Picacho Mountains (Pinal County) southwest to the Agua Dulce Mountains (Pima County) and Copper Mountains (Yuma County), southeast to the Peloncillo Mountains (Cochise County), and south to the international boundary. In the spring of 2016, a group of seven lesser long-nosed bats was found roosting in a cave at BMGR East (Figure 5); this is the only documented occurrence of this species on BMGR.

Within the U.S., habitat types for the lesser long-nosed bat include Sonoran Desert scrub, semi-desert and plains grasslands, and oak and pine-oak woodlands. Farther south, the lesser long-nosed bat occurs at higher elevations. Maternity roosts, suitable day roosts, and concentrations of food plants are all critical resources for the lesser long-nosed bat. All of the factors that make roost sites useable have not yet been identified, but maternity roosts tend to be very warm and poorly ventilated (U.S. Fish and Wildlife Service 1997). Such roosts reduce the energetic requirements of adult females while they are raising their young (Arends *et al*. 1995).

Acuña Cactus (*Echinomastus erectocentrus* var. *acunensis)*

Status

The acuña cactus has a single plump stem, straight central spines, and can reach 30 cm in height. Immature individuals do not resemble mature plants, and are instead disc-shaped or spherical with no central spines. Once the immature plants reach 4 cm, central spines begin to develop.

Acuña cactus is listed as an endangered species and critical habitat has been proposed for this species. Reasons for decline/vulnerability include current and ongoing modification and destruction of its habitat and range from long-term drought, effects of climate change, and ongoing and future border activities.

Life History

The acuña cactus occurs in valleys and on small knolls and gravel ridges of up to 30 percent slope in the Palo-Verde-Saguaro Association of the Arizona Upland subdivision of the Sonoran desertscrub at 365 to 1,150 m (1,198 to 3,773 ft) in elevation. The plant is not found on all seemingly suitable habitat and microclimate (soil structure, chemistry, and moisture) may be important factors.

The acuña cactus relies solely on the production of seeds for reproduction and genetic diversity, with pollination highly linked to survival, as the species cannot fertilize itself. Acuna cacti are pollinated by a suite of bees from the Andrenidae, Anthophoridae, Anthophorinae, Halictidae, and Megachilidae families; the leafcutter bee (*Megachile palmensis*) and cactus bee (*Diadasia rinconis*) are thought to be the primary pollinators. Flowers are pink or purple, up to 5 cm wide, and appear in late March and April. Fruits are pale green when young and tan when dry. Seeds are black and rugose (wrinkled or creased). Recruitment and adult survivorship are impacted by drought.

Habitat and Occurrence

The Acuña cactus is known from five population areas in southern Arizona in Maricopa, Pima, and Pinal Counties, and also from Mexico near the U.S border. Land ownership is primarily National Park Service and Bureau of Land Management with additional sites on Department of Defense, Arizona State Lands, Tohono O'odham Nation, and private lands. Small populations of Acuña cactus occur at the southeastern corner of BMGR East, more than 30 miles from nearest proposed ERCA targets (Figure 5).

Existing Conditions/Ongoing Activities at BMGR West (Proposed ERCA Gun Position)

The temporary gun position on BMGR West would be placed within an existing Ground Support Area (GSA 76 or 71) (Figure 3).

GSAs within BMGR West provide approved off-road locations to which Marine Corps ground units deploy with equipment and troops to participate in air-and-ground or ground-only training. The GSAs are used occasionally throughout the year by other Marine Corps units. The 35 GSAs were established in geographically dispersed and tactically realistic positions to provide ground unit Commanders with sufficient flexibility to deploy their forces to meet the tactical challenges of a variety of possible war fighting training scenarios. Marine Corps ground units that typically participate in training activities at the BMGR include infantry, air defense, command, control, communications, and support units.

A GSA is customarily used for small unit training, forward operating base (FOB) activities, air defense training, and bivouacking. Air defense training consists of ground units that emit electronic threats to aircraft or track aircraft.

Marine Corps use of undeveloped GSAs involve off-road vehicle driving, placing equipment on the ground, erecting tents and the other facilities of a military bivouac, and troops walking within the site.

Other uses of GSAs include early warning control and ground-based air defense training. Other DoD and Marine Corps training/testing exercises have occurred in the past and may in the future on the BMGR-West. These exercises could include aviation units from the Air Force and Navy, and aviation and aviation-related ground units from the Marine Corps. Aviation and ground units deployed in conjunction with these exercises conduct operations in the same manner as the exercises described above. Such exercises have typically been short, lasting approximately three to five days.

The MCASY consulted with USFWS on the use of GSAs, etc. under the 2015 BO 22410-1995-F-0114-R007 Ongoing Activities at the Barry M. Goldwater Range by the Marine Corps Air Station–Yuma, Yuma and Maricopa Counties, Arizona. The proposed action of setting up a temporary gun position within a GSA generally falls within the scope of that BO.

Existing Conditions/Ongoing Training at BMGR East (Proposed ERCA Target)

The Biological Opinion 22410-1996-F-0094-R003 (4 May 2010) identifies tactical ranges including NTAC and STAC. These ranges are described as diverse target complexes for air-to-ground weapons training that simulate combat staging areas. NTAC and STAC provide an array of simulated combat targets and threats including: airfields with aircraft in revetments and on taxiways and runways, as well as control towers, hangars, and administrative buildings; field artillery batteries and missile launchers; truck convoys; railroad yards with trains; friendly/enemy tank groups and regiments; Maverick missile training targets (plywood and real tanks); simulated SCUD Launchers and ZSU 23-4 anti-aircraft artillery; High-Explosive (HE) hills (one small hill on each tactical range is authorized for high-explosive ordnance); and SAM missile sites with protective soil revetments and associated radar equipment.

Many targets are constructed of plywood and other common construction materials. Exceptions are simulated trains, convoys, buildings, and combat vehicles made of salvaged tanks, trucks,

buses, jeeps, and Sea/Land cargo containers. The configuration and type of targets used can change when new combat scenarios require different target configurations. New targets are also continually added to replace old ones. Salvaged vehicles positioned on the tactical ranges are pre-conditioned by removal of heavy components (engines and transmissions), draining of all lubricants and coolants, and removal of glass windows and rubber tires before being used as targets.

Authorized ordnance for delivery at selected NTAC and STAC targets includes gun/cannon ammunition (as would be used for this test), white phosphorus spotting rockets, and training practice bombs. Training practice munitions are not armed with high explosives or incendiary warheads but may contain a small spotting charge that produces flash and smoke to reveal where the round has struck. HE bombs and rockets and live Maverick and Hellfire missiles are only authorized for use on the specific targets.

Potential ERCA Impacts to Sonoran pronghorn on BMGR West

Ground-based activities, including vehicle and foot traffic within Sonoran pronghorn habitat can degrade pronghorn habitat and cause pronghorn to flee or be excluded from habitat, which during stressful times, such as drought, can contribute to increased mortality or decreased physical condition of animals. In the past, military interaction with Sonoran Pronghorn was rather limited. However, due to recent population growth, the likelihood of interactions has increased considerably. That said, most ground-based activities outside or on the edge of the Sonoran pronghorn range are less likely to interact with pronghorn and therefore, less likely to impact them.

All ERCA activities on BMGR West would occur on existing roads and within existing Ground Support Areas 71 or 76. Using existing roads and previously disturbed sites within GSAs would prevent additional disturbance or alteration of pronghorn habitat. The impact at the GSA would be similar to other ground-based impacts identified in the 2015 BO.

Long-range test firings would occur approximately 3 times per year, with the duration of each test lasting 7 days each as described below. Potential visual and auditory impacts to pronghorn from the ERCA project would be similar to the impacts pronghorn experience from visual/noise disturbance currently occurring at the GSAs on BMGR West including heavy equipment, generators, lights, and people on the ground. The impulse noise from the gun at one mile is similar to that of thunder, but of shorter duration. This noise reduces over distance and distances around 3 miles the sound would be barely audible.

Use of GSAs 76 or 71 would reduce potential visual and noise impacts because these GSAs are at the western edge of Sonoran Pronghorn range. According to historic pronghorn locations (1994-2015) most pronghorn occur considerably south and west of the proposed GSAs. Pronghorn have not been observed within 3 miles of GSA 71 or 76 since 2000 (see Figure 3).

Furthermore, the GSAs already receive a higher degree of military use. YPGs use of these areas 3 times per year would not present a significant change in how these lands are used.

Additionally, conservation measures will be implemented to minimize impacts to Sonoran pronghorn. For example, all test personnel accessing the range would be required to receive pronghorn training and must adhere to established speed limits to reduce the likelihood of vehicle strikes on pronghorn.

Potential ERCA Impacts to Sonoran Pronghorn on BMGR East

Within BMGR East, the ERCA program would fire at selected existing targets within existing air-to-ground target areas (NTAC and STAC). Thus, there would be no additional habitat disturbances within the Sonoran Pronghorn range associated with target placement and construction activities. Projectile impact would be limited to a 3 to 6 foot crater. There is little risk of fire ignition because the rounds would be inert.

Long-range test firings would occur approximately 3 times per year. The duration of each test would be approximately 7 days: 3 days for setup (no firing), 2 days for test firings, and 2 days for teardown (no firing). Approximately 12 rounds would be fired over the course of each firing day. The total annual firing would be approximately 72 rounds per year. Noise associated with firing inert warheads for the test at BMGR East would be limited to the "whoosh" of the projectile incoming to target (audible, but not nearly as loud as an aircraft and shorter in duration). The firing of the gun would barely be audible from BMGR East depending on atmospheric conditions. The sound of the impact is limited to the sound of a large piece of solid metal hitting the ground. There would be no aircraft overflight noise associated with the ERCA program.

The 2010 BO notes that noise may generally induce increased heart rates in ungulates and may cause them to flee. Indirectly, the Sonoran Pronghorn foraged more and bedded less on days without ground and air stimuli. A study cited in the BO concluded that, "military activity was associated with changes in the behavior of pronghorn, but these changes did not likely influence animals in a detrimental manner" (USFWS 2010). Noise impacts associated with the incoming rounds would be audible at less than 1 mile from the flight line, but not nearly as loud as an aircraft and shorter in duration. The BMGR range is already subject to a considerable amount of military noise. Currently BMGR East uses the airspace and targets on a daily basis with aircraft and munitions that are much louder. The ERCA project would only fire six days per year which does not present an appreciable increase in activity on BMGR East. The frequency and intensity of noise at BMGR East would not exceed that evaluated in the BO.

A survey crew consisting of YPG test personnel would access the target subsequent to the conclusion of each firing. In total, the survey crew would access targets approximately 3 times per year. All access would be via authorized roads. The 2010 BO also evaluated impacts to pronghorn from ground-based activities. Threats from ground-based activities include collision with ground vehicles and disturbance to Sonoran pronghorn and their habitat. However, accessing targets approximately 3 times per year would not represent an appreciable increase in ground-based activities evaluated in the BO. Furthermore, with implementation of OI 13-01 specific to vehicle use on the range (p. 57 of BMGR East BO), there will be no appreciable increase in impacts from ground-based activities associated with the ERCA program.

Firing inert artillery projectiles (about 72 rounds per year) into the existing targets on NTAC and STAC would not present a significant increase to adverse effects to Sonoran Pronghorn analyzed in the 2010 BO. At BMGR East, in 2015, there were 6,742 munitions drops into targets in NTAC and 7,051 drops on STAC. While ordnance delivery varies by target and ordnance type, some individual target arrays received as many as 1,000 rounds annually (Figure 6). Assuming that a single ordnance delivered from the ERCA program is comparable to one munitions drop, the proposed action under ERCA would deliver up to 72 rounds annually onto existing targets, contributing approximately 1% to munitions deliveries in NTAC and STAC (Berry 2016).

As noted in the 2010 BO, "The likelihood of practice bombs or inert ordnance affecting pronghorn is remote. Such ordnance or pieces thereof would have to fall on or otherwise strike an animal to kill or injure it. In addition, the inert rounds would not result in impacts associated with high explosive rounds such as explosion noise and wildland fire. Last, with implementation of OI 13-01 specific to target closures, there will be no appreciable increase in impacts from ordinance delivery activities associated with the ERCA program.

Potential Impacts to Lesser Long-nosed Bat

According to the BO 22410-1996-F-0094-R003, NTAC and STAC generally do not support lesser long-nosed bat forage plants except in the mountains (BO 2010). The selected gun positions and targets are not located in mountainous areas so there would be no habitat disturbance in foraging areas. If any shots occur at night, it is possible that foraging bats could hear the projectile in flight; however, this sound would likely not disturb foraging bats or their habitat. The projectile would have a very high trajectory (up to 75,000 feet) except on firing and landing. Lesser long-nosed bats fly much lower. It is highly unlikely that the projectile would strike long-nosed bats so this impact would be discountable (Figure 5).

Potential Impacts to Acuna Cactus

The acuña cactus on BMGR East has only been found on the eastern portion of the range approximately 30 miles from the proposed targets for the project. Projectiles fired at the targets would not affect acuña cactus. Direct impacts from projectiles hitting the ground would be many miles from acuña cactus locations or proposed critical habitat. Because the rounds are inert, there would be no likelihood of indirect impacts from wildland fire spreading into acuña cactus habitat.

Cumulative Impact

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

Most lands within the action area (current range of the pronghorn within Arizona) are managed by Federal agencies; thus, most activities that could potentially affect pronghorn are Federal activities that are subject to section 7 consultation. The effects of these Federal activities are not

considered cumulative effects. Relatively small parcels of private and State lands occur within the currently occupied range of the pronghorn near Ajo and Why, north of the BMGR from Dateland to Highway 85, and from the Mohawk Mountains to Tacna. State inholdings in the BMGR were acquired by the USAF. Continuing rural and agricultural development, recreation, vehicle use, grazing, and other activities on private and State lands adversely affect pronghorn and their habitat. MCAS-Yuma (2001) reports that 2,884 acres, on lands outside the BMGR, have been converted to agriculture near Sentinel and Tacna. These activities on State and private lands and the effects of these activities are expected to continue into the foreseeable future. Historical habitat and potential recovery areas currently outside of the current range are also expected to be affected by these same activities on lands in and near the action area in the vicinity of Ajo, Why, and Yuma.

Of most significant concern to pronghorn is the high level of border related activity in the action area resulting from illegal border crossing and interdiction efforts. Border activity has resulted in route proliferation, off-highway vehicle activity, increased human presence in backcountry areas, discarded trash, abandoned vehicles, cutting of firewood, illegal campfires, and increased chance of wildfire. Habitat degradation and disturbance of pronghorn have resulted from these activities. Though border activity levels are still high, the trend in overall border apprehensions and drive-throughs has declined in recent years within the action area likely due to increased law enforcement presence, the border fence, and the status of the economy in the U.S. Despite high levels of border activity and law enforcement response throughout the action area, pronghorn in the U.S. have managed to increase since 2002, although their use of areas subject to high levels of border use and law enforcement appear to have declined. We expect border activities and their effects on pronghorn to continue.

Conclusion

Impacts to Sonoran Pronghorn

BMGR East and West

Based on our analysis, the proposed ERCA project **may affect and is likely to adversely affect Sonoran pronghorn**; This determination is based on human activity that would occur within pronghorn habitat as well as noise associated with firing the projectile and the remote possibility of injury or mortality due to munitions delivery, or collision with vehicles. YPG would operate under the procedures and protocols identified by BMGR East and West for any activity that may be conducted on the range. These include any applicable conservation measures as well as the Terms and Conditions of their most recent BOs

YPG

The ERCA project on YPG is consistent with the proposed action previously analyzed in BO 02EAAZ00-2014-F-0161. All potential impacts from the ERCA to Sonoran pronghorn were addressed in that BO. YPG would continue to implement the conservation measures and terms and conditions for BO 02EAAZ00-2014-F-0161.

Impacts to Lesser Long-nosed Bat

According to the BO 22410-1996-F-0094-R003, NTAC and STAC generally do not support lesser long-nosed bat forage plants except in the mountains (BO 2010). The selected targets are not located in mountainous areas, nor is there likely disturbance to foraging or roosting bats from the projectile flight (Figure 5). There is no known foraging habitat for lesser long-nosed bat on YPG. Therefore, the proposed project may affect but is not likely to adversely affect lesser long-nosed bat. YPG seeks FWS concurrence with this determination.

Impacts to Acuña Cactus

Acuña cactus have only been found along the eastern edge of BMGR East, well outside the proposed project area (Figure 5). The proposed project would have no effect on Acuña cactus.

References

USFWS Biological Opinion on Ongoing Operations and Proposed Enhancements of the BMGR East (4 May 2010).

USFWS Biological Opinion on Ongoing Activities at the Barry M. Goldwater Range by the Marine Corps Air Station-Yuma (3 November 2015)

USFWS Biological Opinion on Activities and Operations at the United States Army Garrison Yuma Proving Ground, Yuma and La Paz Counties, Arizona. AZGFD Annual Progress Report, Biennial Sonoran Pronghorn and Triennial Bighorn Sheep Aerial Surveys, January-December 2014.

AZGFD Annual Progress Report, Biennial Sonoran Pronghorn and Triennial Bighorn Sheep Aerial Surveys, January-December 2014.

AZGFD Annual Progress Report, Biennial Sonoran Pronghorn and Triennial Bighorn Sheep Aerial Surveys, January-December 2015.

Tim Berry, 2016, personal communication. BMGR East Range Operation Statistics.

USFWS, Environmental Conservation Online System, ECOS

Figure 1. General Project Area

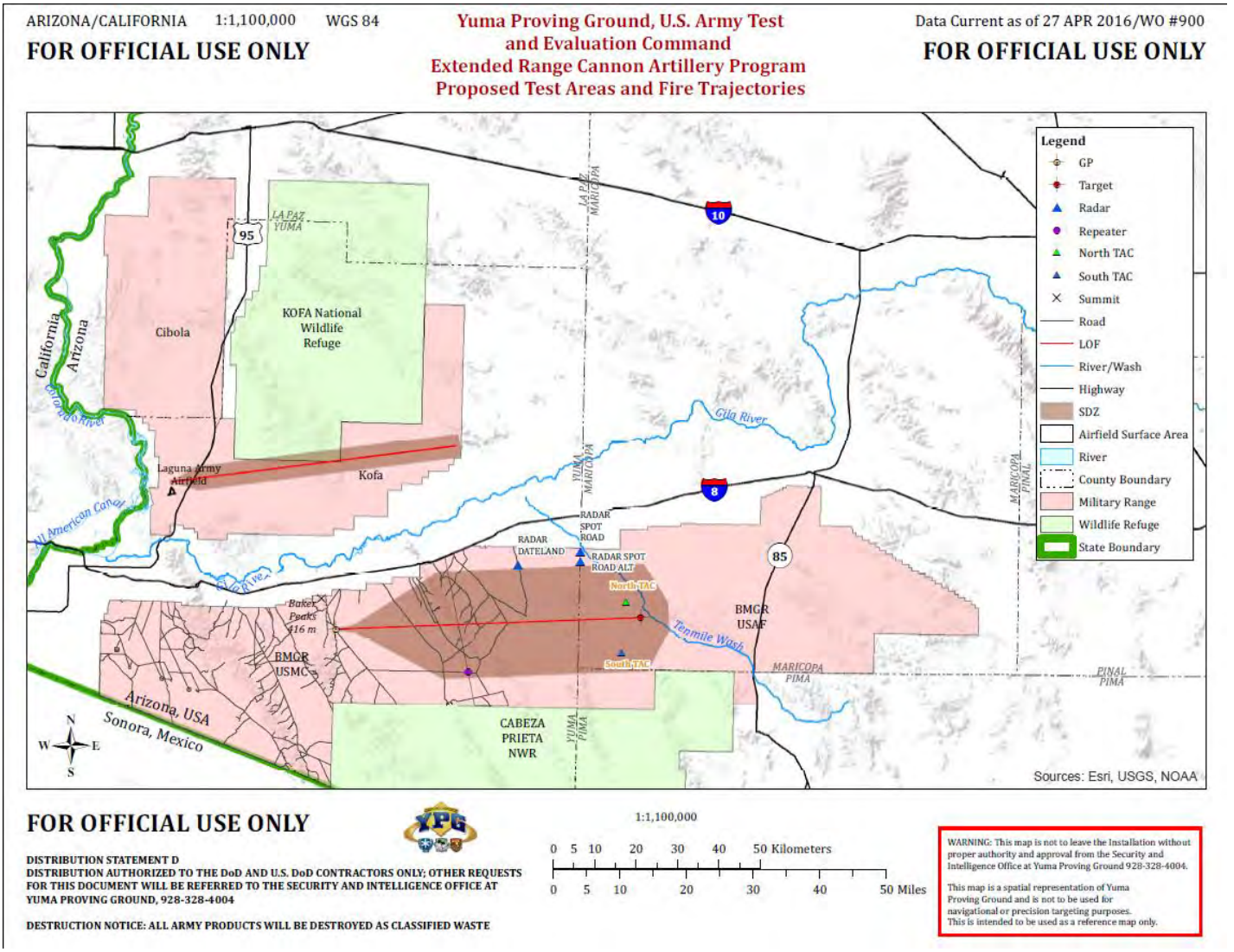


Figure 2. Pronghorn Locations on BMGR

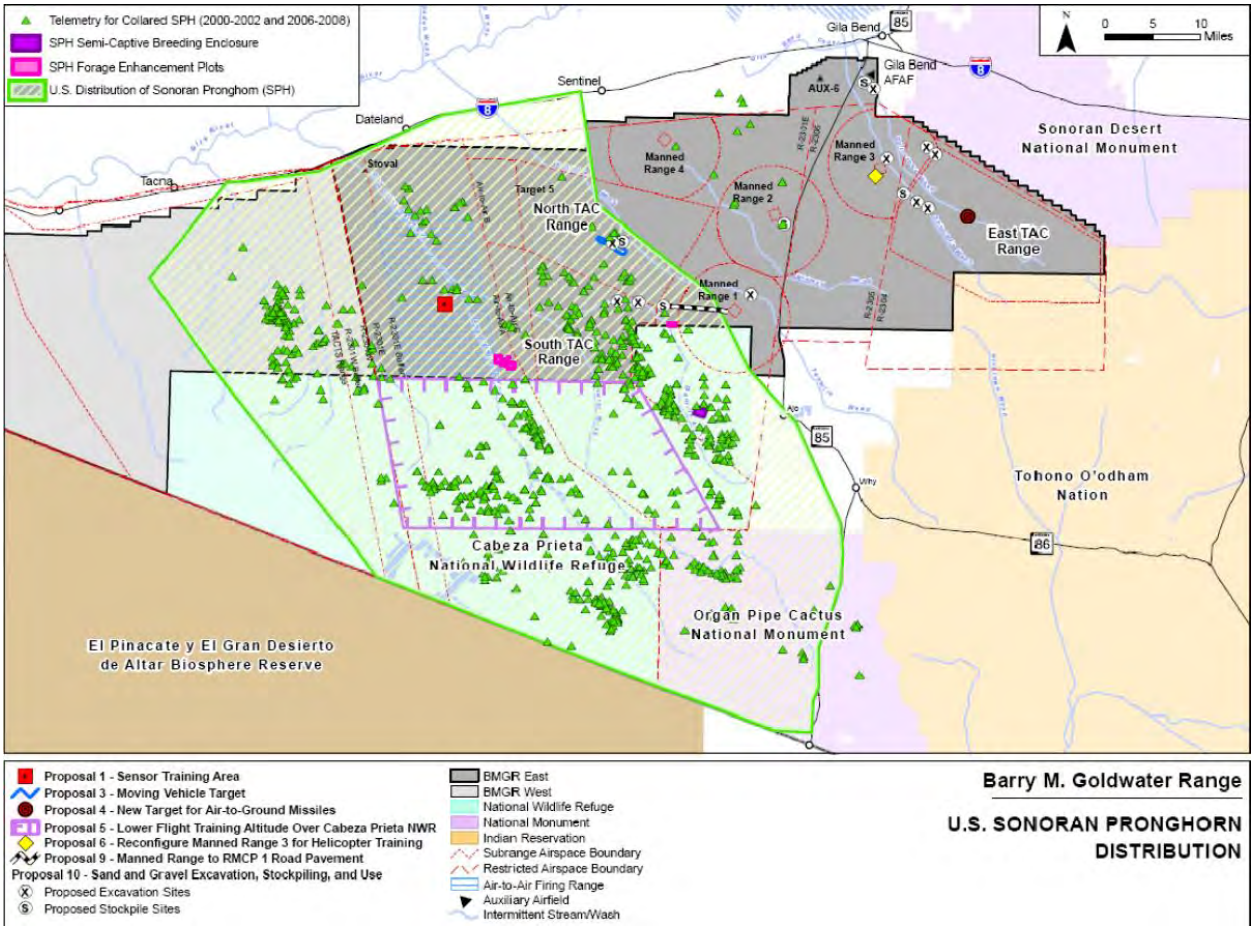


Figure 3. Pronghorn Distribution in Proximity to Proposed Gun Positions (GSA 71 and 76)

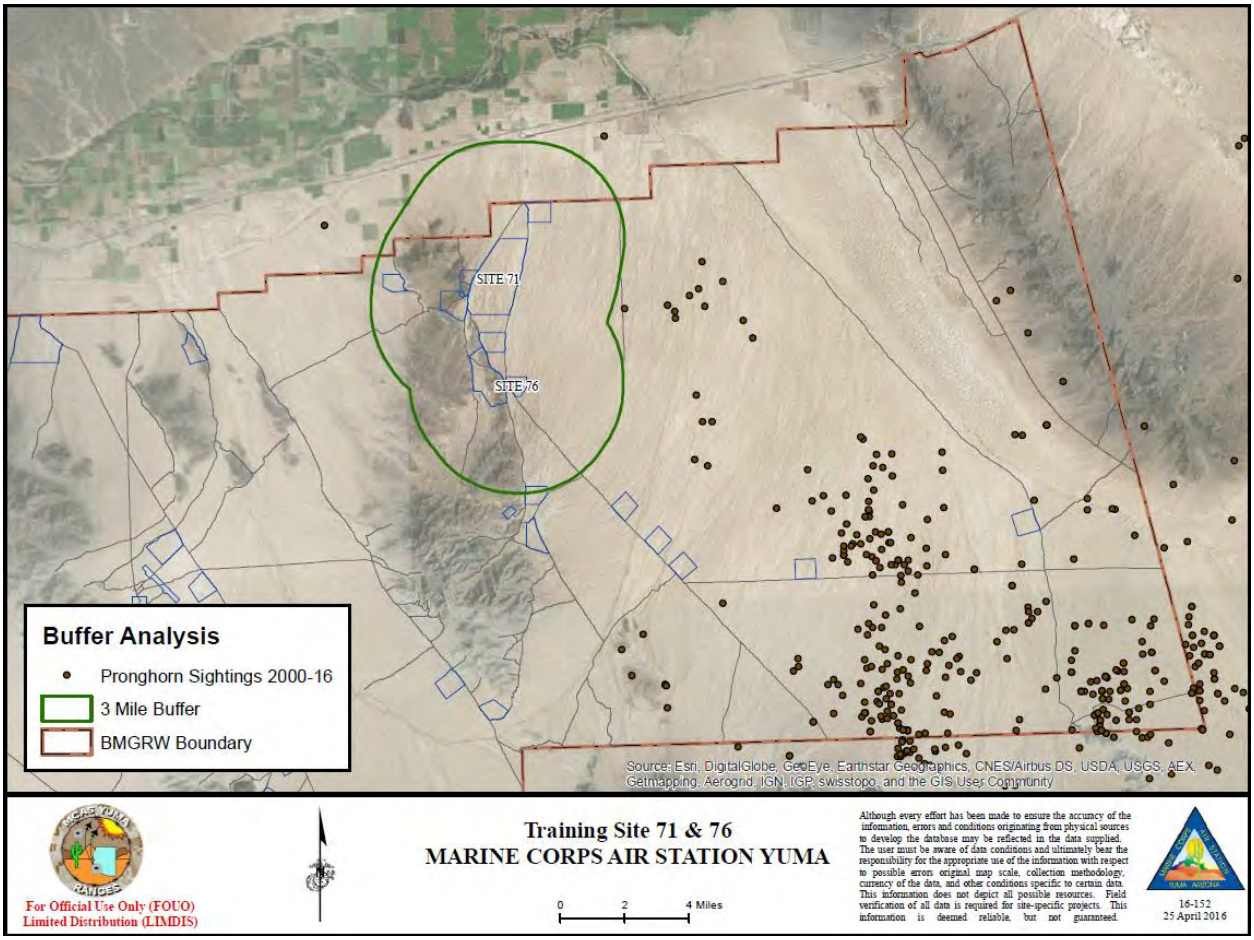


Figure 3b. Sonoran Pronghorn Range on BMGR West

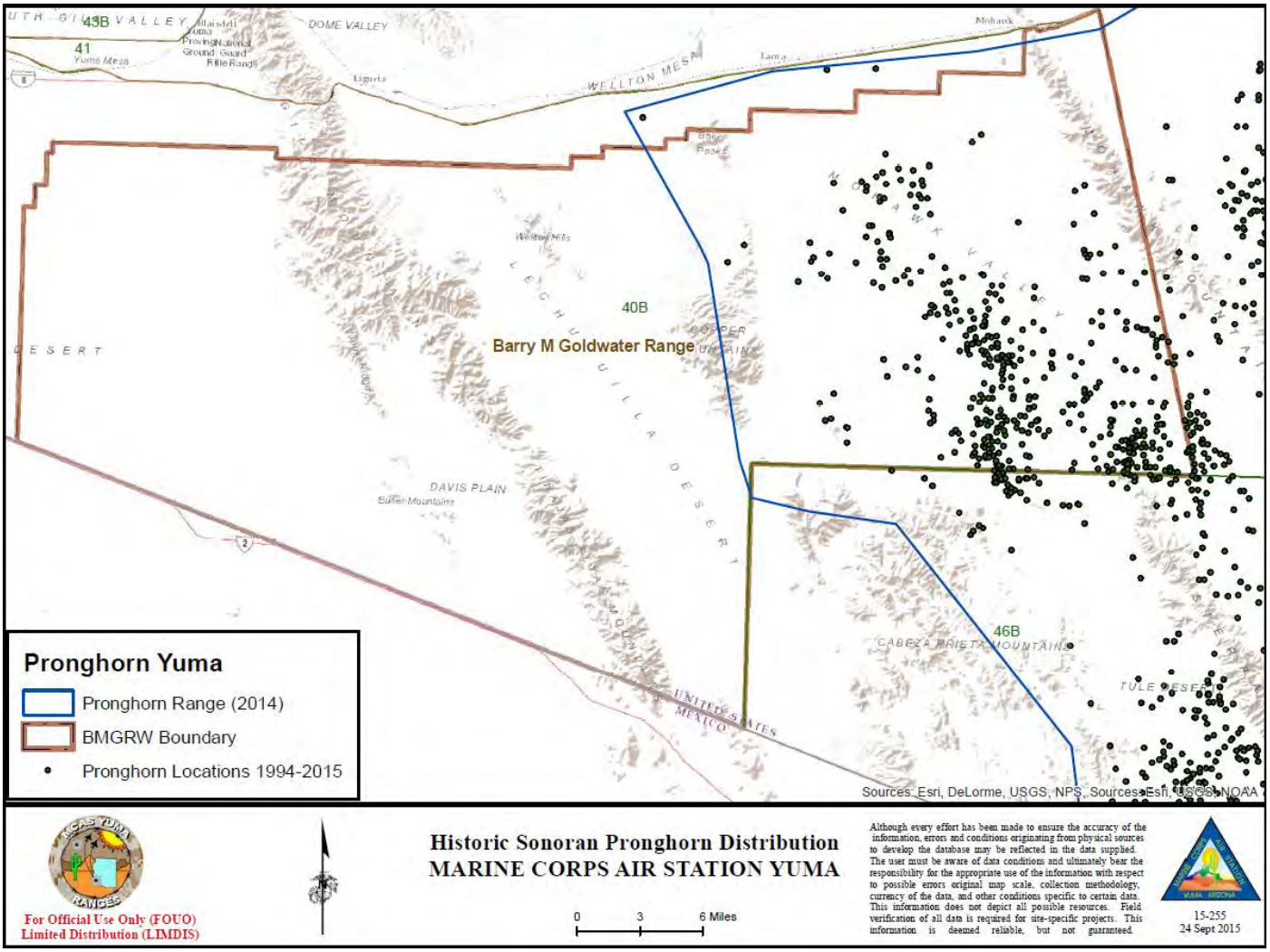


Figure 4.

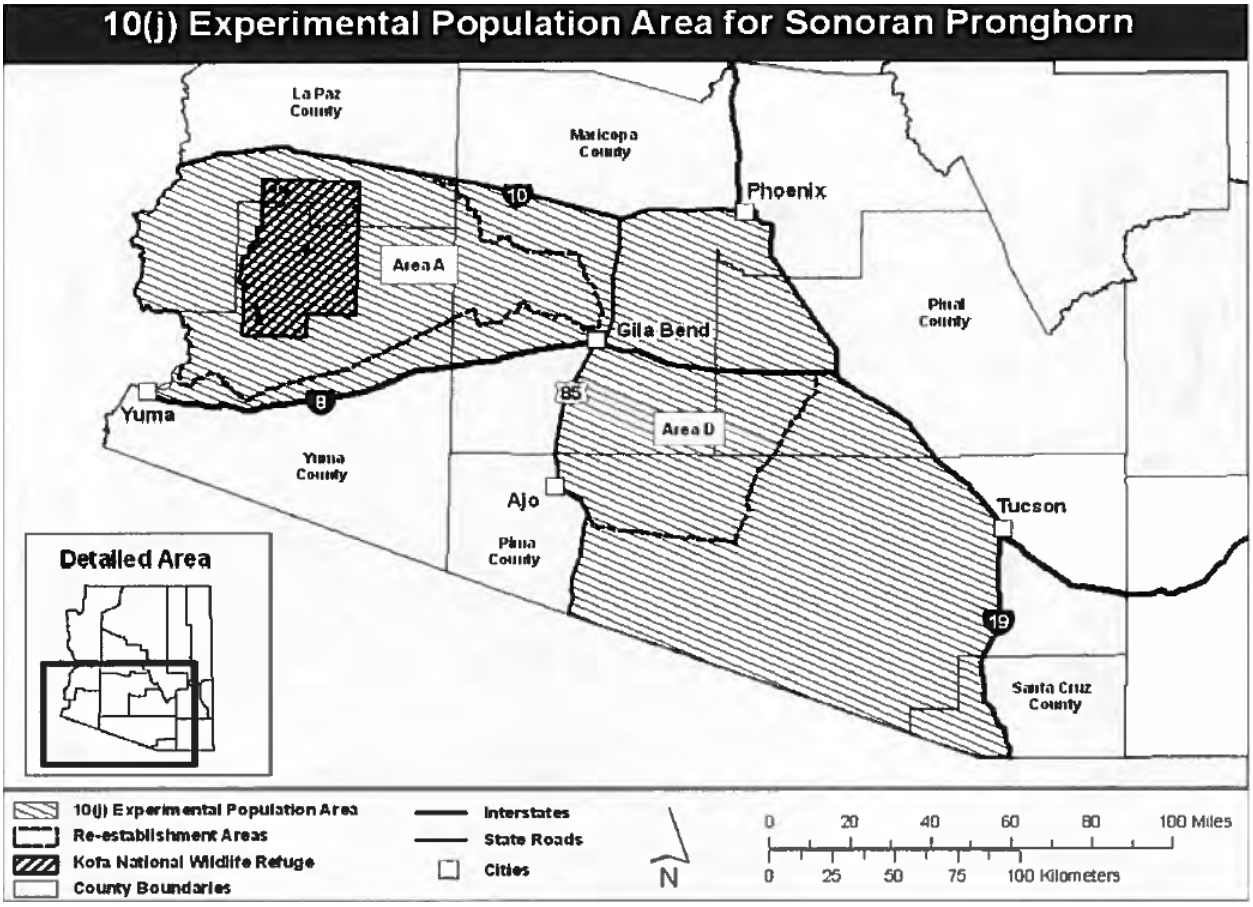

10(j) Experimental Population Area for Sonoran Pronghorn
La Paz County
Maricopa County
Phoenix
Area A
Gila Bend
Pinal County
Yuma
Yuma County
Area B
Ajo
Pima County
Tucson
Santa Cruz County
Detailed Area
10(j) Experimental Population Area
Re-establishment Areas
Kofa National Wildlife Refuge
County Boundaries
Interstates
State Roads
Cities
N
0 20 40 60 80 100 Miles
0 25 50 75 100 Kilometers

Figure 5. Acuña Cactus and Lesser Long-nosed Bat locations on BMGR East.

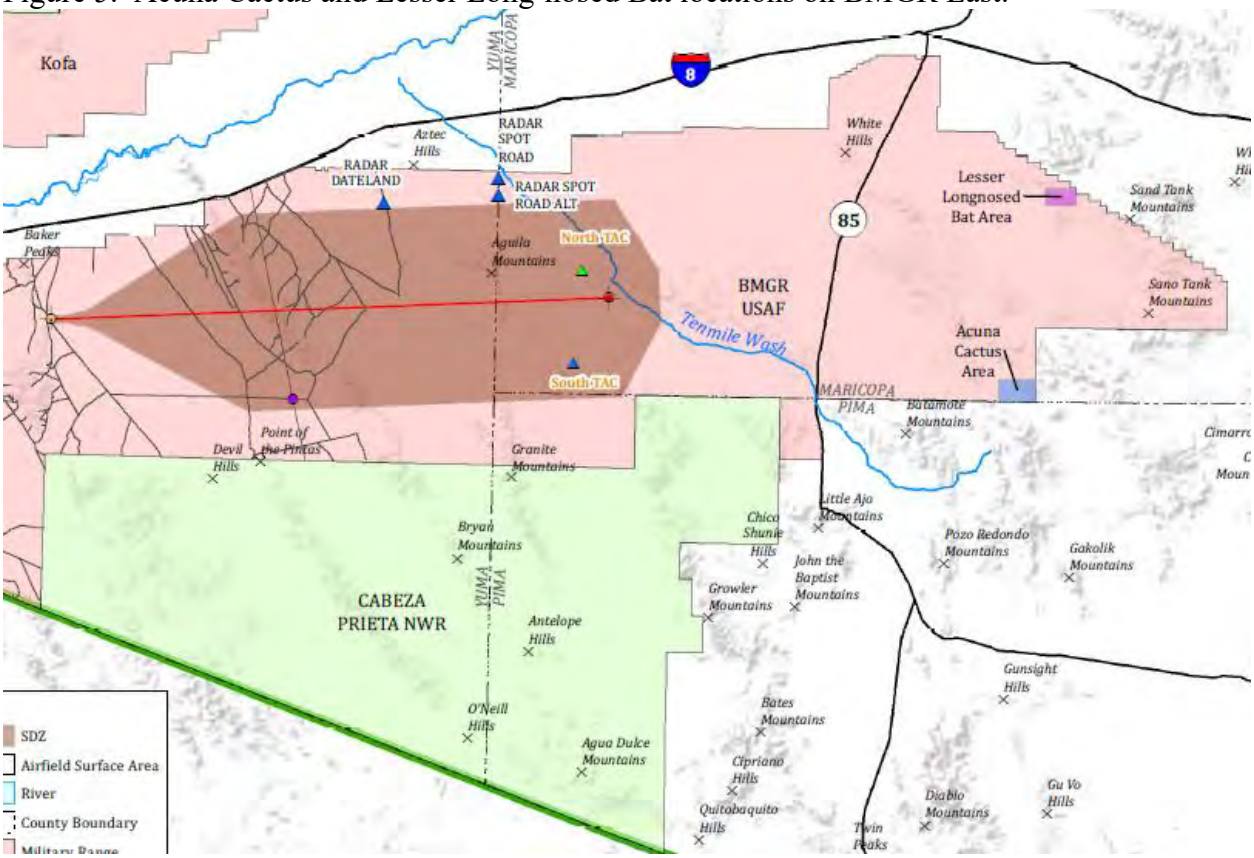
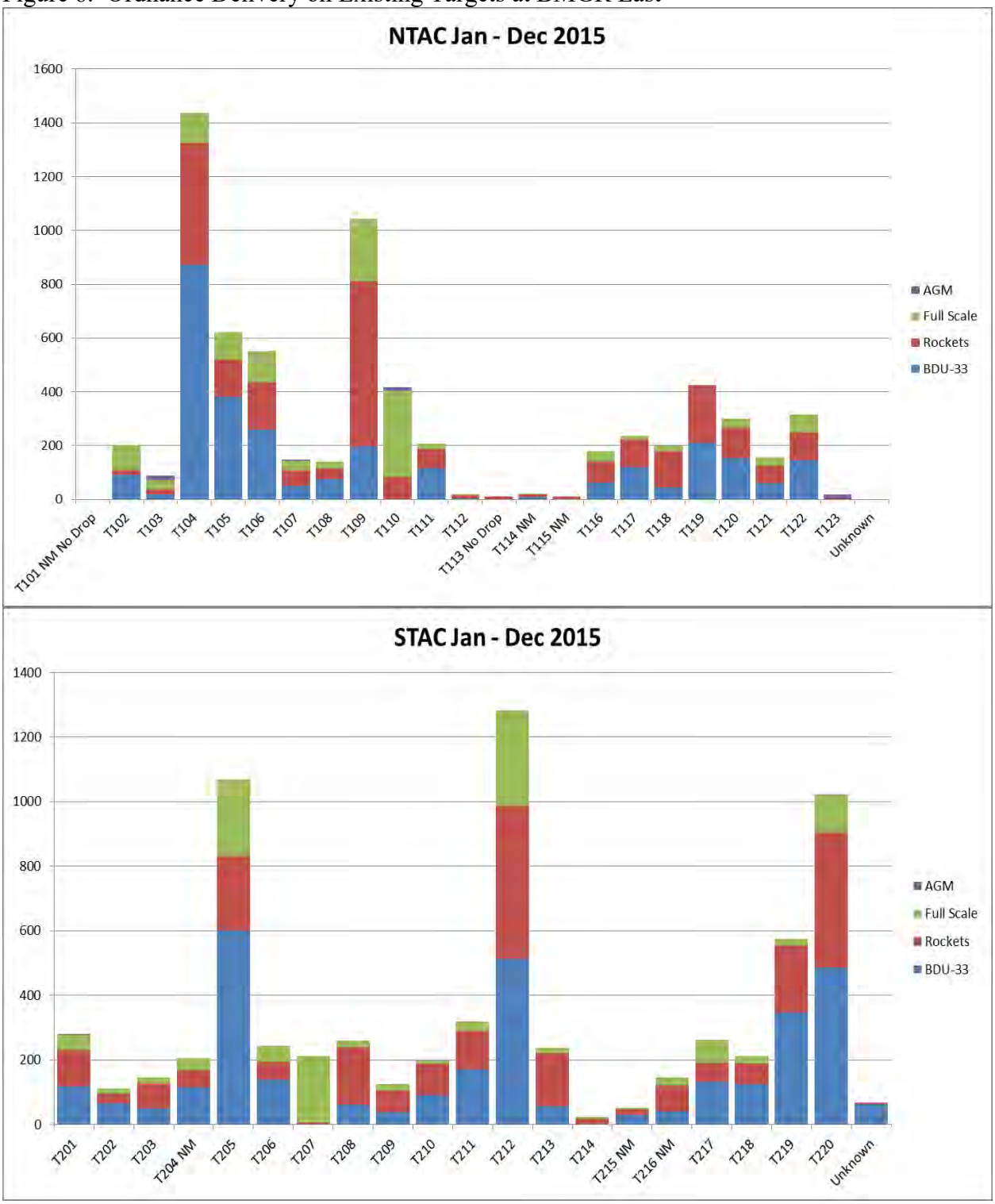


Figure 6. Ordnance Delivery on Existing Targets at BMGR East



ERCA

Appendix C

SHPO Consultation

Tribal Consultation

YPG NHPA Lead Agency Designation Memorandum

SHPO - 2015-0773 (135120) /NHPE
ARIZONA STATE HISTORIC PRESERVATION OFFICE

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, YUMA
301 C STREET
YUMA AZ 85365-9498

REPLY TO ATTENTION OF

January 23, 2017

RECEIVED
JAN 25 2017
ARIZONA STATE HISTORIC PRESERVATION OFFICE

Environmental Sciences Division

Ms. Kathryn Leonard
Arizona State Historic Preservation Officer
1100 W. Washington
Phoenix, AZ 85007

E-MAILED
2-9-17

Ms. Leonard:

U.S. Army Garrison Yuma Proving Ground (USAG YPG) is initiating consultation on the project effect determination for the Extended Range Cannon Artillery (ERCA) project. This is a multijurisdictional project between USAG YPG, Barry M. Goldwater Air Force Range West (BMGR-W) managed by Marine Corps Air Station Yuma (MCASY), and Barry M. Goldwater Air Force Range East (BMGR-E) managed by Luke Air Force Base (LAFB), as depicted on the enclosed map. USAG YPG has been designated the National Historic Preservation Act lead agency by LAFB and MCASY for elements of the ERCA project contained within each installation for the purpose of making the overall project finding of effect (see enclosed).

The elements of the ERCA project contained within USAG YPG include the development of a new impact area and two observation mounds. Two Class III surveys (YPG-R-112 and YPG-R-274) cover 100% of the proposed impact area and observation mounds. No historic sites were found in the survey boundaries and consultation on these reports have concluded.

The elements of the ERCA project contained within BMGR-W include Ground Support Areas (GSA) 71 and 76 for emplacement of the temporary ERCA gun position. Four cultural surveys, and subsequent consultations, have been conducted that include GSA 71 and GSA 76 (BMGRW-1988-001, BMGRW-1989-001, BMGRW-2008-002, BMGRW-2010-002). Approximately 65% of GSA 71 has been covered by a full cultural survey to a radius of 500 feet, while all of the surveys encompass GSA 76 to a radius of 500 feet. No known sites are located within 500 feet of GSA 71 or GSA 76.

The elements of the ERCA project contained within BMGR-E include the potential use of extant North Tactical Range (NTAC) Targets 106 and 111 and South Tactical Range (STAC) Targets 208 and 211, with Targets 106 and 208 preferred. Approximately 86.9% of Targets 106 and 111 and 87.5% of Targets 208 and 211 have had Class III surveys conducted with subsequent consultations. There are no eligible sites located within 500 feet of the selected targets.

A similar letter has been sent to the tribes with whom USAG YPG, MCASY, and LAFB consult as well as the Cultural Resource Managers of MCASY and LAFB. At this time, we request concurrence on our overall project effects determination of "no adverse

effect" 36 CFR 800.5(b) as there are no eligible sites on the proposed use areas on USAG YPG and BMGR-W, and there are no eligible sites within 500 feet of the selected targets on BMGR-E. If you have comments or concerns, please address your correspondence to Erin Goslin, Cultural Resources Manager, at (928) 328-4811 or erin.r.goslin.civ@mail.mil. Thank you for your continued interest and support of USAG YPG's mission.

Sincerely,

Gordon K. Rogers
Garrison Manager

Enclosures

CONCUR

for Kris Powell 2-9-17
Arizona State Historic Preservation Office
NO ADVERSE EFFECT

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, YUMA
301 C STREET
YUMA AZ 85365-9498

REPLY TO
ATTENTION OF

January 23, 2017

Environmental Sciences Division

Mr. Robert Miguel
Chairman
42507 W. Peters & Nall Road
Maricopa, Arizona 85138-3940

Chairman Miguel:

U.S. Army Garrison Yuma Proving Ground (USAG YPG) is initiating consultation on the project effect determination for the Extended Range Cannon Artillery (ERCA) project. This is a multijurisdictional project between USAG YPG, Barry M. Goldwater Air Force Range West (BMGR-W) managed by Marine Corps Air Station Yuma (MCASY), and Barry M. Goldwater Air Force Range East (BMGR-E) managed by Luke Air Force Base (LAFB), as depicted on the enclosed map. USAG YPG has been designated the National Historic Preservation Act lead agency by LAFB and MCASY for elements of the ERCA project contained within each installation for the purpose of making the overall project finding of effect (see enclosed).

The elements of the ERCA project contained within USAG YPG include the development of a new impact area and two observation mounds. Two Class III surveys (YPG-R-112 and YPG-R-274) cover 100% of the proposed impact area and observation mounds. No historic sites were found in the survey boundaries and consultation on these reports have concluded.

The elements of the ERCA project contained within BMGR-W include Ground Support Areas (GSA) 71 and 76 for emplacement of the temporary ERCA gun position. Four cultural surveys, and subsequent consultations, have been conducted that include GSA 71 and GSA 76 (BMGRW-1988-001, BMGRW-1989-001, BMGRW-2008-002, BMGRW-2010-002). Approximately 65% of GSA 71 has been covered by a full cultural survey to a radius of 500 feet, while all of the surveys encompass GSA 76 to a radius of 500 feet. No known sites are located within 500 feet of GSA 71 or GSA 76.

The elements of the ERCA project contained within BMGR-E include the potential use of extant North Tactical Range (NTAC) Targets 106 and 111 and South Tactical Range (STAC) Targets 208 and 211, with Targets 106 and 208 preferred. Approximately 86.9% of Targets 106 and 111 and 87.5% of Targets 208 and 211 have had Class III surveys conducted with subsequent consultations. There are no eligible sites located within 500 feet of the selected targets.

A copy of the letter is also being sent to Ms. Caroline Antone, Cultural Resources Manager. At this time, we request concurrence on our overall project effects determination of "no adverse effect" 36 CFR 800.5(b) as there are no eligible sites on the

proposed use areas on USAG YPG and BMGR-W, and there are no eligible sites within 500 feet of the selected targets on BMGR-E. If you have comments or concerns, please address your correspondence to Erin Goslin, Cultural Resources Manager, at (928) 328-4811 or erin.r.goslin.civ@mail.mil. Thank you for your continued interest and support of USAG YPG's mission.

Sincerely,

Gordon K. Rogers
Garrison Manager

Enclosures

THE HOPI TRIBE

Herman G. Honanie
CHAIRMAN

Alfred Lomahquahu Jr.
VICE-CHAIRMAN

March 13, 2017

Gordon K. Rogers, Garrison Manager
Attention: Erin Goslin, Cultural Resources Manager
Department of the Army, US Army Installation Management Command
Headquarters, United States Army Garrison, Yuma
301 C Street
Yuma, Arizona 85365-9498

Dear Mr. Rogers,

This letter is in response to your correspondence dated January 23, 2017, regarding Yuma Proving Ground initiating consultation on the project effect determination for the Extended Range Cannon Artillery. The Hopi Tribe claims cultural affiliation to prehistoric cultural groups in Arizona, including the Hohokam prehistoric cultural group in southern Arizona. The Hopi Cultural Preservation Office supports the identification and avoidance of prehistoric archaeological sites, and we consider the prehistoric archaeological sites of our ancestors to be "footprints" and Traditional Cultural Properties. Therefore, we appreciate Yuma Proving Ground's continuing solicitation of our input and your efforts to address our concerns.

The Hopi Cultural Preservation Office reiterates that we appreciate that the Yuma Proving Ground is identifying historic properties in potential use areas, and we are interested in consulting on any proposal that has the potential to adversely affect prehistoric cultural resources. In the enclosed letter dated November 14, 2016, the Hopi Cultural Preservation Office reviewed a cultural resources survey report of 761 acres on the Kofa Range for the proposed extended range cannon artillery project that identified an ineligible prehistoric site and four ineligible multi component sites.

We understand the project areas within the Barry M. Goldwater Range West and East have been surveyed for cultural resources and none were identified. Therefore, we concur that a determination of no adverse effect is appropriate for this undertaking. However, we recommend that if any prehistoric cultural features or deposits are encountered during project activities, these activities must be discontinued in the immediate area of the remains, and the State Historic Preservation Office must be consulted to evaluate their nature and significance and if any Native American human remains or funerary objects are discovered during construction they shall be immediately reported as required by law.

If you have any questions or need additional information, please contact Terry Morgart at the Hopi Cultural Preservation Office at 928-734-3619 or tmorgart@hopi.nsn.us. Thank you for your consideration.

Respectfully,

Leigh J. Kuwanwisiwma, Director
Hopi Cultural Preservation Office

Enclosure: November 14, 2016, letter
xc: Arizona State Historic Preservation Office

THE HOPI TRIBE

Herman G. Honanie
CHAIRMAN

Alfred Lomahquahu Jr.
VICE-CHAIRMAN

November 14, 2016

Gordon K. Rogers, Garrison Manager
Attention: Erin Goslin, Cultural Resources Manager
Department of the Army, United States Army Garrison, Yuma
301 C Street
Yuma, Arizona 85365-9498

Dear Manager Rogers,

This letter is in response to your correspondences dated November 2 and 3, 2016, with enclosed cultural resources survey reports regarding 761 acres for the proposed extended range cannon artillery project on the Kofa Range and the 1,943 acre historic Camp Laguna training camp on the Yuma Proving Ground Barry M. Goldwater Range East. The Hopi Tribe claims cultural affiliation to the Archaic and Hohokam prehistoric cultural groups in southern Arizona. The Hopi Cultural Preservation Office supports the identification and avoidance of prehistoric archaeological sites, and we consider the prehistoric archaeological sites of our ancestors to be Traditional Cultural Properties. Therefore, we appreciate Yuma Proving Grounds continuing solicitation of our input and your efforts to address our concerns.

The Hopi Cultural Preservation Office has reviewed the enclosed survey report covering 761 acres on the Kofa Range that identifies 1 ineligible prehistoric site and 4 ineligible prehistoric sites. Regarding the eligibility determinations, we defer to the State Historic Preservation Office and other interested tribes. We also recommend that if any unidentified cultural features or deposits are encountered during project activities, these activities must be discontinued in the immediate area of the remains, and the State Historic Preservation Office must be consulted to evaluate their nature and significance, and if any Native American human remains or funerary objects are discovered they must be reported as required by law.

If you have any questions or need additional information, please contact Terry Morgart at the Hopi Cultural Preservation Office at 928-734-3619 or tmorgart@hopi.nsn.us. Thank you for your consideration.

Respectfully,

Leigh J. Kuwanwisiwma, Director
Hopi Cultural Preservation Office

xc: Arizona State Historic Preservation Office

AK-CHIN INDIAN COMMUNITY

Community Government

42507 W. Peters & Nall Road • Maricopa, Arizona 85138 • Telephone: (520) 568-1000 • Fax: (520) 568-1001

February 28, 2017

Mr. William Sellars
Range Management Department
MCAS Yuma
Box 99134
Yuma, AZ 85369-9134

Re: **Determination of Site Eligibility and Determinations Project of "No Adverse Effects" of the U.S. Army Garrison Yuma Proving Grounds (USAG YPG) for the Extended Range Cannon Artillery (ERCA) Project.**

Dear William Sellers,

The Ak-Chin Indian Community did receive your letter dated January 23, 2017 regarding the U.S. Army Garrison Yuma Proving Grounds (USAG YPG) for the Extended Range Cannon Artillery (ERCA) Project for the determination of site eligibility and determinations project of "No Adverse Effects" 36 CRF 800.5(b) on the proposed use areas on USAG YPG & BMGR-W.

Thank you for informing our Community about the surveys. At this time, due to the project location, we will defer all comments and concur with the Tohono O'odham Nation Tribal Historic Preservation Office located in Sells, Arizona.

If you should have any questions, please contact Ms. Bernadette Carra, CRS-Land Management at (520) 568-1337 or Mrs. Caroline Antone, Cultural Resources Manager at (520) 568-1372. Thank you.

Sincerely,

Robert Miguel, Chairman
Ak-Chin Indian Community

SHPO - 2015-0773 (135120) /NHPE
ARIZONA STATE HISTORIC PRESERVATION OFFICE

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, YUMA
301 C STREET
YUMA AZ 85365-9498

REPLY TO ATTENTION OF

January 23, 2017

RECEIVED
JAN 25 2017
ARIZONA STATE HISTORIC PRESERVATION OFFICE

Environmental Sciences Division

Ms. Kathryn Leonard
Arizona State Historic Preservation Officer
1100 W. Washington
Phoenix, AZ 85007

E-MAILED
2-9-17

Ms. Leonard:

U.S. Army Garrison Yuma Proving Ground (USAG YPG) is initiating consultation on the project effect determination for the Extended Range Cannon Artillery (ERCA) project. This is a multijurisdictional project between USAG YPG, Barry M. Goldwater Air Force Range West (BMGR-W) managed by Marine Corps Air Station Yuma (MCASY), and Barry M. Goldwater Air Force Range East (BMGR-E) managed by Luke Air Force Base (LAFB), as depicted on the enclosed map. USAG YPG has been designated the National Historic Preservation Act lead agency by LAFB and MCASY for elements of the ERCA project contained within each installation for the purpose of making the overall project finding of effect (see enclosed).

The elements of the ERCA project contained within USAG YPG include the development of a new impact area and two observation mounds. Two Class III surveys (YPG-R-112 and YPG-R-274) cover 100% of the proposed impact area and observation mounds. No historic sites were found in the survey boundaries and consultation on these reports have concluded.

The elements of the ERCA project contained within BMGR-W include Ground Support Areas (GSA) 71 and 76 for emplacement of the temporary ERCA gun position. Four cultural surveys, and subsequent consultations, have been conducted that include GSA 71 and GSA 76 (BMGRW-1988-001, BMGRW-1989-001, BMGRW-2008-002, BMGRW-2010-002). Approximately 65% of GSA 71 has been covered by a full cultural survey to a radius of 500 feet, while all of the surveys encompass GSA 76 to a radius of 500 feet. No known sites are located within 500 feet of GSA 71 or GSA 76.

The elements of the ERCA project contained within BMGR-E include the potential use of extant North Tactical Range (NTAC) Targets 106 and 111 and South Tactical Range (STAC) Targets 208 and 211, with Targets 106 and 208 preferred. Approximately 86.9% of Targets 106 and 111 and 87.5% of Targets 208 and 211 have had Class III surveys conducted with subsequent consultations. There are no eligible sites located within 500 feet of the selected targets.

A similar letter has been sent to the tribes with whom USAG YPG, MCASY, and LAFB consult as well as the Cultural Resource Managers of MCASY and LAFB. At this time, we request concurrence on our overall project effects determination of "no adverse

effect" 36 CFR 800.5(b) as there are no eligible sites on the proposed use areas on USAG YPG and BMGR-W, and there are no eligible sites within 500 feet of the selected targets on BMGR-E. If you have comments or concerns, please address your correspondence to Erin Goslin, Cultural Resources Manager, at (928) 328-4811 or erin.r.goslin.civ@mail.mil. Thank you for your continued interest and support of USAG YPG's mission.

Sincerely,

Gordon K. Rogers
Garrison Manager

Enclosures

CONCUR

for Kris Powell 2-9-17
Arizona State Historic Preservation Office
NO ADVERSE EFFECT

Received from Tribal Admin 2-6-17 P

E-mailed 2-9-17 Bm (initial & date)

Scanned 2-9-17 Bm (initial & date)

SAN CARLOS APACHE TRIBE
Historic Preservation & Archaeology Department
P.O. Box 0
San Carlos Arizona 85550
Tel. (928) 475-5797, apachevern@yahoo.com

Tribal Consultation Response Letter

Date: 2/7/17
Contact Name: Erin Goslin, erin.r.goslin.civ@mail.mil
Company: Department of the Army, Headquarters, United States Army Garrison, Yuma
Address: 301 C. Street, Yuma, AZ 85365-9498
Project Name/#: Initiation consultation on the project effect determination for the extended range cannon artillery project

Dear Sir or Madam:

Under Section 106 and 110 of the National Historic Preservation Act, we are replying to the above referenced project. Please see the appropriate marked circle, including the signatures of Vernelda Grant, Tribal Historic Preservation Officer (THPO), and the concurrence of the Chairman of the San Carlos Apache Tribe:

☒ **NO INTEREST/NO FURTHER CONSULTATION/NO FUTURE UPDATES**
We defer to the Tribe located nearest to the project area.

☒ **CONCURRENCE WITH REPORT FINDINGS & THANK YOU**

☒ **REQUEST ADDITIONAL INFORMATION**
I require additional information in order to provide a finding of effect for this proposed undertaking, i.e. Project description ___ Map ___ Photos ☒ Other We defer to the Four Southern Tribes - T.O. Nation & BRC

○ **NO EFFECT**
I have determined that there are no properties of religious and cultural significance to the San Carlos Apache Tribe that are listed on the National Register within the area of potential effect or that the proposed project will have no effect on any such properties that may be present.

○ **NO ADVERSE EFFECT**
Properties of cultural and religious significance within the area of effect have been identified that are eligible for listing in the National Register for which there would be no adverse effect as a result of the proposed project.

○ **ADVERSE EFFECT**
I have identified properties of cultural and religious significance within the area of potential effect that are eligible for listing in the National Register. I believe the proposed project would cause an adverse effect on these properties. Please contact the THPO for further discussion.

We were taught traditionally not to disturb the natural world in a significant way, and that to do so may cause harm to oneself or one's family. Apache resources can be best protected by managing the land to be as natural as it was in pre-1870s settlement times. Please contact the THPO, if there is a change in any portion of the project, especially if Apache cultural resources are found at any phase of planning and construction. Thank you for contacting the San Carlos Apache Tribe, your time and effort is greatly appreciated.

DIRECTOR/THPO: _____ 02/07/17
Vernelda J. Grant, Tribal Historic Preservation Officer — Date

CONCURRENCE: _____ 2/8/17
Terry Rambler, Tribal Chairman — Date

cc:

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, YUMA
301 C STREET
YUMA AZ 85365-9498

REPLY TO
ATTENTION OF

1/31/17

To Vern Grant

FYI

TR, Chm

January 23, 2017

Environmental Sciences Division

Mr. Terry Rambler
Chairman
San Carlos Avenue
San Carlos, Arizona 85550-9900

FEB 0 2 2017

Chairman Rambler:

U.S. Army Garrison Yuma Proving Ground (USAG YPG) is initiating consultation on the project effect determination for the Extended Range Cannon Artillery (ERCA) project. This is a multijurisdictional project between USAG YPG, Barry M. Goldwater Air Force Range West (BMGR-W) managed by Marine Corps Air Station Yuma (MCASY), and Barry M. Goldwater Air Force Range East (BMGR-E) managed by Luke Air Force Base (LAFB), as depicted on the enclosed map. USAG YPG has been designated the National Historic Preservation Act lead agency by LAFB and MCASY for elements of the ERCA project contained within each installation for the purpose of making the overall project finding of effect (see enclosed).

The elements of the ERCA project contained within USAG YPG include the development of a new impact area and two observation mounds. Two Class III surveys (YPG-R-112 and YPG-R-274) cover 100% of the proposed impact area and observation mounds. No historic sites were found in the survey boundaries and consultation on these reports have concluded.

The elements of the ERCA project contained within BMGR-W include Ground Support Areas (GSA) 71 and 76 for emplacement of the temporary ERCA gun position. Four cultural surveys, and subsequent consultations, have been conducted that include GSA 71 and GSA 76 (BMGRW-1988-001, BMGRW-1989-001, BMGRW-2008-002, BMGRW-2010-002). Approximately 65% of GSA 71 has been covered by a full cultural survey to a radius of 500 feet, while all of the surveys encompass GSA 76 to a radius of 500 feet. No known sites are located within 500 feet of GSA 71 or GSA 76.

The elements of the ERCA project contained within BMGR-E include the potential use of extant North Tactical Range (NTAC) Targets 106 and 111 and South Tactical Range (STAC) Targets 208 and 211, with Targets 106 and 208 preferred. Approximately 86.9% of Targets 106 and 111 and 87.5% of Targets 208 and 211 have had Class III surveys conducted with subsequent consultations. There are no eligible sites located within 500 feet of the selected targets.

A copy of the letter is also being sent to Ms. Vernelda Grant, Tribal Historic Preservation Officer. At this time, we request concurrence on our overall project effects determination of "no adverse effect" 36 CFR 800.5(b) as there are no eligible sites on the

JAN 27 2017

February 1, 2017

RE: THE EXTENDED RANGE CANNON ARTILLARY PROJECT (ERCA)

Dear Erin,

I am writing to you regarding the project mentioned above and in response to the letter of January 23rd (2017) from Gordon Rogers your Garrison Commander. We have no concerns other than to say we defer to any other tribes or tribal departments who do have issues with the ERCA Project. We do have a comment just for the record inasmuch as we are not any less concerned with the plant and animals present in your PA than we are with the conservation of archaeological sites. Be that as it may we appreciate the information and the timely correspondence. On another note we would like to arrange a field trip to your area to see any rock art sites you could suggest to us this coming October/November. I am assuming we would coordinate that through you.

Cordially,

Gertrude Smith
Yavapai Cultural Preservation Director
Yavapai-Apache nation of Camp Verde

CC: GR

2400 West Datsi Street Camp Verde, Az. 86322
928.567.3649

Received from Tribal Admin 1-31-17am

E-mailed 2-1-17am (initial & date)

Scanned 2-1-17am (initial & date)

SAN CARLOS APACHE TRIBE
Historic Preservation & Archaeology Department
P.O. Box 0
San Carlos Arizona 85550
Tel. (928) 475-5797, apachevern@yahoo.com

Tribal Consultation Response Letter

Date: 01/26/2017
Contact Name: Gordon K. Rogers, Garrison Manager
Company: HQ-US Army Garrison, Yuma
Address: 301 C. Street
Project Name/#: Yuma, AZ 85365-9498

Email: erin.r.goslin.civ@mail.mil

Dear Sir or Madam: Extended Range Cannon Artillery (ERCA)

Under Section 106 and 110 of the National Historic Preservation Act, we are replying to the above referenced project. Please see the appropriate marked circle, including the signatures of Vernelda Grant, Tribal Historic Preservation Officer (THPO), and the concurrence of the Chairman of the San Carlos Apache Tribe:

- O **NO INTEREST/NO FURTHER CONSULTATION/NO FUTURE UPDATES**
  We defer to the Tribe located nearest to the project area.
- O **CONCURRENCE WITH REPORT FINDINGS & THANK YOU**
- O **REQUEST ADDITIONAL INFORMATION**
  I require additional information in order to provide a finding of effect for this proposed undertaking, i.e. Project description ___ Map ___ Photos _X_ Other We defer to the four Southern Tribes.
- O **NO EFFECT**
  I have determined that there are no properties of religious and cultural significance to the San Carlos Apache Tribe that are listed on the National Register within the area of potential effect or that the proposed project will have no effect on any such properties that may be present.
- O **NO ADVERSE EFFECT**
  Properties of cultural and religious significance within the area of effect have been identified that are eligible for listing in the National Register for which there would be no adverse effect as a result of the proposed project.
- O **ADVERSE EFFECT**
  I have identified properties of cultural and religious significance within the area of potential effect that are eligible for listing in the National Register. I believe the proposed project would cause an adverse effect on these properties. Please contact the THPO for further discussion.

We were taught traditionally not to disturb the natural world in a significant way, and that to do so may cause harm to oneself or one's family. Apache resources can be best protected by managing the land to be as natural as it was in pre-1870s settlement times. Please contact the THPO, if there is a change in any portion of the project, especially if Apache cultural resources are found at any phase of planning and construction. Thank you for contacting the San Carlos Apache Tribe, your time and effort is greatly appreciated.

DIRECTOR/THPO: _____ 01/26/2017
Vernelda J. Grant, Tribal Historic Preservation Officer — Date

CONCURRENCE: _____ 1/27/17
Terry Rambler, Tribal Chairman — Date

cc:

JAN 2 6 2017

V6

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, YUMA
301 C STREET
YUMA AZ 85365-9498

REPLY TO
ATTENTION OF

January 23, 2017

Environmental Sciences Division

Mr. Terry Rambler
Chairman
San Carlos Avenue
San Carlos, Arizona 85550-9900

Chairman Rambler:

U.S. Army Garrison Yuma Proving Ground (USAG YPG) is initiating consultation on the project effect determination for the Extended Range Cannon Artillery (ERCA) project. This is a multijurisdictional project between USAG YPG, Barry M. Goldwater Air Force Range West (BMGR-W) managed by Marine Corps Air Station Yuma (MCASY), and Barry M. Goldwater Air Force Range East (BMGR-E) managed by Luke Air Force Base (LAFB), as depicted on the enclosed map. USAG YPG has been designated the National Historic Preservation Act lead agency by LAFB and MCASY for elements of the ERCA project contained within each installation for the purpose of making the overall project finding of effect (see enclosed).

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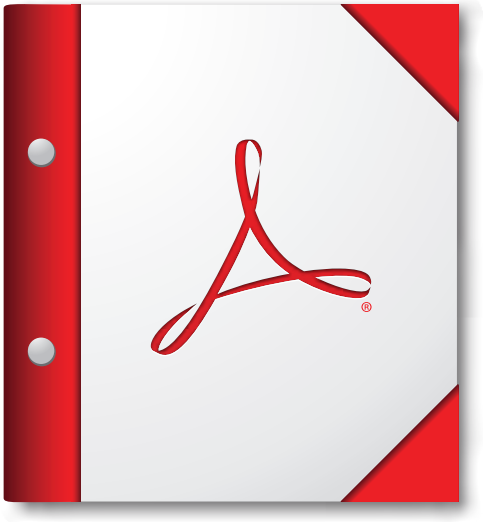
The elements of the ERCA project contained within BMGR-E include the potential use of extant North Tactical Range (NTAC) Targets 106 and 111 and South Tactical Range (STAC) Targets 208 and 211, with Targets 106 and 208 preferred. Approximately 86.9% of Targets 106 and 111 and 87.5% of Targets 208 and 211 have had Class III surveys conducted with subsequent consultations. There are no eligible sites located within 500 feet of the selected targets.

A copy of the letter is also being sent to Ms. Vernelda Grant, Tribal Historic Preservation Officer. At this time, we request concurrence on our overall project effects determination of "no adverse effect" 36 CFR 800.5(b) as there are no eligible sites on the



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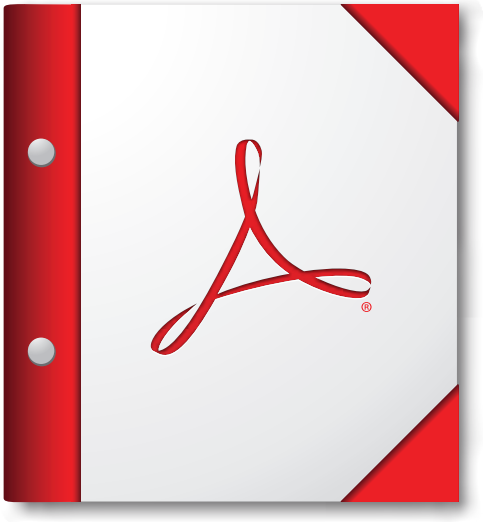

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Get Adobe Reader Now!

DPW

THE HOPI TRIBE

Herman G. Honanie
CHAIRMAN

Alfred Lomahquahu Jr.
VICE-CHAIRMAN

March 21, 2016

Gordon K. Rogers, Garrison Manager
Attention: Erin Goslin, Archaeologist
Department of the Army, US Army Installation Management Command
Headquarters, United States Army Garrison, Yuma
301 C Street
Yuma, Arizona 85365-9498

Dear Mr. Rogers,

This letter is in response to your correspondences dated February 8 and March 3, 2016, regarding the Yuma Proving Ground preparing Environmental Assessments to implement proposed activities and operations addressed in the November 2015 Real Property Master Plan, and evaluate the consequences of the Extended Range Cannon Artillery test program.

The Hopi Tribe claims cultural affiliation to earlier identifiable cultural groups in Arizona, including the Hohokam prehistoric cultural group in southern Arizona. The Hopi Cultural Preservation Office supports the identification and avoidance of our ancestral sites, and we consider the prehistoric archaeological sites of our ancestors to be Traditional Cultural Properties. Therefore, we appreciate Yuma Proving Ground's continuing solicitation of our input and your efforts to address our concerns.

The Hopi Cultural Preservation Office previously responded to correspondences on the Real Property Master Plan with the enclosed letters dated May 7 and October 31, 2012, January 17, 2013, March 26, 2014and May 11, 2015. We appreciate that the Yuma Proving Ground is identifying historic properties in potential use areas, and we are interested in consulting on any proposal that has the potential to adversely affect prehistoric cultural resources. Therefore, if any identified prehistoric sites cannot be avoided and will be adversely affected by project activities, then we request to be provided with copies of the draft environmental assessment, cultural resources survey report and any proposed treatment plans for review and comment.

If you have any questions or need additional information, please contact Terry Morgart at the Hopi Cultural Preservation Office at 928-734-3619 or tmorgart@hopi.nsn.us. Thank you for your consideration.

Respectfully,

Leigh J. Kuwanwisiwma, Director
Hopi Cultural Preservation Office

Enclosures: May 7 and October 31, 2012, January 17, 2013, March 26, 2014 and May 11, 2015 letters
xc: Arizona State Historic Preservation Office

DPW

GILA RIVER INDIAN COMMUNITY

POST OFFICE BOX 2140, SACATON, AZ 85147

TRIBAL HISTORIC PRESERVATION OFFICE

(520) 562-7162
Fax: (520) 562-5083

March 23, 2016

Gordon K. Rogers, Garrison Manager
Department of the Army
U.S. Army Installation Management Command
Headquarters, U.S. Army Garrison, Yuma
301 C Street
Yuma, Arizona 85365-9498

RE: Environmental Assessment (EA) Preparation for the Extended Range Cannon Artillery (ECRA) Test Program, Unites States Army Garrison Proving Ground (USYGPG), Luke Air Force Base (LAFB) Barry M. Goldwater-East (BMGR-East) and the Marine Corps Air Station Yuma (MCAS) Barry M. Goldwater West (BMGR-West)

Dear Garrison Manager Rogers,

The Gila River Indian Community Tribal Historic Preservation Office (GRIC-THPO) has received a your consultation letter dated March 3, 2016. The United States Army Garrison Yuma Proving Ground (USAYPG) is preparing an EA for the Extended Range Cannon Artillery Test Program (ECRA) which will be conduction on lands managed by the USAYPG, the LAFB, and the MCAS. The USAYPG is the lead federal agency for this undertaking. Testing of the cannon will occur on the Cibola and Kofa Firing Ranges of the USAGYPG and on the BMGR-East and BMGR-West.

The GRIC-THPO will participate in the Section 106 consultation process. Please forward all applicable documents to our office for review and comment. The proposed project area is within the ancestral lands of the Four Southern Tribes (Gila River Indian Community; Salt River Pima-Maricopa Indian Community; Ak-Chin Indian Community and the Tohono O'Odham Nation). The GRIC-THPO defers to the Tohono O'Odham Nation as lead in the consultation process.

Thank you for consulting with the GRIC-THPO on this undertaking. If you have any questions please do not hesitate to contact me or Archaeological Compliance Specialist Larry Benallie, Jr. at 520-562-7162.

Respectfully,

Barnaby V. Lewis
Tribal Historic Preservation Officer
Gila River Indian Community

IMYM-PWE 6 June 2017

MEMORANDUM FOR RECORD

SUBJECT: Quechan Field Visit for the Extended Range Cannon Artillery (ERCA) EA

The Quechan expressed interest in March 2016 for a field visit in the area to be affected by the ERCA project. However, the field visit has not been able to conducted, despite repeated attempts by YPG archaeologist Ms. Goslin and BMGR-E archaeologist Ms. Rankin to provide it. Below detail the attempts made for this request.

1. Emails between the Quechan and YPG to arrange for a field visit were initiated 25 March 2017 by Ms. Kingery during the NEPA public scoping period. Ms. Goslin replied to Ms. Kingery on 30 March 2016 and again 22 March 2017; however, Ms. Kingery has never responded.
2. Ms. Goslin was invited to address the Quechan Tribal Council on 10 April 2017 to inform them of any projects that were on-going or proposed on YPG. At this meeting, I briefed the ERCA project as a whole as well as the request for a visit by Ms. Kingery on 30 March 2016. No comments or requests were made by the Tribal Council at that time.
3. After the Quechan Tribal Council on 10 April 2017, Ms. Goslin met with Mr. Scott, Chairman of the Quechan Culture Committee. Ms. Goslin provided print-outs of the email chain between Ms. Kingery and herself and asked for Mr. Scott to become the new contact person for this project. He accepted.
4. Ms. Goslin emailed Mr. Scott on 17 April 2017 to determine if the Quechan were still interested in a field visit, to which he replied in the affirmative. Ms. Goslin provided this request to Ms. Rankin so that a field trip could be arranged.
5. On 4 May 2017, I emailed Mr. Scott the requested PowerPoint presentation used by Ms. Rankin during the Four Southern Tribes meeting on 17 February 2017. This presentation provided an update on the sites within the project APE for the five proposed targets on BMGR-E. He confirmed receipt of the presentation the same day.
6. Ms. Rankin had a trip scheduled for 14 May 2017; however, the Quechan cancelled. There has been no new date scheduled.

Erin Goslin
Cultural Resources Manager

09 January 2017

Memorandum FOR ERCA Planning Team

From: 56 RMO/ESMC

Subject: STATUS OF CULTURAL REOURCES FOR ERCA PROJECT

The NTAC sites were revisited in Dec to check the original site descriptions and compare with current site conditions. Site descriptions were updated and repeat photos were taken of the site environment and individual features. Threats and new disturbance were also recorded. This information will be used to complete determinations of eligibility.

AZ Z:8:001 (ASM) on NTAC is no longer eligible because it was mitigated through complete data recovery. This action was taken in 1978-79, when the main airfield was constructed. Note that cremated ancestral remains were recovered here.

Sites on STAC will be visited that last week of Jan and first week of Feb. Information recorded is the same as that for sites on NTAC.

Site photos will be inventoried, cataloged and in a Power Point presentation that will be given to tribes and SHPO. The presentation will cover the ERCA Project (YPG to provide information) and eligibility of sites within the APE. The presentation would likely occur at the Feb meeting of the Four Southern Tribes, the third Friday of the month.

AR has already initiated the consultation process with SHPO (Kris Powell). Once we have reached a consensus determination of site eligibility with the SHPO we will be in a better position to decide whether this is a “No Effect” or “No Adverse Effect”.

Adrianne G. Rankin
Archaeologist, Barry M. Goldwater Range East

ERCA

Appendix D

Ethnography & Cultural History

Several regional overviews have been completed over the years. Additional information on the prehistory, ethnography, and history of the western Papagueria can be found in Ahlstrom, ed. 2000; *Fragile Patterns: The Archaeology of the Western Papgueria*, edited by Altschul and Rankin; and *Paths to Preservation: A Research Design and Heritage Management Plan for the Barry M. Goldwater Range East, Arizona*, Heilen, Vanderpot et al.

PREHISTORY

The First People

Popular questions in American archaeology today include "who were the first Americans?" and "when did they arrive in the New World?" Archaeologists have long argued that the first Americans were hunters in pursuit of large-game animals who crossed the Bering land bridge, thereby leaving their Asian homeland for the New World about 12,000 years ago. Recent finds have complicated this picture. Researchers with the University Of Pennsylvania Department Of Anthropology have worked extensively in analyzing the genetics of individuals living in Russia's Altai Republic for markers in both mitochondrial DNA and Y chromosome DNA. Mitochondrial DNA traces the maternal, or female line of descent, whereas Y chromosome DNA traces the paternal, or male, descent. They compared the samples to those that had previously been collected from individuals in southern Siberia, East Asia, Central Asia, Mongolia, and a number of different Native American groups. After analyzing the Y chromosome DNA, the researchers found a unique mutation common to both the Native Americans and southern Altaians in a lineage dubbed as "Q". The Altai region is located at the four corners of what is today China, Russia, Mongolia, and Kazakhstan.

In determining how long ago the mutations took place, the researchers concluded that the southern Altaian lineage diverged genetically from the Native American lineage about 13,000 to 14,000 years ago. This correlates with current theories that support the migration of peoples into the Americas from Siberia between roughly 15,000 and 20,000 years ago. Furthermore, their results showed that Native American populations originally arose, not from one single migration of people, but at least three. The majority descended from a single original group of First American migrants, but at least two subsequent migrations also made important genetic contributions. Moreover, their origins could be genetically traced to populations traversing across the ancient Beringia land bridge that existed during the ice ages over 15,000 years ago (Schurr et al).

This research, coupled with recent discoveries, has raised many questions and has led archaeologists to consider the notion of multiple migrations. Sites such as Monte Verde in southern Chile, Meadowcroft in Pennsylvania, Cactus Hill in Virginia (Dillehay 1989, 1997; Fiedel 1999; Haynes 1999; Lewin 1989; McAvoy and McAvoy 1997: Meltzer et al. 1997; Nemecek 2000; Taylor et al. 1999) and the Paisley Caves in south-central Oregon (Jenkins et al) offer some of the most promising evidence of "pre-Clovis culture. Monte Verde, as an example, has yielded dates that are coeval with the Clovis sites in North America. Recent discoveries made at the Friedkin site in Buttermilk Creek, Texas (Waters, 2011) are progressively pushing back the time thought to be

associated with the "peopling of the Americas" with dates of 15,500 years ago, nearly 2,000 years older than Clovis time period. This bolsters the idea that not all migrations would have entered through the Bering land bridge, as the Clovis-first hypothesis has proposed; some may have involved coastal or maritime adaptations and routes, and different human populations might have been involved in different migrations (Anderson and Gillam 2000; Dixon 1993, 1999; Fladmark 1979; Stanford and Bradley 2000). Sites on the Pacific coast in British Columbia and off the shore of California have yielded similar dates but show a fully maritime culture.

The Paisley Caves in south-central Oregon have yielded dates that are at least contemporaneous with Clovis culture, if not earlier. A total of 190 AMS (accelerator mass spectrometry) radiocarbon dates have been taken on terrestrial plants, macrofossils from coprolites, bone collagen and water soluble extracts recovered from each of these categories. The results of these tests, along with the distinctive "Western Stemmed" projectile points, have added a new chapter to the multiple migration theory as well. The dating of the Western Stemmed projectile points to possibly pre-Clovis times adds new data to digest in the ongoing debate about the starkly different production technologies overlapping in time and whether or not they developed separately. The results even suggest that the Clovis culture may have developed or originated in the Southeastern region of the United States and moved westward, while the Western Stemmed tradition originated, perhaps earlier than the Clovis, in the West and moved eastward.

Compelling claims for a pre-Clovis occupation of the southern latitudes have been debated by investigators for decades. Many pre-Clovis claims in the Americas have been rejected and largely forgotten (Waters 1985), but the validity of other claims (such as those listed above) remains an open question. To be legitimized as unequivocally pre-Clovis, a pre-Clovis claim must meet four basic criteria. It must "1) indisputably artifactual; 2) consistently and reliably dated; 3) show clear, verifiable relationships be- tween dated materials and . . . artifacts; and 4) demonstrate the existence of an extensive, geographic pat- tern of temporally and technologically related sites" (Heilen 2004:306; see also Haynes 1964, 1966; Taylor et al. 1996; Toth 1991). Most pre-Clovis claims focus primarily on individual sites and attempt to satisfy only Criteria 1–3. Ultimately, a pre-Clovis claim will be adequately demonstrated only if a pattern of related sites can be established.

Malpais

Julian Hayden (1976) developed a culture history framework for southwestern Arizona and northwestern Mexico based in part on the work of Malcolm Rogers (1939, 1945, 1958, 1966). Hayden added a "pre-Clovis" archaeological culture, the Malpais, to the beginning of Rogers's sequence, suggesting that it predated 12,000 B.P. and could be as old as 35,000 B.P. The Malpais artifact assemblage, identified primarily from the Sierra Pinacate region of northwest Mexico, contains choppers, scrapers, and worked shell. The flaked stone typically exhibits heavy patination called desert varnish. These tool assemblages are also found in association with "sleeping circles," trails, rock shrines, and intaglios (Hayden 1982). Dating of the Malpais complex based on desert varnish on the tools remains controversial.

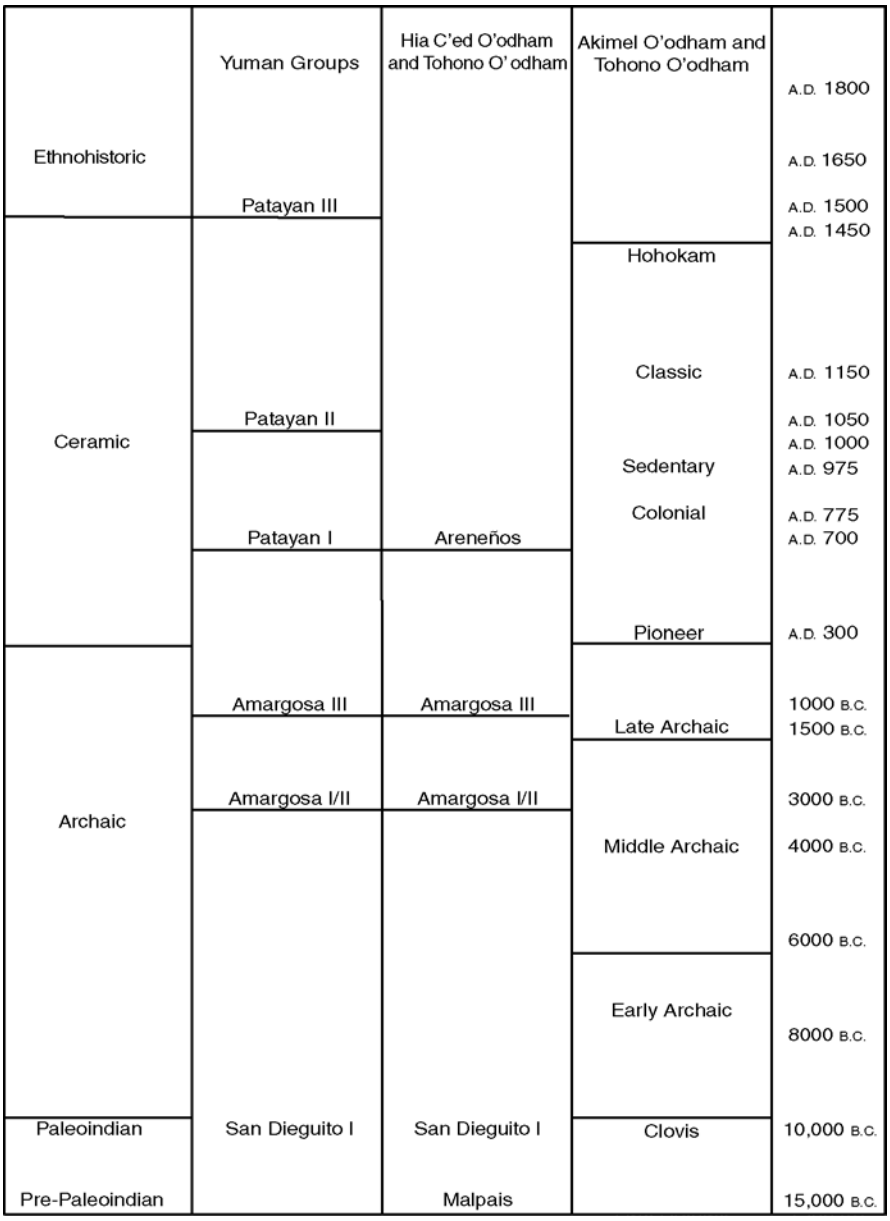

Figure 1. Culture History of the Western Papagueria.

Despite problems, a unique feature of Hayden's pre-Clovis Malpais culture is that Hayden established a pattern of related sites (Heilen 2004). Hayden's claim satisfies Criterion 4 (and probably Criterion 1) but may not satis- fy Criterion 2 or Criterion 3 for demonstrating pre-Clovis occupation. Unless stratified, datable contexts with indisputably Malpais artifacts are discovered or problems with dating desert varnish are resolved, Hayden's Malpais model does not satisfy all the necessary criteria for demonstrating a pre-Clovis occupation.

Malpais artifacts suggest use of both inland desert and coastal environments (Hayden 1976a, 1998; Hei- len 2004; Rosenthal 1977b, 1979). Therefore, a pre-Clovis status for Malpais would have

strong implica- tions for the peopling of the Americas and questions regarding the first Americans. Essentially, if Malpais is pre-Clovis or coeval with Clovis, the Malpais model would lend support to models favoring coastal mi- gration in the peopling of the Americas (Dixon 1993, 1999; Fladmark 1979, 1983). If Malpais is instead late Paleoindian or Archaic period in age, Hayden's work would still provide valuable information on ear- ly occupation of the Western Papaguería. Committed reinvestigation of Hayden's Malpais model—involv- ing the careful reanalysis of formation processes at Malpais sites and the search for more securely datable contexts with Malpais artifacts—will be necessary to resolve questions about Malpais chronology (Heilen 2004, 2009). Although Hayden (1967, 1976a, 1976b, 1998) presented an intriguing case for pre-Clovis oc- cupation of the Americas, much more work is needed to validate Hayden's claim.

Clovis

The Clovis complex is characterized by distinctive fluted projectile points that are widely distributed across North America. Dated between ca. 11,200 and 10,900 radiocarbon years before present (rcybp), or around 13,000 years ago, Clovis sites are often subtle and are widely interpreted to represent the activities of highly mobile groups that specialized in large-game hunting. These groups appear to have spread rapidly across North America within the span of just a few hundred years. The rapid spread of Clovis could have resulted from high mobility, low population densities, and large areas of unoccupied land into which these hunters could migrate. Other possible explanations for the rapid spread include the idea that Clovis technology spread rapidly among preexisting populations, rather than being transported from region to region by highly mobile groups. Clovis flaked stone technology is characterized by large and highly distinctive lanceolate projectile points with a channel flake removed from the center to produce a flute. Prismatic blades; end scrapers and side scraper flake tools; ivory or bone tools, such as points or foreshafts; and the use of red ocher are also representative of Clovis technology (Bradley et al. 2010; Stanford and Bradley 2012). Clovis materials are also often associated with extinct megafauna, which appear to have been a major focus of Clovis subsistence. One human burial, considered to be the oldest in North America, is the skeleton of a Clovis child. Experts determined that it was a young boy about one to one-and-a-half years old. The skeleton was discovered in the Anzick burial site in western Montana with dozens of ochre-covered stone tools found at the site were consistent with Clovis technology, and radiocarbon dating revealed that the skeleton was approximately 12,600 years old.

Many of the large-game species hunted by Paleoindian populations quickly went extinct during the terminal Pleistocene epoch. A common explanation for the widespread and rapid extinction of numerous megafaunal species in North America during the late Pleistocene is that the species were overhunted (Alroy 2001; Diniz-Filho 2004; Martin 1967, 1973; Martin and Wright 1967). Similar extinctions of megafauna in other parts of the globe have also coincided with the peopling of new lands (e.g., Australia, New Zealand), strengthening the case that human predation was intimately linked with extinction (Anderson 1989; Brook and Bowman 2004; Surovell et al. 2005; but see Grayson and Meltzer 2002, 2003; Wroe et al. 2004). Other theories of megafaunal extinctions have included disease, ecological shifts associated with climate change, and the environmental and ecological consequences of a massive impact from an extraterrestrial body. The last hypothesis proposed that an impact from an extraterrestrial object occurred over the Great Lakes region of North America at approximately 12,900 b.p., resulting in widespread environmental havoc and destruc- tion that may have triggered both climate change and extinctions (Firestone et al. 2007; but see Holliday and Meltzer 2010).

Few Paleoindian sites are reported from the western portion of the Papaguería. The deeply stratified deposits at the famous site at Ventana Cave, located on the west side of the eastern Papaguería, contain Paleoindian through historical-period O'odham materials (Haury 1950). Rogers (1966) and Hayden (1976) identified San Dieguito I artifacts there and obtained a radiocarbon date of 11,300–12,000 B.P. Another Paleoindian deposit has been reported at Quitovac, Sonora. Mammoth remains and tools were found at this *cienega* site, but their association is controversial. San Dieguito I artifacts were reported from around the pond at Quitobaquito, but these remains were bulldozed in the 1960s before they could be recorded Climate in the western portion of the Papaguería during the Paleoindian period was much colder and wetter than today. Analysis of packrat middens indicate that the vegetation consisted of piñon, juniper, yucca, and grasses. Archaeologists trained in Arizona refer to Paleoindian sites as Clovis, whereas those from California use the terms San Dieguito or Lake Mohave. In theory, Clovis sites contain the remains of big-game hunters; in contrast, the San Dieguito/Lake Mohave adaptation focused on resources near pluvial desert lakes and coastal marshes of the late Pleistocene and early Holocene.

Most of the evidence of Paleoindian sites in the western portion of the Papaguería consists of surface artifacts. Ezell (1954) reported a fluted Clovis-style projectile point from near the northwest boundary of OPCNM in the CPNWR, and another fluted point was found along the Gila River near Painted Rocks (Whittlesey et al. 1994). A Clovis-style point has been recorded from the Fortuna Mine area on the BMGR West (Cheryl Blanchard, BLM, personal communication 2007).

In 1998, a multicomponent site, AZ Y:8:100 (ASM), dating to the Paleoindian Clovis period, Early Archaic period, Middle Archaic period, and Ceramic period was recorded in East Pass of NTAC (Tucker 2000b). The site consists of 12 features, including rock clusters, rock rings and roasting features, four Clovis-style fluted projectile points and point fragments, two Early Archaic Jay/Lake Mohave style points, and a Middle Archaic Willow Leaf Pinto point, as well as ground stone and 40 sherds (Tucker 2000b:405–424). The site is located on the upper *bajada* of the Crater Mountains near the mouth of a canyon. Water sources were identified in the canyon, and the tooth of extinct horse was identified in the vicinity of the site.

Archaic Period

The term "Archaic" refers to a period from approximately 8500 B.C. to A.D. 1, as well as to an economy of hunting and gathering that gradually adapted to local environments and resources. Analysis of pollen and macrofossils from pack rat middens in the Papaguería (Van Devender 1977, 1987; Van Devender and Spaulding 1979) indicates that Sonoran Desert vegetation was established by 8000 B.C. and that Archaic period paleoenvironments were similar to environments of the modern Sonoran Desert. By this time, the large Pleistocene fauna that helped to fuel the Paleoindian hunting economy was extinct. The Archaic lifeway was characterized by hunting small-game animals and gathering wild plants. Tools used by these hunters and gatherers reflect this economic base and the change in vegetation. Grinding tools, such as manos and metates, were used in plant processing. Less specialized projectile points probably were used as dart points and knives. The Papaguería is located in an area considered transitional between two major Archaic traditions: the Amargosa culture and the Cochise culture.

Southwestern Archaic

Research conducted since the 1970s has indicated that there are no clear boundaries between the Amargosa and Cochise cultural traditions. Several authors have suggested that the traditional regional conception of Archaic should be abandoned (see Bayham et al. 1986; Huckell 1984a). The prevalent view now portrays the Archaic as a widespread post-Pleistocene hunting-gathering adaptation that can be divided into three periods based on changes in artifact assemblages and shared characteristics, including seasonal mobility; a broad subsistence base, including wild plants and small game; and the common presence of grinding implements. Differences in assemblages may be the result of site function, site location, and availability of local resources. This approach emphasizes hunter-gatherer adaptation and the social organization of autonomous groups with defined territories. Integrative features, such as mating networks (Wobst 1974, 1977), unite the groups into a recognizable culture—the Southwestern Archaic—and result in the widespread use of projectile point and ground-stone-artifact styles. These three periods incorporate most of the previous inferences made by earlier researchers in a streamlined fashion.

The Early Archaic includes the period from 8500 to 4800 B.C. (Huckell 1984b) and encompasses Amargosa I (Rogers 1958), Sulphur Spring (Sayles and Antevs 1941), and the Ventana–Amargosa I phase of the Red Sand level at Ventana Cave. The assemblage includes well-made, percussion-flaked scrapers; foliate, bifacial knives; choppers; flat slab metates; oval manos; and tapering-stemmed projectile points similar to Lake Mohave and Silver Lake points. Early Archaic period components on the BMGR East have been identified mostly by the presence of Great Basin stemmed projectile points, including Jay or Lake Mohave projectile points. These stemmed, lanceolate projectile points are found throughout much of the land in the southwestern deserts. Two of these points were discovered in the San Dieguito component of the C. W. Harris site, where they exhibited traces of asphaltum mastic on the hafting element; the points have been interpreted as having been secured in socketed foreshafts and possibly bound with sinew (Justice 2002:98). Such points are dated between ca. 9000 and 6000 b.c., bridging the gap between Paleoindian and Archaic period cultures. Currently, only five sites with Early Archaic period components are recorded in the 56 RMO database. All of the sites with an Early Archaic period component on the BMGR East have grinding equipment and diverse flaked stone tools; despite their rarity, most also have a variety of feature types, including bedrock mortars, cairns, ther- mal features, rock alignments, and trails. Two of the sites on ETAC include rockshelters as features.

The Middle Archaic extends from 4800 to 1500 B.C. This phase is equivalent to Amargosa II (Rogers 1958), to the Chiricahua phase of the Cochise culture (Sayles and Antevs 1941), and to Chiricahua–Amargosa II at Ventana Cave (Haury 1950). Typical projectile points include Pinto, Gypsum Cave, Chiricahua, Bajada, and stemmed points with indented bases. Sites containing similar stemmed points are documented throughout the Southwest from this period (Huckell 1984a). Basin-shaped metates made their appearance during this phase. Middle Archaic period components have typically been recognized through the discovery of Chiricahua, Pinto, or San Jose projectile points. Nearly all sites and isolates with a Middle Archaic period temporal affiliation have been found in upper *bajada* or foothill settings on BMGR East. In addition to being located mostly in upland settings, sites and isolates with Middle Archaic period components usually lie close to drainages, particularly near stream junctions or near the head or terminus of a drainage.

Relatively rich assemblages of faunal remains and ground stone and flaked stone artifacts are common at sites with Middle Archaic period components; diverse ceramic artifacts dating to later periods are also relatively common at such sites. Most Middle Archaic period finds have been made on ETAC or NTAC.

The Late Archaic extends from 1500 B.C. to A.D. 1–300 and is equivalent to Amargosa III (Rogers 1958) and the San Pedro phase of the Cochise culture (Sayles and Antevs 1941). In this phase, lithic technology is elaborated to include better-quality raw material, refined biface production, pressure flaking, and a greater diversity of ground stone tools. Side-notched or side-to-corner-notched points are dominant across the Southwest. Elko Corner-notched, a typical Great Basin style, merges stylistically with San Pedro points in southwestern Arizona. Elaboration of ground stone artifacts is indicated by the presence of deep, basin-shaped metates; shaped manos; mortars; pestles; and gyratory crushers. Huckell (1995) added a phase to the end of the Late Archaic sequence, known as the Cienega phase, lasting from ca. 800 B.C. to A.D. 300 (see also Mabry 2005). Increased reliance on domesticated plants, including maize, occurred in this period. Plain ware ceramics appeared at the end of the Late Archaic, and unfired ceramic figures are present in the Tucson Basin. Some groups in the Tucson Basin, and probably elsewhere, possessed cultivated plants and sites with structures, storage pits, and middens by 500 B.C. (Huckell 1995).

Excavations at sites along the Santa Cruz River in the Tucson Basin have revealed extensive and densely occupied agricultural settlements with irrigation facilities dating as far back as 1200 B.C. Data from some of these sites suggest that mixed foraging and farming economies, settled village life, long-term storage, and irrigated farming began to appear centuries before the advent of sophisticated ceramic-contain- er technology or the emergence of the formative archaeological cultures. Features at these sites consisted of large numbers of circular pit structures, storage pits, burials, trash deposits, canals, and agricultural fields. The many pit structures at these sites were of relatively ephemeral and perishable construction, however, suggesting that permanent residence may not have been established at this time. Subsistence remains included a high diversity of wild-plant and animal foods, some of which may have been collected 20 km (12 miles) or more away from the site. Seasonality data indicate that plants were collected throughout the year for most periods of site use. Numerous storage pits indicate surplus food production and anticipated future use of these sites. Most striking, irrigation facilities and ubiquitous maize indicate that relatively intensive farm- ing was performed along the Santa Cruz River floodplain as early as 1200 b.c. and possibly earlier (Diehl 2005a, 200b; Ezzo and Deaver 1998; Gregory et al. 2007; Mabry 2005). Some canal features were larger and more complex than the earliest known examples in Mexico, suggesting that canal irrigation in the Tuc- son Basin was not derived from Mesoamerican practices but was instead a local, independent invention that could have supported at least hamlet-sized settlements (Doolittle 1990; Mabry 2002).

The adoption of maize appears to correlate with substantial change in settlement and land use, including a shift from residential to logistic mobility, increased sedentism and territoriality, development of private property and land tenure, increased population size, and changes in domestic organization (Mabry 2005). Still, substantial spatial and temporal variability in farming and foraging practices apparently occurred in the region during the period (Diehl 2005c; Ezzo and Deaver 1998; Gregory et al. 2007; Heilen 2008b; Mabry 1998; Riggs et al. 2000; Roney and Hard 2002; Wegener et al. 2006). The degree to which occupants of the Western Papaguería were

affected by the social and economic changes seen in the Tucson Basin is unclear, particularly given a lack of excavations.

Late Archaic period components have been identified at 50 sites on the BMGR East. In addition, 15 isolates have been affiliated with the Late Archaic period. Usually, Late Archaic period components have been recognized through the discovery of Bajada, Cortaro, Datil, Gypsum, Humboldt, Elko, or San Pedro projectile points. Sites and isolates with Late Archaic period temporal affiliations are located in settings very similar to those where Middle Archaic period discoveries have been made: foothill and upper *bajada* settings as well as settings adjacent to streams and stream junctions (see above). Late Archaic period components frequently are present at sites with Middle Archaic period components; in addition, sites and isolates with Late Archaic period components (that lack Middle Archaic period components) are often located within few hundred meters of a site or isolate with a Middle Archaic period component. In other words, Late Archaic period populations apparently were revisiting the same areas used by Middle Archaic period populations but may have been using those areas somewhat more extensively or intensively.

To understand the Archaic period, research should be focused on evaluating local adaptations rather than on global explanations. In order to accomplish this task, we must focus more on predicted cultural trajectories. Culture change among bands and small groups is more likely to result from changing economic emphasis than on breakthrough innovations (Steward 1955). For example, one explanation of the origin of agriculture in the New World is a processual model that begins with a culture having a mixed hunting-and-gathering economy (Coe and Flannery 1964; MacNeish 1964; for the Southwest, see Huckell 1995; Matson 1991; Wills 1988). Wild grasses originally were a minor component of subsistence, but through time, scheduling decisions based on multiple factors increased the relative importance of these plants. This increased emphasis had a positive feed- back effect on plant genetics, as subtle artificial selection promoted the food potential of grasses. Over the millennia, this process culminated in a shift to sedentary villages based on agriculture.

In explaining the Archaic cultural developments in the Western Papaguería, one must understand how hunters and gatherers perceived the environment. Hypotheses are required that relate economic decisions to organizational and logistical choices linked to the archaeological record. For example, hard seeds of wild grasses in the San Cristobal Valley and Childs Valley probably were a critical part of the local Archaic period adaptation. The degree of importance placed on wild-grass seeds fluctuated with climatic conditions and technological innovation. Grasses would have been more available during moister regimes, and grass seeds would have been more useful in the diet after the introduction of slab or flat-surface grinding implements. During drier periods, people would have placed greater reliance on desert succulents, legumes, and riverine resources.

Researchers predict that intense use of desert grasses coincided with moister regimes and the introduction of grinding implements (ca. 3000 B.C.). The size and range of the group(s) exploiting the grasses depended on the amount and reliability of the resource. Small, mobile groups would be expected if the grasslands were restricted in size, were available for short periods, or were unpredictable from season to season; larger groups probably coalesced in these grasslands during generation-long periods of abundant resources. The challenge is to examine the archaeological record of the San Cristobal Valley and Childs Valley for patterns of short-term, repeated use and more intense occupation and to correlate these patterns with environmental reconstructions. The patterns may then be integrated with similar patterns in other resource areas, leading to a cohesive

model of how the territories of Archaic period hunters and gatherers changed in relation to the availability of resources and how these economic shifts were reflected in alterations to the social system.

Ceramic Period

The Ceramic period dates from the beginning of the Common Era (A.D. 1) to A.D. 1450. The events and processes that took place on the BMGR and in the Western Papaguería during this period are often interpreted relative to cultural sequences identified in areas to the north and east (Hohokam), the west (Patayan), and, to a lesser degree, the south (Trincheras). The Areneños, an archaeological construct originally attributed to groups in and around the Sierra Pinacate (Hayden 1967), has not figured as prominently in interpretations of regional prehistory despite its ethnographic and archaeological validity (Doyel 2008:249; Eiler and Doyel 2008). Rather, archaeologists working in the Papaguería have focused most of their attention on the origin of decorated ceramic types. As with earlier periods, cultural sequences developed for the Formative period in regions to the east and west are usedto describe events and processes in the Papaguería. Because our knowledge of Hohokam culture is so much better than that of Patayan culture, most culture histories of the Papaguería look eastward.

Hohokam

The Hohokam have been the subject of relatively intensive study, particularly in the Phoenix Basin (for example, Crown 1987, 1991; Doyel 1991; Gladwin and others 1938; Haury 1976; Wilcox and Sternberg 1983), Tucson Basin (Doelle 1984; Doelle and Fish 1988; Doelle and Wallace 1991; Doyel 1981, 1984; Wallace and Holmlund, 1984), and in the Gila Bend area (Dart and others 1989; Wasley and Johnson 1965). There are four major periods in the Hohokam chronology, which in turn, are divided into a number of phases based on differences in decorated ceramics, other artifact styles, architectural styles, and mortuary practices. The Hohokam culture-historical sequence is reasonably well dated, except for controversy concerning their initial appearance (Dean 1991; Eighmy and McGuire 1988; Haury 1976; Plog 1980; Schiffer 1982).

Archaeologist have argued for many decades about Hohokam origins. While alternatively viewed as a potential result of immigration from Mesoamerica, the general view today has shifted in favor of indigenous development, and very recent research in the Tucson Basin has demonstrated the existence Late Archaic, ceramic producing, agriculturally oriented pit house villages (Mabry and Clark 1994). The Late Archaic period farmers and the earliest Hohokam may have overlapped in the early centuries of the Common Era (i.e., after a.d. 1). Closer to the Western Papaguería, Czarzasty et al. (2003) suggested that both floodplain and *bajada* farming were practiced north of Gila Bend by ca. A.D. 600; four radiocarbon dates associated with agricultural features overlap between A.D. 550 and 610 (2σ-calibrated ranges).

Haury (1950) divided the Hohokam into the “River Branch” and “Desert Branch” based on differences between material culture found along permanent watercourses and that found in more-arid desert areas. Detailed descriptions of River and Desert Hohokam have been presented by McClellan and Vogler (1977), Coe (1979), McGuire (1982c), and Ahlstrom (2000). Haury’s model characterized the Hohokam as a single ethnic group that exhibited variation because of regional environmental variability and available resources. The Phoenix Basin and Tucson Basin areas were

the home of the River Branch, wherein the Hohokam lived as village-dwelling sedentary agriculturists. In the peripheries, resource limitations encouraged alternative lifeways not dependent on irrigation. The Papaguería required a different set of adaptive strategies relative to other areas, some of which involved agriculture and some of which did not. Although the utility and validity of this model have been challenged (Ahlstrom 2000; Altschul et al. 2002; Ezell 1954; Masse 1980), regional variability in Hohokam material culture and adaptation did exist.

Hohokam culture has also been described as a regional system that consisted of interacting but spatially distinct populations integrated through exchange and ceremonial systems (Doyel 1991b; Wilcox 1979, 1980). The regional system contained a core-periphery contrast: each area had its own trajectory and internal cultural dynamics. The core area included the Phoenix (Salt-Gila) Basin; the peripheries included the Papaguería, the Tucson Basin, the Upper Santa Cruz, the San Pedro, Safford, the Tonto Basin, the Upper Verde, the Agua Fria, and Gila Bend. McGuire (1991) suggested that the Papaguería can be subdivided into an eastern portion, from the Avra Valley west to the Santa Rosa Valley, and a western portion, from the Santa Rosa Valley (including the area west of the Sauceda, Batamote, and Ajo Mountains) to the Colorado River. The latter played a key role in the production and exchange of shell artifacts, obsidian, and other products (Ahlstrom, Chenault, and Wrobleski 2000; Doyel 2008). To some extent, the Ceramic period culture history of the Papaguería must be viewed in reference to the Phoenix and Tucson Basins, as changes in these areas influenced shifts in regional alliances of Papaguerian populations.

The periods associated with the Hohokam tradition include the Pioneer Period with a range from A.D. 300-775. Pioneer period components have been recognized on the BMGR East through identification of Pioneer period ceramic artifacts and projectile points. Perhaps because they are large, sites with a Pioneer period temporal affiliation have diverse artifacts and features. Feature types have included bedrock mortars, cairns, thermal features, rock alignment or piles, and a rock ring. Four sites with a Pioneer period component include a rockshelter feature. Most sites with a Pioneer period component have been reused during later periods, suggesting that the location of these sites may have afforded access to resources that remained important throughout much of the Ceramic period.

Colonial Period (ca. 775-975 A.D.) components have been recognized on the BMGR East through identification of Colonial period ceramic artifacts and projectile points; 45 sites with Colonial period components have been recorded. As determined from the discovery of ceramic artifacts identified as either Santa Cruz Red-on-buff or Sacaton Red-on-Buff, two isolates (one on ETAC and one on STAC) have also been identified as affiliated with either the Colonial or the Sedentary period.

The Sedentary Period (ca. 975-1150 A.D.) marked the height of the Hohokam cultural tradition in both the Phoenix and Tucson Basins. The diagnostic ceramic type from this period is known as Sacaton Red on buff. Nearly all sites with Sedentary period temporal affiliations are artifact scatters with feature(s) or, less of- ten, artifact scatters. Features at sites with Sedentary period components include bedrock grinding slicks, bedrock mortars, cairns, thermal features, cleared areas in desert pavement, rock alignments or piles, rock rings, rockshelters, rock images, and trails. Twelve sites with a Sedentary period component (11 of which are either on ETAC or in Area B) include rockshelter features.

The Classic Period contrasts sharply with the pre-Classic periods, which is exemplified by radical shifts in material culture, architecture, mortuary practices, and settlement patterning. The onset of Redware pottery and Salado Polychromes during this period replaced they typical Hohokam red on buff tradition. Classic period components have been recognized on the BMGR East primarily through identification of Classic period ceramic artifacts and projectile points. These have included artifacts affiliated with the Salt- Gila Basin Hohokam or the Tucson Basin Hohokam. Features identified at sites with a Classic period temporal affiliation have included bedrock grinding features, bedrock mortars, cairns, cleared areas in desert pavement, thermal features, rock alignments or piles, rock images, and rockshelters. Most often, sites with a Classic period temporal affiliation have thermal features, rock alignments or piles, or rockshelter features.

Patayan

The Patayan occupied the lower Colorado River valley and the lower Gila River after A.D. 700. Rogers (1945) divided the Patayan culture into three phases, designated Yuma I, II, and III, based on changes in ceramic surface treatment and vessel and rim form. Dating the chronology was based on intrusive Hohokam ceramics. Schroeder (1952, 1957, 1958, 1961) proposed an alternative chronology and ceramic typology for the same materials, which he identified as Hakataya based on variation in surface treatment and temper. Waters's (1982a) examination of Rogers's work for the Lower Colorado Buff Wares resulted in refinement of the typology; identification of a new ceramic type, Colorado Buff; and the conclusion that the data supported Rogers's culture history. Waters (1982a) echoed Colton's (1945) proposal that the term Yuma be dropped to avoid confusion with ethnographic groups and accordingly revised the terminology to Patayan I, II, and III.

Patayan I sites, dating from A.D. 700 to 1050 (Rogers 1945), are found along the lower Colorado River and the lower Gila River and in the northwestern portion of the Papaguería (Huckell 1979; Waters 1982a). Patayan I ceramic traits include the Colorado shoulder, rim notching, incised decoration, lug-and-loop handles, burnish- ing, red slip, and manufacturing processes using basket molding and hemispherical casting (Waters 1982a). Sites include cleared areas (sleeping circles) with gravel rims, roasting pits, hearths, trails, and trail shrines. An abrupt transition from Patayan I to Patayan II ca. A.D. 1050 is marked by a rapid expansion of ceramics into new areas. Patayan II ceramics have been found as far north as southern Nevada, west to Lake Cahuilla, east to the Phoenix Basin and to the eastern side of the BMGR, and south to Puerto Peñasco, Sonora, Mexico. Patayan II ceramics are associated with Hohokam Classic period sites in the Gila Bend area (Wasley and Johnson 1965), on the Tohono O'odham Reservation (Rosenthal et al. 1978), and at Las Colinas in Phoenix. Patayan II ceramics and sites have been identified throughout the Western Papaguería (Ezell 1954; Hill and Bruder 2000; Huckell 1979), including the Sierra Pinacate and Puerto Peñasco (Hayden 1967). Ceramics changed dramatically, and diagnostic traits of Patayan I did not persist into Patayan II. New ceramic traits include stucco finish, fine-lined geometric patterns, and recurved rims.

Patayan III began around A.D. 1500 and was marked by relative continuity in ceramics. Although some Patayan II forms ceased to be made, other Patayan II ceramic traits persisted, with some refinement, into Patayan III. New traits included reinforced rim bands and a new vessel form, the high-necked, small-mouthed olla. Material culture shows continuity with Quechan (Yuma) material, suggesting a Patayan-Quechan (Yuma) continuum (Huckell 1979). Hill and Bruder's (2000) excavations at the Mobak site on the BMGR East identified partially overlapping

components. Eighty percent of the ceramics were identified as Lower Colorado Buff Wares, most of them Patayan I. Hohokam ceramics totaled 5 percent of the ceramic collection, but Classic period Hohokam ceramics outnumbered Patayan II/III ceramics by about three to one. Hill and Bruder (2000:17) suggested that Patayan I ceramics may have been produced into the Classic period. This is consistent with findings at the Lago Seco site, excavated by Huckell (1979), where Classic period Gila and Tonto Polychrome have also been identified. However, radiocarbon dates from the Patayan I component of the Lago Seco site produced dates that support the temporal assignment of Rogers (1945).

What is at stake is whether we view the Western Papaguería as a hinterland for Hohokam and Patayan culture or as the heartland of a group (Areneños) with an essentially Archaic period lifeway that interacted with, but was not dominated by, its Ceramic period neighbors. Indeed, locally made plain wares show both Hohokam and Patayan traits. By far, most archaeologists have taken the first view. However, in the 75 years since Malcolm Rogers began surveying the Western Papaguería, no one has found a major prehistoric village downstream from Painted Rock Dam. Yet hundreds of archaeological sites have been recorded in the interior of the Papaguería, some of which are large and reflect intensive occupations, such as Verbena Village, Lago Seco, Kuakatch Village, and Lost City (see Ahlstrom, ed. 2000).

In contrast to the major formative cultures inhabiting the banks of the Colorado and Gila Rivers and dependent for at least 50 percent of their diet on agriculture, the Hia C-ed O'odham were a mobile people who formed few villages, depended heavily on hunting and gathering, and only occasionally practiced agriculture (Crosswhite 1981; Ezell 1955; Nabhan et al. 1989). The emergence of Formative cultures along the Gila and Colorado Rivers, as well as those along the Rios de la Concepcion and Sonoyta, would have altered the "social equation" for hunters and gatherers of the Western Papagueria. This situation, of course, has been repeated throughout the world for millennia, as Neolithic farming communities developed and interacted with neighboring pastoral and hunter-gatherer societies. Even with the abundance of fieldwork conducted, the archaeological record has provided very little evidence suitable for evaluating these questions.

Areneños

The Areneños, a culture identified in the Sierra Pinacate of northwestern Sonora (Hayden 1967), has not figured prominently in interpretations of regional prehistory. Ezell (1954) and Hayden (1965) postulated that during the Ceramic and historical periods, the Western Papaguería was occupied by a group that made a local plain ware pottery and traded with Patayan/Yuman groups for decorated and plain ware ceramics. Hayden argued that the Late Archaic period Amargosa culture lasted until A.D. 700 in the Sierra Pinacate area, thereby implying that these inferred Archaic cultures, termed Amargosa-Areneños, lived alongside the farmers of the river valleys. The Amargosa-Areneños were subdivided into two groups: a Pinacate group was referred to as the Areneños Pinacateños, and the group occupying the rest of the Western Papaguería was referred to as Areneños. This division corresponds to the distribution of the historical-period Pinacateños band and the Areneños band of the Hia C'ed O'odham. The material culture of the Areneños is a composite of traits found throughout the Western Papaguería: Hohokam and Patayan painted and plain and red ware pottery, walk-in-wells and reservoirs, houses-in-pits, and cremations (Altschul and Rankin 2008:22–23). Specifically, Pinacate sites include Patayan I and II, Snaketown Red-on-buff (ca. A.D. 500–700), and Gila Butte Red-on-buff (ca. A.D. 700–780) ceramics; use of obsidian

for small, triangular, concave-based projectile points; mortars of volcanic scoria; sleeping circles; geoglyphs; and cremation of animal remains—in particular, bighorn sheep, deer, and pronghorn. Hayden also noted a plain brown ware that appeared sparsely in association with Amargosa II projectile points. Beginning around a.d. 700, Patayan I ceramics are found throughout the entire Western Papaguería. Therefore, Hayden (1965) and Ezell (1954) argued that the pottery reflected trade between the Patayan and the local indigenous population, the Amargosa-Areneños, rather than actual use of the area by Patayan groups. Clearly, the Areneños concept is confused and confus- ing. Of the traits listed above, only the plain ware ceramics may be unique to the Pinacate region, but fur- ther study is needed to verify this. In the meantime, it is virtually impossible to identify Areneños sites on any basis other than geography. As put by Altschul and Rankin (2008:23), the Areneños culture concept is a placeholder. Knowing that the interior of the Western Papaguería was home to hunter-gatherers from the Archaic through early historical periods, there clearly existed a group of desert dwellers contemporaneous with the better-known farming cultures along the adjacent rivers. These mobile desert people covered a vast territory; as a result, they were ideal intermediaries to procure and transport desert resources to the rivers.

HISTORICAL PERIOD

Spanish Period

The rugged, arid, and isolated nature of the western portion of the Papaguería constrained historical-period European activities. The Spanish presence in the Southwest began with the expedition of Francisco Vásquez de Coronado in the 1540s. Although Coronado's *entrada* passed far to the east, one of his lieutenants, Melchior Díaz, traveled through the western portion of the Papaguería to Yuma, where he forded the Colorado River into California (Sheridan 1995:26). The next 150 years saw very little Spanish exploration due likely to the paucity of available water. In the late 17th century, however, the Spanish missionary effort brough Jesuit Eusebio Francisco Kino to the Papagueria. During the period 1693–1707, Kino made numerous trips across the region, both as an exploring cartographer and in search of suitable locations for permanent missions. Although he passed through the Papaguería many times en route to the Gila River, he spent little time there and made no attempt to establish settlements. In 1775, Juan Bautista de Anza, commander of the presidio at Tubac, led a group of Spanish settlers down the Gila River and across the California desert to open an overland route to the Franciscan missions along the coast. But soon, the road to California was closed because of the hostility of the Yumans on the lower Colorado River, and the limited Spanish presence in the Papaguería implied by this route ended (Bischoff 2000; Hartmann 1989; Majewski and Ayres 1997; Weber 1992:248–258).

Native American Early Historical Period

In the 1690s, the Hia C-ed O'odham led Kino to their villages at present-day Wellton and Dome along the Gila River. Kino and Captain Juan Mateo Manje were taken to hunting camps and tinajas in what are now CPNWR and the BMGR (Doyel and Eiler 2003). The traditional Hia C-ed O'odham settlement pattern included mobility and long-term habitation, the latter at many places, including, among others, Ajo, Antelope Hill, Bates Well, Chico Shunie, Darby Wells, and Quitobaquito. By the early 1800s, European diseases had depopulated some areas, and some groups moved to more-distant locations, including the interior of the western portion of the Papaguería. The lifeways of all O'odham were disrupted by the arrival of the Europeans, which was accompanied by new diseases, the new mission and mining communities, the creation of the international border, and the loss of access to traditional sites and use areas. Unlike the situation of their O'odham neighbors, no land was set aside for the Hia C-ed O'odham in their traditional homeland in the Western Papaguería on either the Mexican or the U.S. side of the border. Overall, the history of the region after 1600 involved systemic impacts to the local populations from Apache, Spanish, and such widespread European intrusions such as crops, cattle, horses and sheep. Additionally, the aforementioned populations brought about violence, diseases and foreign religious and governance practices (Doyel and Eiler 2003; Eiler and Doyel 2008).

The native inhabitants of the lower Colorado River region have been classified as part of the Yuman sub-group of Hokan speakers (Kroeber 1943). Yuman speakers inhabited large sections of what is currently western Arizona, southern California, and northwest Mexico. Kroeber's (1943) typology recognizes four branches of Yuman speakers: the Colorado delta groups (Cocopah, Kohuana, and Halyikwamai), the river Yumans along the Colorado and Gila Rivers (Quechan or Yuman, Mojave, Halchidhoma, and Maricopa), the upland Yumans of western Arizona (Yavapai, Hualapai, and Havasupai), and the western Yumans of the California deserts (Diegueño, Kamia, Kailwa, and Paipai). In reference to the Western Papaguería, the Quechan, Cocopah, and Mojave are of central concern, as they lived nearest to this region and interacted most with the Hia C'ed O'odham. In general, it can be said that all of these groups were adapted to a riverine, foraging pattern of subsistence, with hunting and gathering being supplemented by floodplain farming of maize, beans, squash, melon, cotton, and various grasses. Castetter and Bell (1951) have claimed that the Mojave were the most agricultural of the river and delta Yumans and that roughly half of their subsistence derived from farming. The Cocopah were the least oriented toward agriculture, with perhaps a third of their food coming from farming, whereas the Quechan reliance on agriculture fell in between the Mojave and Cocopah. No irrigation works or other land modifications are in evidence for this region; agricultural practices relied on floodwater to bring needed moisture to the fields, which were usually quite small (0.8–1.2 ha [2–3 acres]). Seeds were planted after flooding, with newly deposited sediments providing a nutritionally adequate environment. The harvest took place in late summer or early autumn (Forde 1931; Strong 1929). The river Yumans utilized more than 75 wild plants as food sources, the most important being mesquite, including screwbean mesquite (Castetter and Bell 1951). Fish provided a critical source of protein, with hunting restricted primarily to small game, such as jackrabbits, cottontails, squirrels, and pack rats. Rabbit drives have been documented ethnographically (Strong 1929) and archaeologically (Altschul and Jones 1989). Larger game was not abundant in the region, and mule deer and bighorn sheep were hunted only occasionally.

Early American Period

U.S. interests in what is now the project area began with attempts to link California with other states to the east. With the discovery of gold in California in 1848, this became critical. The Camino del Diablo, which crosses the formidable southern portion of the Papaguería and was first used by Europeans in Kino's day, became a common and lethal route for the rush of forty-niners headed to California.

Survey parties crossed the Gadsden Purchase during the 1850s in search of routes for a transcontinental railroad, although it would be decades before a railroad was constructed across the region. Surveys of the U.S.-Mexico border were also commissioned and constituted the first exploration of much of southwestern Arizona. Such surveys brought the region to the attention of others, particularly those seeking precious minerals. Stagecoach lines were established across the region, most notably the Butterfield Overland Stage in 1858.

Post-Civil War Period

After the Civil War, ranching and mining increased in Arizona, as did routes of travel across the region. To protect the new settlers, the military began a concerted effort to subdue "hostile" Native American groups. To supply the military posts and new settlements, cattle ranches appeared across the state, even in arid places like southwestern Arizona. Mines also increased their activities in this period. Communication and transportation links were improved. Trails that had been used by Native Americans for centuries were expanded to handle wagon transportation. One of the most significant developments for the area during the historical period was the arrival of the railroad in the early 1880s.

Ranching on the BMGR is exemplified by the history of the Childs Family. From their ranch headquarters on Tenmile Wash, the Childs family had an immeasurable impact upon the region. Their cattle operation extended across a vast area, and the family intermarried with both local Euro-Americans and Native Americans. The family grazed as many as 2,500 head of cattle over much of the BMGR East, operating ranches at Batamote Well along Tenmile Wash, at Hotshot Well, and at Green Gate Well (Vanderpot and Altschul 2004:155). The influence of the family on the region is evident today in the names given to two major geographical features: Childs Mountain and Childs Valley.

The Childs family ran cattle in an immense area on both sides of the road that is now SR 85. Childs, Jr., himself lived for much of his life at Batamote Well along Tenmile Wash, with his Hia C'ed O'odham wife, Marta. Childs and Marta had 13 children together and also raised numerous adopted Native American boys.

The sons claimed land adjacent to theirs, expanding the size of the ranch over time. A daughter likewise claimed neighboring parcels of land. Many of the local settlers' children married into the Childs family, leading to a highly interrelated community (Dickey 1998; Guenther 1999; Hoy 1999). Childs was often very helpful to his neighbors. He helped many ranchers locate water; among them was Angel Monreal, who settled to the southwest of Childs in the early 1950s (Monreal 1986). Charlie Bell Well, which was eventually owned by Alton Netherlin, was also improved with the help of Childs. Netherlin eventually ran sheep in the Charlie Bell Well area and in the region surrounding Bates Well (Netherlin 1986). Locals indicate that Childs did not always get along with neighboring ranchers. The Gray family ran cattle in what is now OPCNM and fought with Childs, attempting to remove his cattle from their land (Puffer 1988).

The other prominent ranching family in the area, the Stouts, operated a cattle empire on a scale with the Childs operation. The Stout ranch encompassed an area from Gila Bend to Ajo to the Tohono O'odham reservation. It included countless acres of grazing land leased from the BLM. The Stout operation ringed the Sauceda Mountains, and the family developed several water sources throughout their range, including at Tom Thumb and Lookout Well (Guenther 1999). The first Stouts to arrive were wife and husband Annie and Alec (known as "Pop"), who were reportedly from England. Alec worked for the railroad upon reaching Arizona sometime in the late nineteenth century. The Stouts had two sons, Albert and Charles. Charles had no children and died in the 1960s.

Four generations of Stouts have lived in the area around Gila Bend and in what is now the BMGR East. The last Stout, nicknamed Pistol, ran the cattle operation for roughly 15 years before he moved to Sierra Vista. The Stout family also owned and ran several businesses in the town of Gila Bend, including the city waterworks (Stout 1998). The Stouts' ranch land bordered the Childses'; in some places, a fence separated the two, as in the vicinity of Black Gap. Childs's ranch, for the most part, lay to the west and south. The Stouts' cattle ranged over a long distance, often into areas traditionally ranched by the Childses, but brands were generally respected, and there was little rustling. The two families frequently visited with one another, and the Stouts and the Childses leased land from each other (Stout 1998). The Stout brand was a double box, with the letter *E* on top of the letter *H* (Stice and Stout 2000). The Stouts, like other large ranching families, hired many local men to assist them in managing their herds. Many of these men were Tohono O'odham, including Alonzo Puffer, who worked for the family for 30 years.

World War II and Establishment of a Bombing Range

Arizona is the ideal training ground for pilots because of excellent flying conditions and dependable weather and has been the choice as a national center for pilot training for more than 60 years. The military potential of aircraft was realized in World War I, by which time U.S. pilots were using airplanes to fly in bombing raids, strafing missions, air-to-air combat, and reconnaissance missions. The start of World War II marked the meteoric growth in U.S. military aviation. Between 1940 and 1944, $60 billion was appropriated to the Army Air Forces, resulting in a fourfold increase in uniformed personnel, from 51,000 to more than 2,000,000, mainly in the desert training centers of California and Arizona. This large, sudden influx of soldiers, fliers, and defense-plant workers swelled the population and boosted local economies throughout the Southwest.

The Gila Bend Gunnery Base, as it was then called, was established specifically for aerial gunnery and bombing training on the huge tract of land forming the southwestern corner of Arizona. The range was first withdrawn from public use and reserved for military training by a series of four executive orders and two public land orders between 1941 and 1943, providing a total of 2.77 million acres. During World War II, the U.S. War Department divided the range into eastern and western components, designated the Gila Bend Gunnery Range and the Yuma Aerial Gunnery and Bombing Range, respectively, with the eastern section authorized for use by the Advanced Flying Training program at Luke Field (see Thompson 2004). In 1986, the range was renamed the Barry M. Goldwater Air Force Range in honor of the former U.S. senator and Air Force Reserve major general who served at Luke Field during the early days of World War II.

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ERCA

Appendix E

Scoping Letters

Responses to Scoping Letters

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND HEADQUARTERS
UNITED STATES ARMY GARRISON, YUMA
301 C STREET
YUMA AZ 85365-9498

REPLY TO ATTENTION OF

March 3, 2016

Environmental Sciences Division

Ms. Sherri L. Zendri
Administrative Counsel, Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, AZ 85007

Dear Ms. Zendri:

The United States Army Garrison Yuma Proving Ground (USAG YPG) has initiated an analysis to evaluate the potential for direct, indirect, and cumulative effects to the natural and human environment associated with the proposed Extended Range Cannon Artillery (ERCA) test program. As shown on the enclosed map, the ERCA program would test fire long range artillery projectiles to a distance of approximately 70 kilometers at Yuma Proving Ground (YPG) and at the Barry M. Goldwater Range (BMGR) West and East, administered by Marine Corps Air Station Yuma (MCASY) and Luke Air Force Base (LAFB), respectively.

Within YPG, the program proposes to fire projectiles from an existing gun position on the Cibola Range to a new 495-acre impact area on the Kofa Firing Range. Two new observation mounds for stationing of instrumentation such as Kineto-Tracking Mounts, telemetry receivers and/or radars would be constructed south of the new impact area. Based on the design of similar observation mounds, these would be compressed earth, approximately 8 meters high, 8 meters wide, and 12 meters long on the top, with base dimensions of approximately 27 meters by 100 meters. Each mound would have a single access road.

Within BMGR West, an approximately 1.5 acre temporary gun position would be established in a previously disturbed area within Ground Support Area 71 near Baker Peaks. Artillery rounds would be fired at existing targets within two air-to-ground target ranges on BMGR East: North Tactical Range located east of the Aguila Mountains, and South Tactical Range located east of the Granite Mountains and west of the Growler Mountains.

The USAG YPG Environmental Sciences Division is preparing an Environmental Assessment (EA) for this proposed action pursuant to the National Environmental Policy Act (NEPA). LAFB and MCASY are NEPA cooperating agencies. We are initiating scoping to assist us in defining the valued environmental components and issues to address during the analysis of potential impacts that could result from the proposed action. Your input is appreciated and may be submitted to the USAG YPG National

Environmental Protection Act Coordinator at U.S. Army Garrison Yuma, 301 C Street, IMYM-PWE, Yuma, AZ 85365-9498 or via email to: usarmy.ypg.imcom.mbx.nepa@mail.miL. Please submit comments no later than 30 days from the date of this letter.

If you have any questions or need additional information please contact the NEPA coordinator at (928) 328-2015 or Mr. Daniel Steward at (928) 328-2125. If you would like to receive a copy of the EA, please return the enclosed postage paid request card indicating your preference and return address.

Sincerely,

Gordon K. Rogers
Garrison Manager

Enclosure

From: BUCHANAN, CHARLES E CIV USAF AETC 56 RMO/CC [mailto:charles.buchanan@us.af.mil]
Sent: Tuesday, April 26, 2016 4:36 PM
To: USARMY YPG IMCOM Mailbox NEPA <usarmy.ypg.imcom.mbx.nepa@mail.mil>
Cc: Graziani, Dominic J CIV (US) <dominic.graziani.1@us.af.mil>; O'Berry, Kevin M CIV USAF (US) <kevin.oberry@us.af.mil>; Cooper, Jason L Lt Col USAF PACOM (US) <jason.cooper.1@us.af.mil>; Calderon, Cindy L CIV USAF (US) <cindy.calderon.1@us.af.mil>
Subject: Extended Range Cannon Artillery (ERCA) Test Program

Mr Daniel Steward

I appreciate you forwarding letters to my office and others at Luke AFB regarding input to the proposed test action in support of the ERCA program. This response covers the 56 RMO and 56 FW/CC offices that received a letter here at Luke.

We can only comment on the proposed action as it relates to the Barry M. Goldwater East (BMGR-E) complex. As my office is already a cooperating agency on the proposed action I am confident specific issues will be raised and mitigated as the team works through the environmental assessment process.

It appears the BMGR-E will be the least impacted by the ERCA test program however, our biggest concerns related to the natural and human environment are: minimal ground disturbance; Pronghorn antelope considerations; and human safety as it relates to the ERCA surface danger zone (SDZ). I am already aware the Pronghorn situation is being addressed as well as discussion relating to road closures, etc. to mitigate human presence in an active SDZ.

As operations drive the requirement for an environmental assessment, I expect all required aspects of the testing to be known up front. In this regard I'm more concerned with ground access requirements (e.g. radar/camera placement) which can have an effect on our daily operations but more importantly the environment.

Finally, while not necessarily an environmental consideration, the BMGR-E is a primary training range, not a test range. However we are here to support as we can with consideration to our normal business. Thank you again for the consideration and opportunity to raise comment/concerns regarding potential the ERCA test program.

We will continue to engage as a cooperating agency.

Respectfully, Chas

Chas Buchanan
Director, 56 RMO
623-856-8520 (DSN 896)
c 602-663-2096

4035 South Avenue A
Yuma, AZ 85365

APR 1 5 2016

U.S. Customs and Border Protection

Mr. Gordon K. Rogers
Garrison Manager
U.S. Army Garrison Yuma
301 C. Street, IMYM-PWE
Yuma, AZ 85365-9498

Dear Mr. Rogers,

Please consider this message as the official response from the U.S. Border Patrol (USBP) Yuma Sector (YUM) and Tucson Sector (TCA) concerning the Extended Range Cannon Artillery (ERCA) testing, that may be conducted on both the Yuma Proving Ground (YPG) and the Barry M. Goldwater Bombing Range (BMGR) West and East.

Please note, any testing on YPG is not expected to effect USBP operations at this time. However, ERCA testing on the BMGR West and East does create concern for the USBP; specifically related to air and ground operational restrictions as well as safety for both USBP personnel and other subjects, legitimate and/or illicit, that may be in the target area and the Surface Danger Zones (SDZs).

While these are valid concerns, after discussing the topics with the NEPA Program Manager, Sergio Obregon, we believe that the potential impacts can be mitigated to an acceptable level. This acceptable level of operational restrictions and hazard is derived from the following understanding and assumptions:

- YPG will provide testing dates to YUM/TCA, with as much advanced notice as possible, in order to adjust USBP operations to accommodate ERCA testing;
- YUM/TCA will provide YPG, with as much advance notice as possible, of suspected persons in the SDZs and impact areas before planned firing times;
- A clear and direct line of communication will be established between YPG, personnel performing the test, and YUM/TCA regarding ERCA testing and the need to suspend or postpone live fire due to any subject being in or believed to be in the SDZs and impact areas;
- YPG or designee will provide a mechanism (preferably personnel) at both the north and south of each road that transits the SDZs, to either restrict ground traffic during firing times or be able to halt ERCA firing until traffic is confirmed to have transited the SDZs.

Additionally, during live fire testing, restricted airspace over the BMGR West (R2301W) and East (R2301E) will be closed. This can severely impact CBP Air and Marine Operations (AMO). Excluding aircraft beyond the normal restrictions of NTAC and STAC in R2301E is a subject of concern.

From the USBP perspective, at any given time, an aerial search and rescue, medical emergency or law enforcement activity would require the need for an AMO aircraft within the vastness of R2301W and E. We respectfully request that the EA effectively addresses the air space topic between Luke AFB, MCAS Yuma, USBP and YPG. The USBP asks that consideration be given to the entirety of R2301W and E not being closed during live fire.

Sincerely,

Anthony J. Porvaznik
Chief Patrol Agent
Yuma Sector

THE STATE OF ARIZONA
GAME AND FISH DEPARTMENT
5000 W. CAREFREE HIGHWAY
PHOENIX, AZ 85086-5000
(602) 942-3000 • WWW.AZGFD.GOV
REGION IV, 9140 E. 28TH ST., YUMA, AZ 85365

April 1, 2016

Daniel Steward
USAG YPG
National Environmental Protection Act Coordinator
U.S. Army Garrison Yuma
301 C Street IMYM-PWE
Yuma, AZ 85365-9498

Re: Scoping Comments for Environmental Assessment for the Extended Range Canon Artillery Test Program at Yuma Proving Ground and Barry M. Goldwater Range

Dear Mr. Steward:

The Arizona Game and Fish Department (Department) has reviewed the letter dated March 3, 2106 requesting scooping comments for the Environmental Assessment (EA) for the Extend Range Canon Artillery Test Program (ERCA). The following comments are provided for your consideration. We note that the Department also provided comments at the agency scoping meeting.

Under Title 17 of the Arizona Revised Statutes, the Arizona Game and Fish Department (Department), by and through the Arizona Game and Fish Commission (Commission), has jurisdictional authority and public trust responsibilities for management of the state's fish and wildlife resources. It is the mission of the Department to conserve Arizona's diverse fish and wildlife resources and manage for safe, compatible outdoor recreation opportunities for current and future generations.

The Department understands the ERCA artillery will fire projectiles approximately 70 kilometers. The EA will evaluate two locations for ERCA. The first is on YPG, firing projectiles from an existing gun position on the Cibola Range to a 495 acre impact zone on the Kofa Firing Range. The new impact zone will include two new observation mounds with a single access road to each mound. The second location is on Barry M. Goldwater Range (BMGR). The gun position will be on a previously disturbed site within Ground Support Area71 on BMGR West. The artillery will fire at two air to ground targets on the North Tactical Range and South Tactile Range on BMGR East.

The Department recommends evaluating the following potential impacts:

- From wildfire at the new impact zone on the Kofa Range and the potential to carry off of YPG.

- On Sonoran pronghorn on both bases
- Public access on BMGR

Finally we recommend consulting the Department's Environmental On line Tool at https://azhgis2.esri.com/ to determine sensitive species that may be found at the proposed project sites.

The Department appreciates the opportunity to provide these scoping comments. We would appreciate the opportunity to continue to be involved in the EA process. If you have any questions please contact me at 928-341-4047 or bknowles@azgfd.gov.

Sincerely

William Knowles

William Knowles
Region IV Habitat Program Manager

cc: Pat Barber, Region IV Supervisor
Joyce Francis, Habitat Branch Chief
Laura Canaca, Project Evaluation Program Supervisor

AGFD # M16-03185339

Received from Tribal Admin 04/01/16 VN

E-mailed 04/03/16 VN (initial & date)

Scanned 04/03/16 VN (initial & date)

SAN CARLOS APACHE TRIBE
Historic Preservation & Archaeology Department
P.O. Box 0
San Carlos Arizona 85550
Tel. (928) 475-5797, apachevern@yahoo.com

Tribal Consultation Response Letter

Date: March 29, 2016
Contact Name: Erin Goslin; erin.r.goslin.civ@mail.mil
Company: Department of the Army, United States Army Garrison, Yuma
Address: 301 C. Street, Yuma, AZ 85365-9498
Project Name/#: EA to evaluate potential environmental consequences of the Extended Range Cannon Artillery test program

Dear Sir or Madam:

Under Section 106 and 110 of the National Historic Preservation Act, we are replying to the above referenced project. Please see the appropriate marked circle, including the signatures of Vernelda Grant, Tribal Historic Preservation Officer (THPO), and the concurrence of the Chairman of the San Carlos Apache Tribe:

X **NO INTEREST/NO FURTHER CONSULTATION/NO FUTURE UPDATES**
We defer to the Tribe located nearest to the project area.

O **CONCURRENCE WITH REPORT FINDINGS & THANK YOU**

X **REQUEST ADDITIONAL INFORMATION**
I require additional information in order to provide a finding of effect for this proposed undertaking, i.e. Project description ___ Map ___ Photos X Other We defer to the Four Southern Tribes and other nearby tribes.

O **NO EFFECT**
I have determined that there are no properties of religious and cultural significance to the San Carlos Apache Tribe that are listed on the National Register within the area of potential effect or that the proposed project will have no effect on any such properties that may be present.

O **NO ADVERSE EFFECT**
Properties of cultural and religious significance within the area of effect have been identified that are eligible for listing in the National Register for which there would be no adverse effect as a result of the proposed project.

O **ADVERSE EFFECT**
I have identified properties of cultural and religious significance within the area of potential effect that are eligible for listing in the National Register. I believe the proposed project would cause an adverse effect on these properties. Please contact the THPO for further discussion.

We were taught traditionally not to disturb the natural world in a significant way, and that to do so may cause harm to oneself or one's family. Apache resources can be best protected by managing the land to be as natural as it was in pre-1870s settlement times. Please contact the THPO, if there is a change in any portion of the project, especially if Apache cultural resources are found at any phase of planning and construction. Thank you for contacting the San Carlos Apache Tribe, your time and effort is greatly appreciated.

DIRECTOR/THPO: _____ 03/29/16
Vernelda J. Grant, Tribal Historic Preservation Officer — Date

CONCURRENCE: _____ 4/1/16
Terry Rambler, Tribal Chairman — Date

cc:

DPW

THE HOPI TRIBE

Herman G. Honanie
CHAIRMAN

Alfred Lomahquahu Jr.
VICE-CHAIRMAN

March 21, 2016

Gordon K. Rogers, Garrison Manager
Attention: Erin Goslin, Archaeologist
Department of the Army, US Army Installation Management Command
Headquarters, United States Army Garrison, Yuma
301 C Street
Yuma, Arizona 85365-9498

Dear Mr. Rogers,

This letter is in response to your correspondences dated February 8 and March 3, 2016, regarding the Yuma Proving Ground preparing Environmental Assessments to implement proposed activities and operations addressed in the November 2015 Real Property Master Plan, and evaluate the consequences of the Extended Range Cannon Artillery test program.

The Hopi Tribe claims cultural affiliation to earlier identifiable cultural groups in Arizona, including the Hohokam prehistoric cultural group in southern Arizona. The Hopi Cultural Preservation Office supports the identification and avoidance of our ancestral sites, and we consider the prehistoric archaeological sites of our ancestors to be Traditional Cultural Properties. Therefore, we appreciate Yuma Proving Ground's continuing solicitation of our input and your efforts to address our concerns.

The Hopi Cultural Preservation Office previously responded to correspondences on the Real Property Master Plan with the enclosed letters dated May 7 and October 31, 2012, January 17, 2013, March 26, 2014and May 11, 2015. We appreciate that the Yuma Proving Ground is identifying historic properties in potential use areas, and we are interested in consulting on any proposal that has the potential to adversely affect prehistoric cultural resources. Therefore, if any identified prehistoric sites cannot be avoided and will be adversely affected by project activities, then we request to be provided with copies of the draft environmental assessment, cultural resources survey report and any proposed treatment plans for review and comment.

If you have any questions or need additional information, please contact Terry Morgart at the Hopi Cultural Preservation Office at 928-734-3619 or tmorgart@hopi.nsn.us. Thank you for your consideration.

Respectfully,

Leigh J. Kuwanwisiwma, Director
Hopi Cultural Preservation Office

Enclosures: May 7 and October 31, 2012, January 17, 2013, March 26, 2014 and May 11, 2015 letters
xc: Arizona State Historic Preservation Office

DPW

GILA RIVER INDIAN COMMUNITY

POST OFFICE BOX 2140, SACATON, AZ 85147

TRIBAL HISTORIC PRESERVATION OFFICE

(520) 562-7162
Fax: (520) 562-5083

March 23, 2016

Gordon K. Rogers, Garrison Manager
Department of the Army
U.S. Army Installation Management Command
Headquarters, U.S. Army Garrison, Yuma
301 C Street
Yuma, Arizona 85365-9498

RE: Environmental Assessment (EA) Preparation for the Extended Range Cannon Artillery (ECRA) Test Program, Unites States Army Garrison Proving Ground (USYGPG), Luke Air Force Base (LAFB) Barry M. Goldwater-East (BMGR-East) and the Marine Corps Air Station Yuma (MCAS) Barry M. Goldwater West (BMGR-West)

Dear Garrison Manager Rogers,

The Gila River Indian Community Tribal Historic Preservation Office (GRIC-THPO) has received a your consultation letter dated March 3, 2016. The United States Army Garrison Yuma Proving Ground (USAYPG) is preparing an EA for the Extended Range Cannon Artillery Test Program (ECRA) which will be conduction on lands managed by the USAYPG, the LAFB, and the MCAS. The USAYPG is the lead federal agency for this undertaking. Testing of the cannon will occur on the Cibola and Kofa Firing Ranges of the USAGYPG and on the BMGR-East and BMGR-West.

The GRIC-THPO will participate in the Section 106 consultation process. Please forward all applicable documents to our office for review and comment. The proposed project area is within the ancestral lands of the Four Southern Tribes (Gila River Indian Community; Salt River Pima-Maricopa Indian Community; Ak-Chin Indian Community and the Tohono O'Odham Nation). The GRIC-THPO defers to the Tohono O'Odham Nation as lead in the consultation process.

Thank you for consulting with the GRIC-THPO on this undertaking. If you have any questions please do not hesitate to contact me or Archaeological Compliance Specialist Larry Benallie, Jr. at 520-562-7162.

Respectfully,

Barnaby V. Lewis
Tribal Historic Preservation Officer
Gila River Indian Community

From: Arlene Kingery [mailto:historicpreservation@quechantribe.com]
Sent: Friday, March 25, 2016 10:00 AM
To: Goslin, Erin R CIV USARMY USAG (US) <erin.r.goslin.civ@mail.mil>
Subject: [Non-DoD Source] YPG and BMGR ERCA Program Letter 3-03-16

Hi Erin,

We met with Meg some time ago about this project and the BMGR site was not discussed only 2 alternatives at YPG, which now appears to be reduced to one. We would like to arrangea meeting a site visit.

Thank you

Arlene Kingery

HPO

Quechan Indian Tribe

760/572-2423 or cell 928/304-4879

ARIZONA DEPARTMENT
OF
ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.azdeq.gov

Janice K. Brewer
Governor

Henry R. Darwin
Director

March 15, 2016

USAG YPG National Environmental
Protection Act Coordinator
U.S. Army Garrison Yuma
301 C Street, IMYM-PWE
Yuma, AZ 85365-9498

RE: Yuma County: Scoping Letter for Extended Range Cannon Artillery Test Program

Dear Coordinator:

The Arizona Department of Environmental Quality Air Quality Division has reviewed your letter dated March 3, 2016, requesting a scoping letter for the Extended Range Cannon Artillery Test Program. Your project is not located in a maintenance or nonattainment area for any regulated pollutants. As described, your project may have a de minimis impact on air quality. Disturbance of particulate matter is anticipated during construction. Considering prevailing winds, to comply with other applicable air pollution control requirements and minimize adverse impacts on public health and welfare, the following information is provided for consideration:

REDUCE DISTURBANCE of PARTICULATE MATTER during CONSTRUCTION

This action, plan or activity may temporarily increase ambient particulate matter (dust) levels. Particulate matter 10 microns in size and smaller can penetrate the lungs of human beings and animals and is subject to a National Ambient Air Quality Standard (NAAQS) to protect public health and welfare. Particulate matter 2.5 microns in size and smaller is difficult for lungs to expel and has been linked to increases in death rates; heart attacks by disturbing heart rhythms and increasing plaque and clotting; respiratory infections; asthma attacks and cardiopulmonary obstructive disease (COPD) aggravation. It is also subject to a NAAQS.

The following measures are recommended to reduce disturbance of particulate matter, including emissions caused by strong winds as well as machinery and trucks tracking soil off the construction site:

I. Site Preparation and Construction
   A. Minimize land disturbance;
   B. Suppress dust on traveled paths which are not paved through wetting, use of watering trucks, chemical dust suppressants, or other reasonable precautions to prevent dust entering ambient air;

C. Cover trucks when hauling soil;
D. Minimize soil track-out by washing or cleaning truck wheels before leaving construction site;
E. Stabilize the surface of soil piles; and
F. Create windbreaks.

II. Site Restoration
A. Revegetate any disturbed land not used;
B. Remove unused material; and
C. Remove soil piles via covered trucks.

The following rules applicable to reducing dust from open areas, dry washes or riverbeds, roadways and streets are enclosed:

- Arizona Administrative Code R18-2-604 and R18-2-605
- Arizona Administrative Code R18-2-804

Should you have further questions, please do not hesitate to call me at (602) 771-4858, or Lhamo LeMoine at (602) 771-2373.

Regards,

Marina Mejia, Manager
Air Quality Division, SIP Section

Enclosures (2)

cc: Sherri Zendri, Administrative Counsel
Lhamo LeMoine, Administrative Secretary
File No. 353768

applicant being a customer. Permits issued under this subsection shall comply with the requirements in subsection (D)(3) and be in a format prescribed by the Director. Each delegated authority shall:

1. Maintain a copy of each permit issued for the previous five years available for inspection by the Director;
2. For each permit currently issued, have a means of contacting the person authorized by the permit to set an open fire if an order to extinguish open burning is issued; and
3. Annually submit to the Director by May 15 a record of daily burn activity, excluding household waste burn permits, on a form provided by the Director for the previous calendar year containing the information required in subsections (D)(3)(e) and (D)(3)(f).

H. The Director shall hold an annual public meeting for interested parties to review operations of the open outdoor fire program and discuss emission reduction techniques.

I. Nothing in this Section is intended to permit any practice that is a violation of any statute, ordinance, rule, or regulation.

Historical Note
Adopted effective May 14, 1979 (Supp. 79-1). Amended effective October 2, 1979 (Supp. 79-5). Correction, subsection (C) repealed effective October 2, 1979, not shown (Supp. 80-1). Former Section R9-3-602 renumbered without change as Section R18-2-602 (Supp. 87-3). Amended effective September 26, 1990 (Supp. 90-3). Former Section R18-2-602 renumbered to R18-2-802, new Section R18-2-602 renumbered from R18-2-401 effective November 15, 1993 (Supp. 93-4). Amended by final rulemaking at 10 A.A.R. 388, effective March 16, 2004 (Supp. 04-1).

R18-2-603. Repealed

Historical Note
Adopted effective May 14, 1979 (Supp. 79-1). Former Section R9-3-603 renumbered without change as Section R18-2-603 (Supp. 87-3). Amended effective September 26, 1990 (Supp. 90-3). Former Section R18-2-603 renumbered to R18-2-803, new Section R18-2-603 renumbered from R18-2-403 effective November 15, 1993 (Supp. 93-4). Repealed effective October 8, 1996 (Supp. 96-4).

R18-2-604. Open Areas, Dry Washes, or Riverbeds

A. No person shall cause, suffer, allow, or permit a building or its appurtenances, or a building or subdivision site, or a driveway, or a parking area, or a vacant lot or sales lot, or an urban or suburban open area to be constructed, used, altered, repaired, demolished, cleared, or leveled, or the earth to be moved or excavated, without taking reasonable precautions to limit excessive amounts of particulate matter from becoming airborne. Dust and other types of air contaminants shall be kept to a minimum by good modern practices such as using an approved dust suppressant or adhesive soil stabilizer, paving, covering, landscaping, continuous wetting, detouring, barring access, or other acceptable means.

B. No person shall cause, suffer, allow, or permit a vacant lot, or an urban or suburban open area, to be driven over or used by motor vehicles, trucks, cars, cycles, bikes, or buggies, or by animals such as horses, without taking reasonable precautions to limit excessive amounts of particulates from becoming airborne. Dust shall be kept to a minimum by using an approved dust suppressant, or adhesive soil stabilizer, or by paving, or by barring access to the property, or by other acceptable means.

C. No person shall operate a motor vehicle for recreational purposes in a dry wash, riverbed or open area in such a way as to cause or contribute to visible dust emissions which then cross property lines into a residential, recreational, institutional, educational, retail sales, hotel or business premises. For purposes of this subsection "motor vehicles" shall include, but not be limited to trucks, cars, cycles, bikes, buggies and 3-wheelers. Any person who violates the provisions of this subsection shall be subject to prosecution under A.R.S. § 49-463.

Historical Note
Adopted effective May 14, 1979 (Supp. 79-1). Former Section R9-3-604 renumbered without change as Section R18-2-604 (Supp. 87-3). Amended effective September 26, 1990 (Supp. 90-3). Former Section R18-2-604 renumbered to R18-2-804, new Section R18-2-604 renumbered from R18-2-404 and amended effective November 15, 1993 (Supp. 93-4).

R18-2-605. Roadways and Streets

A. No person shall cause, suffer, allow or permit the use, repair, construction or reconstruction of a roadway or alley without taking reasonable precautions to prevent excessive amounts of particulate matter from becoming airborne. Dust and other particulates shall be kept to a minimum by employing temporary paving, dust suppressants, wetting down, detouring or by other reasonable means.

B. No person shall cause, suffer, allow or permit transportation of materials likely to give rise to airborne dust without taking reasonable precautions, such as wetting, applying dust suppressants, or covering the load, to prevent particulate matter from becoming airborne. Earth or other material that is deposited by trucking or earth moving equipment shall be removed from paved streets by the person responsible for such deposits.

Historical Note
Adopted effective May 14, 1979 (Supp. 79-1). Former Section R9-3-605 renumbered without change as Section R18-2-605 (Supp. 87-3). Amended effective September 26, 1990 (Supp. 90-3). Former Section R18-2-605 renumbered to R18-2-805, new Section R18-2-605 renumbered from R18-2-405 effective November 15, 1993 (Supp. 93-4).

R18-2-606. Material Handling

No person shall cause, suffer, allow or permit crushing, screening, handling, transporting or conveying of materials or other operations likely to result in significant amounts of airborne dust without taking reasonable precautions, such as the use of spray bars, wetting agents, dust suppressants, covering the load, and hoods to prevent excessive amounts of particulate matter from becoming airborne.

Historical Note
Section R18-2-606 renumbered from R18-2-406 effective November 15, 1993 (Supp. 93-4).

R18-2-607. Storage Piles

A. No person shall cause, suffer, allow, or permit organic or inorganic dust producing material to be stacked, piled, or otherwise stored without taking reasonable precautions such as chemical stabilization, wetting, or covering to prevent excessive amounts of particulate matter from becoming airborne.

B. Stacking and reclaiming machinery utilized at storage piles shall be operated at all times with a minimum fall of material and in such manner, or with the use of spray bars and wetting agents, as to prevent excessive amounts of particulate matter from becoming airborne.

Historical Note
Section R18-2-607 renumbered from R18-2-407 effective

ARTICLE 8. EMISSIONS FROM MOBILE SOURCES (NEW AND EXISTING)

R18-2-801. Classification of Mobile Sources

A. This Article is applicable to mobile sources which either move while emitting air contaminants or are frequently moved during the course of their utilization but are not classified as motor vehicles, agricultural vehicles, or agricultural equipment used in normal farm operations.
B. Unless otherwise specified, no mobile source shall emit smoke or dust the opacity of which exceeds 40%.

Historical Note
Adopted effective February 26, 1988 (Supp. 88-1). Amended effective September 26, 1990 (Supp. 90-3). Amended effective February 3, 1993 (Supp. 93-1). Former Section R18-2-801 renumbered to Section R18-2-901, new Section R18-2-801 renumbered from R18-2-601 effective November 15, 1993 (Supp. 93-4).

R18-2-802. Off-road Machinery

A. No person shall cause, allow or permit to be emitted into the atmosphere from any off-road machinery, smoke for any period greater than 10 consecutive seconds, the opacity of which exceeds 40%. Visible emissions when starting cold equipment shall be exempt from this requirement for the first 10 minutes.
B. Off-road machinery shall include trucks, graders, scrapers, rollers, locomotives and other construction and mining machinery not normally driven on a completed public roadway.

Historical Note
Adopted effective February 26, 1988 (Supp. 88-1). Amended effective September 26, 1990 (Supp. 90-3). Former Section R18-2-802 renumbered to Section R18-2-902, new Section R18-2-802 renumbered from R18-2-602 effective November 15, 1993 (Supp. 93-4).

R18-2-803. Heater-planer Units

No person shall cause, allow or permit to be emitted into the atmosphere from any heater-planer operated for the purpose of reconstructing asphalt pavements smoke the opacity of which exceeds 20%. However three minutes' upset time in any one hour shall not constitute a violation of this Section.

Historical Note
Adopted effective February 26, 1988 (Supp. 88-1). Amended effective September 26, 1990 (Supp. 90-3). Former Section R18-2-803 renumbered to Section R18-2-903, new Section R18-2-803 renumbered from R18-2-603 effective November 15, 1993 (Supp. 93-4).

R18-2-804. Roadway and Site Cleaning Machinery

A. No person shall cause, allow or permit to be emitted into the atmosphere from any roadway and site cleaning machinery smoke or dust for any period greater than 10 consecutive seconds, the opacity of which exceeds 40%. Visible emissions when starting cold equipment shall be exempt from this requirement for the first 10 minutes.
B. In addition to complying with subsection (A), no person shall cause, allow or permit the cleaning of any site, roadway, or alley without taking reasonable precautions to prevent particulate matter from becoming airborne. Reasonable precautions may include applying dust suppressants. Earth or other material shall be removed from paved streets onto which earth or other material has been transported by trucking or earth moving equipment, erosion by water or by other means.

Historical Note
Adopted effective February 26, 1988 (Supp. 88-1). Amended effective September 26, 1990 (Supp. 90-3). Amended effective February 3, 1993 (Supp. 93-1). Former Section R18-2-804 renumbered to Section R18-2-904, new Section R18-2-804 renumbered from R18-2-604 effective November 15, 1993 (Supp. 93-4).

R18-2-805. Asphalt or Tar Kettles

A. No person shall cause, allow or permit to be emitted into the atmosphere from any asphalt or tar kettle smoke for any period greater than 10 consecutive seconds, the opacity of which exceeds 40%.
B. In addition to complying with subsection (A), no person shall cause, allow or permit the operation of an asphalt or tar kettle without minimizing air contaminant emissions by utilizing all of the following control measures:
1. The control of temperature recommended by the asphalt or tar manufacturer;
2. The operation of the kettle with lid closed except when charging;
3. The pumping of asphalt from the kettle or the drawing of asphalt through cocks with no dipping;
4. The dipping of tar in an approved manner;
5. The maintaining of the kettle in clean, properly adjusted, and good operating condition;
6. The firing of the kettle with liquid petroleum gas or other fuels acceptable to the Director.

Historical Note
Adopted effective February 26, 1988 (Supp. 88-1). Amended effective September 26, 1990 (Supp. 90-3). Former Section R18-2-805 renumbered to Section R18-2-905, new Section R18-2-805 renumbered from R18-2-605 effective November 15, 1993 (Supp. 93-4).

ARTICLE 9. NEW SOURCE PERFORMANCE STANDARDS

R18-2-901. Standards of Performance for New Stationary Sources

Except as provided in R18-2-902 through R18-2-905, the following subparts of 40 CFR 60, New Source Performance Standards (NSPS), and all accompanying appendices, adopted as of July 1, 2006, and no future editions or amendments, are incorporated by reference as applicable requirements. These standards are on file with the Department and shall be applied by the Department. These standards can be obtained from the U.S. Government Printing Office, Superintendent of Documents, Mail Stop SSOP, Washington D.C. 20402-9328.

1. Subpart A - General Provisions.
2. Subpart D - Standards of Performance for Fossil-Fuel-Fired Steam Generators for Which Construction is Commenced After August 17, 1971.
3. Subpart Da - Standards of Performance for Electric Utility Steam Generating Units for Which Construction is Commenced After September 18, 1978.
4. Subpart Db - Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units.
5. Subpart Dc - Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units.
6. Subpart E - Standards of Performance for Incinerators.
7. Subpart Ea - Standards of Performance for Municipal Waste Combustors for Which Construction is Commenced after December 20, 1989 and on or Before September 20, 1994.
8. Subpart Eb - Standards of Performance for Large Municipal Waste Combustors for Which Construction is Commenced after September 20, 1994 or for Which

ERCA

Appendix F

Yuma Sun - Notice of Availability

Notice of Availability Distribution Letters

AFFP
NOTICE OF AVAILABILITY Extende

Affidavit of Publication

STATE OF ARIZONA }
COUNTY OF YUMA } SS

Lisa Reilly or Kathy White, being duly sworn, says:

That she is Publisher or Business Manager of the Yuma Sun, a daily newspaper of general circulation, printed and published in Yuma, Yuma County, Arizona; that the publication, a copy of which is attached hereto, was published in the said newspaper on the following dates:

January 29, 2017

That said newspaper was regularly issued and circulated on those dates.
SIGNED:

Publisher or Business Manager

Subscribed to and sworn to me this 29th day of January 2017.

Virgen P. Perez

Virgen P Perez, Notary, Yuma County, Arizona

My commission expires: May 10, 2017

OFFICIAL SEAL
VIRGEN P. PEREZ
Commission # 163644
Notary Public - State of Arizona
YUMA COUNTY
My Comm. Expires May 10, 2017

00023067 00112983

US Army Corps of Engineers
915 Wilshire Blvd
Los Angeles, CA 90064

NOTICE OF AVAILABILITY
Environmental Assessment and Draft Finding of No Significance
Extended Range Cannon Artillery Project
Yuma Proving Ground &
Barry M. Goldwater Range
Yuma County, Arizona

The U.S. Army Garrison Yuma Proving Ground (USAG YPG) prepared an environmental assessment (EA) to identify and evaluate potential environmental impacts associated with the Extended Range Cannon Artillery (ERCA) Project.

The ERCA Project is a multi-element, multi-phase test program of U.S. Army's next generation 155mm artillery system. Major components of the artillery system include the cannon, gun mount, artillery projectile, and propellant charges. As part of the ERCA Project, a new 495-acre impact area would be established on YPG to sufficiently accommodate test firings of extended range artillery projectiles ranging from approximately 55 kilometers (km) to 73 km. Moreover, existing operational areas at the Barry M. Goldwater Range (BMGR) which is jointly administered by Marine Corps Air Station Yuma (MCASY) and Luke Air Force Base (LAFB) would also be used to conduct extended range test firings.

The EA was prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality regulations implementing NEPA [Title 40, United States Code, Parts 1500 through 1508]; Department of Defense Directive 4715.9 Environmental Planning and Analysis; and Environmental Analysis of Army Actions (Code of Federal Regulations, Title 32, Part 651). YPG is the NEPA Lead Agency. LAFB and MCASY are NEPA Cooperating Agencies.

Based on the EA, the USAG YPG has prepared a Draft Finding of No Significant Impact (FONSI). For your download and review, the documents are located at http://www.spl.usace.army.mil/Media/Public-Notices/Article/1061943/2017-001-kw-ypg-erca/. Copies of the EA and Draft FONSI are available from the YPG NEPA Coordinator, Environmental Sciences, IMYM-PWE, 301 C Street, Yuma, AZ 85365-9498, (928) 328-2015 or by emailing usarmy.ypg.imcom.mbx.nepa@mail.mil. Public review period is January 29, 2017 to February 28, 2017.
Daily Jan. 29, 2017 - 00112983

3-27-2017

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND HEADQUARTERS
UNITED STATES ARMY GARRISON, YUMA
301 C STREET
YUMA AZ 85365-9498

REPLY TO
ATTENTION OF

January 30, 2017

Environmental Sciences Division

Mr. Eric Odden
Chief Patrol Agent, Yuma Sector
U.S. Customs and Border Protection
4035 South Avenue A
Yuma, AZ 85365

Dear Mr. Odden:

The U.S. Army Garrison Yuma Proving Ground (USAG YPG) has completed an Environmental Assessment (EA) in order to test elements of the Extended Range Cannon Artillery (ERCA) Project on Yuma Proving Ground (YPG) and the Barry M. Goldwater Range (BMGR). Based on the EA, the USAG YPG has prepared a Draft Finding of No Significant Impact (FNSI). The EA analyzes potential impacts to various environmental resources associated with ERCA testing activities on YPG and BMGR.

The ERCA Project is a multi-element, multi-phase test program of U.S. Army's next generation 155mm artillery system. Major components of the artillery system include the cannon, gun mount, artillery projectile, and propellant charges. As part of the ERCA Project, a new 495-acre impact area would be established on YPG to sufficiently accommodate test firings of extended range artillery projectiles. The test program would require extended range firings ranging from approximately 55 kilometers (km) to 73 km. Extended range firings would be conducted on both YPG and on existing operational areas at BMGR which is jointly administered by Marine Corps Air Station Yuma (MCASY) and Luke Air Force Base (LAFB). YPG is the National Environmental Policy Act (NEPA) Lead Agency. LAFB and MCASY are NEPA Cooperating Agencies.

The EA and draft FNSI are now available for public review. Your input is appreciated, please provide your written comments on this EA and Draft FNSI by February 28, 2017. Comments may be submitted by mail to the NEPA Coordinator at U.S. Army Garrison Yuma Proving Ground, IMYM-PWE, 301 C Street, Yuma, AZ 85365-9498 or via email at usarmy.ypg.imcom.mbx.nepa@mail.mil. These documents are also available for download at: http://www.spl.usace.army.mil/Media/Public-Notices/Article/1061943/2017-001-kw-ypg-erca/. If you have any questions or need additional information please contact the NEPA coordinator at (928) 328-2015.

Sincerely,

Gordon K. Rogers
Garrison Manager

ERCA

Appendix G

Public Comments

Response to Public Comments

Wong, Kenneth CIV CESPL CESPD (US)

From: USARMY YPG IMCOM Mailbox NEPA <usarmy.ypg.imcom.mbx.nepa@mail.mil>
Sent: Wednesday, February 22, 2017 6:55 AM
To: Wong, Kenneth CIV CESPL CESPD (US)
Subject: [EXTERNAL] FW: [Non-DoD Source] ERCA EA Response from USBP Yuma Sector

See ERCA Comments below…

From: RINGLER, MICHAEL A [mailto:MICHAEL.A.RINGLER@CBP.DHS.GOV]
Sent: Wednesday, February 08, 2017 9:13 AM
To: USARMY YPG IMCOM Mailbox NEPA <usarmy.ypg.imcom.mbx.nepa@mail.mil>
Cc: BROWNING, ROY M <ROY.M.BROWNING@CBP.DHS.GOV>; CUEVAS, LUIS A <LUIS.A.CUEVAS@CBP.DHS.GOV>; APONTE, HECTOR I <HECTOR.I.APONTE@CBP.DHS.GOV>
Subject: [Non-DoD Source] ERCA EA Response from USBP Yuma Sector

_____

To whom it may concern:

This message is to confirm that we have reviewed the ERCA EA from January 2017. At this time we do not have any additional input or objections. We respectfully ask that our contact information be passed to the program managers for future visibility, communication and coordination.

In addition to myself, can you please include the following person to in future communications:

Roy M. Browning
Assistant Chief Patrol Agent
U.S. Border Patrol-Yuma Sector
Office: (928) 341-6557
Cell: (928) 941-6099
Fax: (928) 341-6677
Roy.Browning@dhs.gov < Caution-mailto:Roy.Browning@dhs.gov >

Thank you for your time. Please contact me if you have any questions or need more information from us. We look forward to working with YPG.

Michael A. Ringler
Special Operations Supervisor
Strategic Planning and Coordination
USBP Yuma Sector
928-341-6516 Office
928-750-8114 Gov Cell
928-210-0758 Personal Cell
Michael.Ringler@DHS.GOV < Caution-mailto:Michael.Ringler@DHS.GOV >

Wong, Kenneth CIV CESPL CESPD (US)

From: USARMY YPG IMCOM Mailbox NEPA <usarmy.ypg.imcom.mbx.nepa@mail.mil>
Sent: Wednesday, February 22, 2017 6:55 AM
To: Wong, Kenneth CIV CESPL CESPD (US)
Subject: [EXTERNAL] FW: [Non-DoD Source] Support of the ERCA Project

ERCA Comments…

From: Julie Engel [mailto:jengel@greateryuma.org]
Sent: Wednesday, February 08, 2017 12:42 PM
To: USARMY YPG IMCOM Mailbox NEPA <usarmy.ypg.imcom.mbx.nepa@mail.mil>
Subject: [Non-DoD Source] Support of the ERCA Project

All active links contained in this email were disabled. Please verify the identity of the sender, and confirm the authenticity of all links contained within the message prior to copying and pasting the address to a Web browser.

_____

I am writing as the Presdient/CEO of the Greater Yuma Economic Development Corporation, in support of the ERCA Project. Adding this to Yuma Proving Ground test capabilities will strengthen our defenses while also strengthening the Mission of Yuma Proving Ground.
I am available for verbal comment as well.

Sincerely,

Julie Engel

Julie Engel, CEcD
President/CEO
Greater Yuma EDC
899 Plaza Circle Drive, Suite 2
Yuma AZ, 85365
928-782-7774 x12
928-782-7775 fax
928-210-5153 Cell
Caution-Blockedwww.greateryuma.org < Caution-Blockedhttp://www.greateryuma.org/ >

<Caution-Blockedhttp://png-2.findicons.com/files/icons/852/drink_web_2_0/128/drink_facebook.png> < Caution-Blockedhttp://www.facebook.com/pages/Greater-Yuma-Economic-Development-Corporation/205799309434458?ref=tn_tnmn > <Caution-Blockedhttp://png-1.findicons.com/files/icons/2137/twitter/128/twitter_16.png> < Caution-Blockedhttps://twitter.com/#!/GYEDC >

<Caution-Blockedhttp://iedconline.org/images/masthead_sub.gif> < Caution-Blockedhttp://iedconline.org/ >

Member International Economic Development Council
Member Economic Development Research Partners

YUMA 50

Yuma 50, Inc.

February 22, 2017

To Whom It May Concern;

The Yuma 50 Community Military Support Group is writing to lend their support of the ERCA Project.

Adding this capability to the Yuma Proving Ground test arsenal will strengthen our defenses while also strengthening the Mission of Yuma Proving Ground. We are 100% in favor of this extension.

I am available for verbal comment as well.

Sincerely,

Ken Rosevear

Ken Rosevear
Chairman
Yuma 50

YUMA AUDUBON SOCIETY • SIERRA CLUB, GRAND CANYON CHAPTER

February 28, 2017

VIA EMAIL

NEPA Coordinator
U.S. Army Garrison
Yuma Proving Ground
IMPM-PWE
301 C Street
Yuma, Arizona 85365-9498

Re: Extended Range Cannon Artillery Project Environmental Assessment and Draft Finding of No Significant Impact

Dear NEPA Coordinator:

Please accept the following comments on the "Extended Range Cannon Artillery Project Environmental Assessment and Draft Finding of No Significant Impact" on behalf of the Yuma Audubon Society and Sierra Club's Grand Canyon (Arizona) Chapter.

The Yuma Audubon Society (YAS, Yuma Audubon) is a non-profit 501(c)(3) chapter of the National Audubon Society. With approximately 130 members in Yuma, La Paz, and Mohave Counties in Arizona, Yuma Audubon provides educational and recreational opportunities through seasonal monthly meetings, field trips, bird walks, and programs in the community and schools. Yuma Audubon also is committed to conservation and environmental protection and frequently participates in public input processes offered by governmental agencies at the national, regional, state, and local levels, including commenting on agency proposals like this one. Our members enjoy visiting the public lands in the Yuma to Kingman area and are deeply concerned with the protection of their environmental and cultural values. When and where permitted, Yuma Audubon members have visited the Yuma Proving Ground (YPG) and Barry M. Goldwater Range (BMGR) for both recreational and educational purposes.

Sierra Club is a national nonprofit organization of approximately 2.7 million members and supporters dedicated to exploring, enjoying, and protecting the wild places of the earth; to practicing and promoting the responsible use of the earth's ecosystems and resources; to educating and enlisting humanity to protect and restore the quality of the natural and human environment; and to using all lawful means to carry out these objectives. Sierra Club's Grand Canyon Chapter was organized in 1965, and, prior to that, our members were also involved in protecting Arizona's resources. Sierra Club and its members have long enjoyed recreation, as permitted, on the Yuma Proving Ground and Barry M. Goldwater Range and have advocated for strong environmental protections on both.

Based on our reading of the Environmental Assessment (EA), we urge YPG not to implement Alternative 1, which would use Yuma Proving Ground for the proposed action. As we evaluated this alternative (#1) it has become apparent that it is just too dangerous to the public and too inappropriate with the purposes of the Kofa National Wildlife Refuge (KNWR, Kofa Refuge) to be implemented. On the other hand, Alternatives 2 and 3 (both of which would site the proposed action on the BMGR),

would allow sufficient distance within the confines of the range for the firings to occur. Ironically, Alternative 1 would use explosive warheads, while Alternatives 2 and 3 would not. It seems counterintuitive to use live warheads in an area that would cross a major north-south federal highway (US 95) and the Kofa Refuge while only inert warheads would be used on the BMGR, where neither a federal highway nor a wildlife refuge would be in the path of the projectiles. Again, this argues for use of Alternative 2 or 3 and not Alternative 1.

We understand that US 95 would be closed during weapons testing for safety reasons, but this brings its own problems. First, part of a major north-south federal highway, running all the way from Mexico to Canada, would be closed several times during the year. Would travelers be advised of an alternate route before they commit themselves to US 95 at Quartzsite or Yuma, and what would the alternative route be? How would the time required for the alternate route journey compare with the time to travel US 95 from Quartzsite to Yuma? At what points would US 95 be closed? The EA is unclear on these points and needs to more fully evaluate the impacts of Alternative 1 on travel and vehicle management during firing periods. A protocol must be developed to handle emergencies that might arise involving travelers on US 95 during firing periods as well. For example, how would a burro-vehicle or horse-vehicle crash be handled? Owing to all of these factors, the Draft EA is incorrect and inaccurate in stating (p. 4), "There would be no short-term or long-term impacts to traffic levels and patterns." There would certainly be short-term impacts to traffic patterns, at a minimum.

While US 95 would be closed during firing periods, we don't see how the Kofa Refuge could effectively be closed at such times. While the area on the refuge that is expected to be impacted is relatively small and not heavily used, nevertheless, how would it be guaranteed that there is no one in the area? Additionally, if a projectile were to veer off-course to the left, how far could it penetrate the refuge? This could endanger people outside the portion of the refuge considered in the EA. The EA states in 2.1.1 (p. 7): "As such, scheduling may be limited to low traffic periods and avoid high visitation periods for Kofa NWR." Why would it be permissible to schedule test firings during periods of moderate or low visitation for the Kofa Refuge? People could still be endangered by testing activities unless it is determined there is no one on the refuge. Could projectiles also overshoot the impact area? This would be a problem because they would land on adjacent land east of YPG and not a designated weapons testing area.

We are also concerned about the possibility of fires resulting from the proposed tests at the YPG site. The King Valley fire burned an estimated 3000 acres and spread to the Kofa Refuge. This is an area of 4.7 square miles. Regeneration of vegetation in deserts takes a long time as most desert vegetation is not fire-adapted and due to its arid nature, any fire in a desert environment has very long-term effects. According to a literature review of the time required for plant succession to occur in the Sonoran and Mohave deserts, it takes an estimated 76 years for total perennial plant cover to reestablish itself, and 215 years for the species diversity of undisturbed desert habitat to reestablish itself (Abella 2010). Thus the EA clearly underestimates the impact of fires in the Sonoran Desert.

We were surprised not to see any mitigation measures or protocols involving vehicles involved in the testing activities. It has been established that vehicles can carry invasive non-native plant species into new areas. Their spread has been traced along vehicle corridors (Cal-IPC 2012). The mitigation measures should include procedures to clean vehicles before they leave the areas where they are based and other best management practices.

The three alternatives, plus the no action alternative considered and evaluated only the testing regime described at Section 2.1, "With only 72 rounds fired per year" (pages 6, 26 and throughout). The true

impacts are contained in the testing regime described at Section 2.1.3 and are never analyzed. The applicant does state "the impacts analysis encompasses the use of the new impact area for the ERCA Project as well as other test missions" (page 23); however, upon examination all impacts analyzed in the EA are solely for the ERCA and 72 firings. For example, "temporary closures would likely occur on weekends when recreational use would likely peak. However, disruptions would be limited since testing would occur at a maximum of three times per year" (page 56).

The public will be significantly impacted beyond the stated impacts because the analysis does not review the total actions of the applicant. During test periods (page 7) there would be "temporary evacuation of manned facilities, closure of Highway 95, and coordination with the Kofa NWR" (page 7). However, these are only assessed for the very few days that the ERCA project may be operative; not the additional other uses that the new impact area may receive daily.

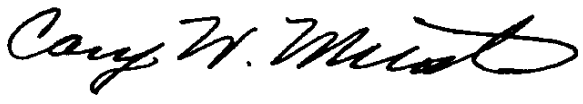
The Army states that "potential for direct impacts to wildlife from munition or debris strikes within the SDZ is possible" (page 24); "due to the slow recovery of desert vegetation, disturbance to the vegetation would result in long-term impacts" (page 23); the proposed action May Affect and Likely to Adversely Affect Sonoran pronghorn" (page 25); and yet these impacts do not include all of the uses which will occur in the newly designated YPG impact area, but only for the limited ERCA action.

The EA needs to include these other impacts that will occur in the newly designated impact zone at YPG in its analysis.

The Regional Project Area Map (Figure 1) does not indicate where the new operational areas are in relation to the current YPG, BMGR and National Wildlife Refuges. It would be helpful if the maps included areas identified in the text so that a reader could comprehend what is being proposed. For example, GSAs 71 and 76 within the BMGR (page 7); Targets 106 or 111 in NTAC and Targets 208, 211 or 215 in STAC (page 7) are not identified on the map. The proposed 495-acre new range at the southeast corner of the KOFA region near the Palomas Mountains is not located on the map. These areas could easily be indicated by cross hatching or some other means.

Thank you for the opportunity to comment on this proposed action. Because of the above reasons, we do not think that Alternative 1 should be implemented. Between Alternatives 2 and 3, whichever has lesser impacts to the environment would be preferred by us if this project is implemented.

Sincerely,



Conservation Chair
Yuma Audubon Society
PO Box 6395
Yuma, Arizona 85366-6395
928-782-3552

Chapter Director
Sierra Club – Grand Canyon (Arizona)
Chapter
514 W Roosevelt St
Phoenix, Arizona 85003
602-253-8633

REFERENCES

Abella, Scott. R. 2010. Disturbance and Plant Succession in the Mojave and Sonoran Deserts of the American Southwest. *International Journal of Environmental Research and Public Health,* 7(4), 1248–1284. http://doi.org/10.3390/ijerph7041248. Accessed at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2872343/, February 27, 2017.

Cal-IPC. 2012. *Preventing the Spread of Invasive Plants: Best Management Practices for Transportation and Utility Corridors.* Cal-IPC Publication 2012-01. California Invasive Plant Council, Berkeley, CA. Accessed at http://www.cal-ipc.org/ip/prevention/PreventionBMPs_TransportationUtilityCorridors.pdf, February 27, 2017

United States Department of the Interior

FISH AND WILDLIFE SERVICE
KOFA NATIONAL WILDLIFE REFUGE
SOUTHWEST ARIZONA REFUGE COMPLEX

9300 E. 28th St.
Yuma, Arizona 85365
Ph: (928) 783-7861
Fax: (928) 783-8611
Email: christa_weise@fws.gov

March 7, 2017

Sergio Obregon
NEPA Coordinator
U.S. Army Garrison
Yuma Proving Ground
IMPM-PWE
301 C Street
Yuma, Arizona 85365-9498

Re: Extended Range Cannon Artillery (ERCA) Project Environmental Assessment (EA) and Draft Finding of No Significant Impact (FONSI).

Dear Mr. Obregon,

Thank you for the opportunity to comment on the Draft FONSI for the ERCA EA. We are opposed to new test or test ranges that will impact Kofa NWR by having both the actual line of fire and the Safety Danger Zone (SDZ) cross a part of the refuge, such as Alternative 1 of the EA. This use of Kofa NWR is not consistent with the U.S. Fish and Wildlife Service refuge mission, or with the specific purpose for which Kofa NWR was established (conservation of wildlife resources with an emphasis on desert bighorn sheep), and would impact wildlife and wildlife habitat. It would also endanger the public, reduce public access, and interfere with refuge management operations.

We have considerable concerns for public safety on Kofa NWR, which is open to the public day and night, year round. Overnight camping is allowed and the refuge includes a vast area and many access points. Effectively informing all visitors of the impending danger and ensuring that no visitors are within the line of fire or SDZ is not possible. Initiating a new project that not only includes part of Kofa as SDZ but actual line of fire of live munitions does not seem reasonable, particularly because alternatives 2 and 3 do not come with the same level of public safety hazard. Refuge staff and management activities would also be affected by the outlined Alternative 1. In addition, it seems counterintuitive to use live warheads in an area that would cross a major north-south federal highway (US 95) and the Kofa NWR while only inert warheads would be used on the BMGR (Alternatives 2 and 3), where no public road is crossed and only military lands would be impacted that are effectively closed to public use.

The federally endangered Sonoran pronghorn (listed as threatened on Kofa NWR, as part of a 10j population) will be impacted by noise, potential for igniting fires on the refuge or fires that burn onto the refuge, and by the possibility of habitat destruction and direct impact. While all alternatives have potential impact on the species, only Alternative 1 will have potential direct impacts on the species on a NWR where they are listed as threatened. In addition, other wildlife species would be similarly impacted, including desert bighorn sheep. Alternatives that do not impact a listed species and other wildlife on lands set aside for wildlife protection should be pursued (Alternatives 2 and 3), rather than Alternative 1.

The temporary closure of US 95 described for Alternative 1 during testing activities brings additional problems and concerns as such closures would impact access for refuge visitors and staff. The need for closure of US 95 during testing activities highlights that this testing presents considerable safety risks to the public. Including areas of Kofa NWR in this testing are very concerning as the refuge is open to the public with no reasonable means of closing locations to ensure visitor safety, as previously mentioned.

For the outlined reasons, we believe Alternative 1 has the potential to have substantial negative impacts to the public lands of Kofa NWR. We strongly recommend alternative 2 or 3 is pursued for implementation.

Sincerely,

Elaine E Johnson

for Christa Weise
Refuge Manager

Received from Tribal Admin 2-7-17 RM

E-mailed 2-9-17 RM (initial & date)

Scanned 2-9-17 RM (initial & date)

SAN CARLOS APACHE TRIBE
Historic Preservation & Archaeology Department
P.O. Box 0
San Carlos Arizona 85550
Tel. (928) 475-5797, apachevern@yahoo.com

Tribal Consultation Response Letter

Date: 2/7/17
Contact Name: Gordon Rogers; usarmy.ypg.imcom.mbx.nepa@mail.mil
Company: Department of the Army, United States Army Garrison, Yuma
Address: 301 C. Street, Yuma, AZ 85365-9498
Project Name/#: Draft finding of no significant impact for EA regarding test elements of the extended range cannon artillery project on Yuma proving ground & the barry m. goldwater range

Dear Sir or Madam:

Under Section 106 and 110 of the National Historic Preservation Act, we are replying to the above referenced project. Please see the appropriate marked circle, including the signatures of Vernelda Grant, Tribal Historic Preservation Officer (THPO), and the concurrence of the Chairman of the San Carlos Apache Tribe:

☒ **NO INTEREST/NO FURTHER CONSULTATION/NO FUTURE UPDATES**
We defer to the Tribe located nearest to the project area.

☒ **CONCURRENCE WITH REPORT FINDINGS & THANK YOU**

☒ **REQUEST ADDITIONAL INFORMATION**
I require additional information in order to provide a finding of effect for this proposed undertaking, i.e. Project description ___ Map ___ Photos ___ Other We defer to the four Southern Tribes - T.O. Nation & GRIC

○ **NO EFFECT**
I have determined that there are no properties of religious and cultural significance to the San Carlos Apache Tribe that are listed on the National Register within the area of potential effect or that the proposed project will have no effect on any such properties that may be present.

○ **NO ADVERSE EFFECT**
Properties of cultural and religious significance within the area of effect have been identified that are eligible for listing in the National Register for which there would be no adverse effect as a result of the proposed project.

○ **ADVERSE EFFECT**
I have identified properties of cultural and religious significance within the area of potential effect that are eligible for listing in the National Register. I believe the proposed project would cause an adverse effect on these properties. Please contact the THPO for further discussion.

We were taught traditionally not to disturb the natural world in a significant way, and that to do so may cause harm to oneself or one's family. Apache resources can be best protected by managing the land to be as natural as it was in pre-1870s settlement times. Please contact the THPO, if there is a change in any portion of the project, especially if Apache cultural resources are found at any phase of planning and construction. Thank you for contacting the San Carlos Apache Tribe, your time and effort is greatly appreciated.

DIRECTOR/THPO: _____ 2/07/17
Vernelda J. Grant, Tribal Historic Preservation Officer — Date

CONCURRENCE: _____ 2/8/17
Terry Rambler, Tribal Chairman — Date

cc:

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND HEADQUARTERS
UNITED STATES ARMY GARRISON, YUMA
301 C STREET
YUMA AZ 85365-9498

REPLY TO
ATTENTION OF

FEB 07 2017

January 30, 2017

Environmental Sciences Division

Mr. Vernelda Grant
Tribal Archaeologist, San Carlos Indian Reservation
Tribal Planning Department
P.O. Box O
San Carlos, AZ 85550

Dear Mr. Grant:

The U.S. Army Garrison Yuma Proving Ground (USAG YPG) has completed an Environmental Assessment (EA) in order to test elements of the Extended Range Cannon Artillery (ERCA) Project on Yuma Proving Ground (YPG) and the Barry M. Goldwater Range (BMGR). Based on the EA, the USAG YPG has prepared a Draft Finding of No Significant Impact (FNSI). The EA analyzes potential impacts to various environmental resources associated with ERCA testing activities on YPG and BMGR.

The ERCA Project is a multi-element, multi-phase test program of U.S. Army's next generation 155mm artillery system. Major components of the artillery system include the cannon, gun mount, artillery projectile, and propellant charges. As part of the ERCA Project, a new 495-acre impact area would be established on YPG to sufficiently accommodate test firings of extended range artillery projectiles. The test program would require extended range firings ranging from approximately 55 kilometers (km) to 73 km. Extended range firings would be conducted on both YPG and on existing operational areas at BMGR which is jointly administered by Marine Corps Air Station Yuma (MCASY) and Luke Air Force Base (LAFB). YPG is the National Environmental Policy Act (NEPA) Lead Agency. LAFB and MCASY are NEPA Cooperating Agencies.

The EA and draft FNSI are now available for public review. Your input is appreciated, please provide your written comments on this EA and Draft FNSI by February 28, 2017. Comments may be submitted by mail to the NEPA Coordinator at U.S. Army Garrison Yuma Proving Ground, IMYM-PWE, 301 C Street, Yuma, AZ 85365-9498 or via email at usarmy.ypg.imcom.mbx.nepa@mail.mil. These documents are also available for download at: http://www.spl.usace.army.mil/Media/Public-Notices/Article/1061943/2017-001-kw-ypg-erca/. If you have any questions or need additional information please contact the NEPA coordinator at (928) 328-2015.

Sincerely,

Gordon K. Rogers
Garrison Manager

Comment	Submitting Party or Parties Expressing Similar Concerns	Response
Public Safety – Kofa NWR		
Could projectiles also overshoot the impact area? Additionally, if a projectile were to veer off-course to the left, how far could it penetrate the refuge?	Audubon Society/Sierra Club	Projectiles overshooting the impact area is unlikely. Tests leading to the long-range firing would be conducted initially at shorter distances. The distances would be incrementally increased as the trajectories are further refined. Projectiles veering off course could encroach up to 4 km into the Kofa NWR from the YPG-Kofa NWR boundary.
Firing over the Kofa NWR would endanger the public. Kofa NWR is open to the public day and night year round with overnight camping allowed over vast areas. With multiple access points and no reasonable means of closing the affected areas, it's not possible to ensure the safety of visitors within the line of fire or SDZ.	USFWS – Kofa NWR Audubon Society/Sierra Club	The proposed overflight across Kofa NWR would occur in a remote area of the refuge. Prior to test firing, YPG would deploy personnel along roads and aircraft to monitor for the presence of visitors within the SDZ. Pursuant to avoidance, minimization, and mitigation measures listed in Section 3.8.3 of the EA, YPG would closely coordinate with Kofa NWR and monitor for visitor use prior to conducting test firings. Test firings would be temporarily suspended if visitors are present within the SDZ on Kofa NWR.
Public Safety – US 95		
Firing over US 95 would endanger the public. Temporary closures would impact access for refuge visitors and staff.	USFWS – Kofa NWR	Road closures will be conducted in accordance with Arizona Department of Transportation's road closure protocols. In general, an approximately 3 mile long segment of the roadway between Mile Marker 50 and 53 would be closed for up to 30 min. Traffic management personnel would be placed at both mile markers. Test firings would take place after the area has been cleared of all vehicles.
Would travelers be advised of an alternate route before they commit themselves to US 95 at Quartzsite or Yuma, and what would the alternative route be? How would the time required for the alternate route journey compare with the time to travel US 95 from Quartzsite to Yuma? At what	Audubon Society/Sierra Club	In general, an approximately 3 mile long segment of the roadway between Mile Marker 50 and 53 would be closed for up to 30 min. Due to the short duration of the closure, there would be no need for alternate routes. Furthermore, road closures will be conducted in accordance with Arizona Department of Transportation's road closure protocols.

points would US 95 be closed? The EA is unclear on these points and needs to more fully evaluate the impacts of Alternative 1 on travel and vehicle management during firing periods. A protocol must be developed to handle emergencies that might arise involving travelers on US 95 during firing periods as well.		Traffic management personnel would be placed at both mile markers. Test firings would take place after the area has been cleared of all vehicles. Emergency access will be coordinated between the YPG Public Safety Office and law enforcement or emergency responders on the scene.
Preferred Alternatives		
Alternatives 2 and 3 are preferable to Alternative 1 due to the reduced impacts to public safety and wildlife.	USFWS – Kofa NWR Audubon Society/Sierra Club	Preference for Alternative 1 is noted. YPG would implement avoidance measures to ensure public safety as well as measures to avoid and minimize impacts to wildlife under alternatives.
Wildlife and Vegetation		
Munition ignited fires could result in long term impacts to vegetation due to the lengthy recovery time.	Audubon Society/Sierra Club	Use of explosive ordnance can be a wildfire risk. However, wildfires on YPG are typically small and isolated due to the low density of vegetation. See Section 3.8 of the EA for additional discussion on wildfires.
Best management practices for vehicles are needed to minimize the introduction of non-native, invasive plants within operational areas.	Audubon Society/Sierra Club	YPG, BMGR East, and BMGR West manages invasive species through the implementation of their respective Integrated Natural Resources Management Plans and Integrated Pest Management Plans. All three installations actively monitor and treat weeds in compliance with the management plans and as funding permits.
The Sonoran pronghorn will be impacted by noise, potential for igniting fires on the refuge or fires that burn onto the refuge, and by the possibility of habitat destruction and direct impact. Other wildlife would be similarly impacted.	USFWS – Kofa NWR	Section 3.2.2.2 of the EA evaluates potential direct impacts from noise and vehicle strikes. Indirect impacts associated with wildfires are also discussed. Impacts associated with the ERCA project on YPG is covered by Biological Opinion # 02EAAZ00-2014-F-0161. YPG initiated consultation with the United States Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act on October 4 2016. On May 3, 2017, the USFWS issued Biological Opinion 02EAAZ00-

		2017-F-0039. With implementation of the terms and conditions of this BO as well as the following installation-specific BOs, impacts to the Sonoran Pronghorn would be avoided and minimized: BO 22410-1995-F-0114-R007 (BMGR West); BO 22410-1996-F-0094-R003 (BMGR East); BO 02EAAZ00-2014-F-0161 (YPG). Impacts to other wildlife are also evaluated in Section 3.2.2.2 of the EA. Based on the discussion therein, impacts to wildlife would be minor.
Kofa NWR Mission Conflict		
Use of Kofa NWR for artillery testing is not consistent with the U.S. Fish and Wildlife Service refuge mission, or with the specific purpose for which Kofa NWR was established (conservation of wildlife resources with an emphasis on desert bighorn sheep).	USFWS – Kofa NWR	Overflights across the Kofa NWR would occur in YPG Airspace R2307. The overflights would not conflict with the Kofa NRW's mission to conserve wildlife resources. Pursuant to avoidance, minimization, and mitigation measures listed in Section 3.8.3 of the EA, YPG would closely coordinate with Kofa NWR prior to conducting test firings.
Additional Analysis		
Analysis of temporary US 95 closure, Kofa NWR closure under the SDZ, and other manned facilities are limited to ERCA activities. The analysis needs to include other uses of the new impact area on YPG beyond the ERCA program.	Audubon Society/Sierra Club	Like the ERCA project, other uses of the new impact area as mentioned in Section 2.1.3 of the EA would entail testing of various munitions. However, these activities would be wholly contained within YPG's boundary. Overflights across Kofa NWR and closure of US 95 would not be required. Furthermore, impacts to vegetation from munition-ignited wildfires or others resources within the new impact area would not be different from those characterized for the ERCA project.
Impacts to wildlife and vegetation associated with the new impact area on YPG is limited to ERCA activities. The analysis needs to include other uses of the new impact area on YPG beyond the ERCA program.	Audubon Society/Sierra Club	
Impact analysis for the new impact area on YPG is primarily limited to the ERCA project. The analysis needs to include other uses of the new impact area on YPG beyond the ERCA program.	Audubon Society/Sierra Club	

Map Revisions		
Revise Figure 1 to show new operational areas are in relation to the current YPG, BMGR and National Wildlife Refuges.	Audubon Society/Sierra Club	Figure 1 has been revised.
Revise maps to show GSAs 71 and 76 within the BMGR, Targets 106 or 111 in NTAC and Targets 208, 211 or 215 in STAC.	Audubon Society/Sierra Club	Maps have been revised.
Additional Information		
Provide additional information for findings of effects as may be required by the Four Southern Tribes, GRIC, and the Tohono O'odham.	San Carlos Apache Tribe	YPG would provide available information requested by the Four Southern Tribes, GRIC, and the Tohono O'odham.
Support for the Proposed Action		
Adding this capability to the Yuma Proving Ground test arsenal will strengthen our defenses while also strengthening the Mission of Yuma Proving Ground. We are 100% in favor of this extension.	Yuma 50 Greater Yuma Economic Development Corporation	Support for the project is noted.
Request for Additional Coordination		
The ERCA EA has been reviewed. No additional input or objections are offered. Forward the following POCs to the ERCA Project manager for future visibility, communication and coordination: Roy M. Browning Assistant Chief Patrol Agent U.S. Border Patrol-Yuma Sector Office: (928) 341-6557 Cell: (928) 941-6099 Fax: (928) 341-6677 Roy.Browning@dhs.gov Michael A. Ringler Special Operations Supervisor Strategic Planning and Coordination	U.S. Border Patrol-Yuma Sector	YPG would will coordinate with the point of contacts as requested.

USBP Yuma Sector 928-341-6516 Office 928-750-8114 Gov Cell 928-210-0758 Personal Cell Michael.Ringler@DHS.GOV		

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND HEADQUARTERS
UNITED STATES ARMY GARRISON, YUMA
301 C STREET
YUMA AZ 85365-9498

REPLY TO ATTENTION OF

May 23, 2017

Environmental Sciences Division

Mr. Terry Rambler
Tribal Chairman, San Carlos Apache Tribe
P.O. Box 0
San Carlos, AZ 85550

Dear Chairman Rambler:

Thank you for your submittal of comments concerning the Extended Range Cannon Artillery Project (ERCA) at U.S. Army Yuma Proving Ground (USAYPG) and the Barry M. Goldwater Range.

We note your determination that further consultation is not required and your concurrence with the findings in the draft Environmental Assessment. We will also honor your request to provide additional information as may be requested by the Four Southern Tribes for the ERCA Project.

Thank you for your interest and support of USAYPG's cultural resources program.

Sincerely,

Gordon K. Rogers
Garrison Manager

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DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND HEADQUARTERS
UNITED STATES ARMY GARRISON, YUMA
301 C STREET
YUMA AZ 85365-9498

REPLY TO ATTENTION OF

May 23, 2017

Environmental Sciences Division

Ms. Sandra Bahr
Sierra Club – Grand Canyon Chapter
514 W. Roosevelt St
Phoenix, AZ 85003

Dear Ms. Bahr:

Thank you for your submittal of comments concerning the Extended Range Cannon Artillery Project (ERCA) at U.S. Army Yuma Proving Ground (USAYPG) and the Barry M. Goldwater Range (BMGR). Your comments encompassed issues of public safety and potential for wildfires. You also provided suggestions for improving the Environmental Assessment (EA).

With regards to public safety, you expressed concern associated with the proposed overflights across Kofa National Wildlife Refuge (NWR) and US Highway 95. With respect to Kofa NWR, the overflights would occur in a remote area of the refuge near the USAYPG boundary. We would coordinate with Kofa NWR staff to schedule around planned activities on the refuge well in advance of potential firings. Also we would schedule any firing activity to avoid high use periods for the refuge (October-January hunting season).

Prior to firing over the Kofa NWR, USAYPG would place observers and conduct sweeps of the Surface Danger Zone (SDZ) via unmanned aerial systems to ensure to the best of our ability that there is no one present on that portion of the refuge. We understand that the topography of the area will be extremely challenging for detection of people and we will try to focus around potential points of entry or likely areas of interest. If people are observed within the SDZ, then firing would not commence until the area is cleared.

You also inquired about the possibility of test firings overshooting the impact area and the distance a projectile would travel if it were to veer off-course. Projectiles overshooting the impact area is unlikely. Tests leading to the long-range firings would be conducted initially at shorter distances. The distances would be incrementally increased as trajectories are further refined. Projectiles veering off course could encroach up to 4 km into the Kofa NWR from the USAYPG-Kofa NWR boundary.

With respect to overflights across US Highway 95, USAYPG would close an approximately 3 mile long segment of the roadway between Mile Marker 50 and 53

for up to 30 minutes. Due to the short duration of the closure, there would be no need for alternate routes for travelers on US Highway 95. Furthermore, road closures would be conducted in accordance with Arizona Department of Transportation's road closure protocols. Traffic management personnel would be placed at both mile markers. Test firings would occur after the road segment has been cleared of all vehicles. Last, emergency access will be coordinated between the USAYPG Public Safety Office and law enforcement or emergency responders on the scene.

As to your comments concerning munition-ignited wildfires, such fires are typically small in size due to the low density of vegetation. On USAYPG, there has been approximately 25 small wildfire events that burned a total of 170 acres from 2003 to present. A total of 87 wildfires were recorded at BMGR East from 2006-2011. The fires are typically located within the target complex and are typically less than 10 acres. In the past five years, BMGR East has recorded 53 munition-ignited. There have been no munition-ignited wildfires since in BMGR West since 2012.

However, during wet years, there is an increase in vegetation that can carry wildfire. For example, in 2005 a wildfire on BMGR East burned approximately 130,000 acres. In the same year, the King Valley Fire on USAYPG burned 3,000 acres on USAYPG and 26,000 acres on Kofa NWR for a total of about 29,000 acres. The size of both fires were attributed to the heavy winter rains that year. Though a possibility exists that munitions could ignite large wildfires, the probability for such events is relatively low.

An additional factor affecting wildfires is the presence of non-native, invasive plants within operational areas. To that end, all three installations involved in the ERCA project manage invasive species through their respective Integrated Natural Resources Management Plans (INRMPs) and Integrated Pest Management Plans. All applicable management measures from the INRMPs will be implemented as part of the ERCA Project. Last, a best management practice requiring inspection and cleaning of vehicles subsequent to working in or traveling through weed infested areas has been added to the EA.

You expressed the need to evaluate other testing activities that could occur in the new impact area within USAYPG. Like the ERCA Project, other uses of the new impact area would entail testing of various munitions. In general, the impacts characterized for ERCA would also characterize impacts associated with other testing activities. However, unlike ERCA, these activities would be wholly

contained within USAYPG's boundary. Overflights across Kofa NWR and closure of US Highway 95 would not be required.

Last, you suggested adding additional visual elements to the maps in the EA. Maps in the final EA will be updated accordingly.

Thank you again for your comments. We understand your concerns for public safety and potential impacts to wildlife habitat. USAYPG is committed to ensuring the safety of the public as well as protection of environmental resources. A copy of this letter is also being furnished to Mr. Cary Meister of the Yuma Audubon Society.

Sincerely,

Gordon K. Rogers
Garrison Manager

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DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND HEADQUARTERS
UNITED STATES ARMY GARRISON, YUMA
301 C STREET
YUMA AZ 85365-9498

REPLY TO ATTENTION OF

May 25, 2017

Environmental Sciences Division

Mr. Ken Rosevear
Chairman, Yuma 50
180 W. 1st Street, Suite D
Yuma, AZ 85364

Dear Mr. Rosevear:

Thank you for your submittal of comments concerning the Extended Range Cannon Artillery Project (ERCA) at Yuma Proving Ground (YPG) and the Barry M. Goldwater Range.

Your statement of support for the ERCA Project is noted and will be incorporated into our administrative record. Thank you for your interest and support of YPG's mission.

Sincerely,

Gordon K. Rogers
Garrison Manager

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DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND HEADQUARTERS
UNITED STATES ARMY GARRISON, YUMA
301 C STREET
YUMA AZ 85365-9498

REPLY TO ATTENTION OF

May 23, 2017

Environmental Sciences Division

Mr. Cary Meister
Conservation Chair, Yuma Audubon Society
P.O. Box 6395
Yuma, AZ 85366-6395

Dear Mr. Meister:

Thank you for your submittal of comments concerning the Extended Range Cannon Artillery Project (ERCA) at U.S. Army Yuma Proving Ground (USAYPG) and the Barry M. Goldwater Range (BMGR). Your comments encompassed issues of public safety and potential for wildfires. You also provided suggestions for improving the Environmental Assessment (EA).

With regards to public safety, you expressed concern associated with the proposed overflights across Kofa National Wildlife Refuge (NWR) and US 95. With respect to Kofa NWR, the overflights would occur in a remote area of the refuge near the USAYPG boundary. We would coordinate with Kofa NWR staff to schedule around planned activities on the refuge well in advance of potential firings. Also we would schedule any firing activity to avoid high use periods for the refuge (October-January hunting season).

Prior to firing over the Kofa NWR, USAYPG would place observers and conduct sweeps of the Surface Danger Zone (SDZ) via unmanned aerial systems to ensure to the best of our ability that there is no one present on that portion of the refuge. We understand that the topography of the area will be extremely challenging for detection of people and we will try to focus around potential points of entry or likely areas of interest. If people are observed within the SDZ, then firing would not commence until the area is cleared.

You also inquired about the possibility of test firings overshooting the impact area and the distance a projectile would travel if it were to veer off-course. Projectiles overshooting the impact area is unlikely. Tests leading to the long-range firings would be conducted initially at shorter distances. The distances would be incrementally increased as trajectories are further refined. Projectiles veering off course could encroach up to 4 km into the Kofa NWR from the USAYPG-Kofa NWR boundary.

With respect to overflights across US 95, USAYPG would close an approximately 3 mile long segment of the roadway between Mile Marker 50 and 53 for up to 30 minutes.

Due to the short duration of the closure, there would be no need for alternate routes for travelers on US 95. Furthermore, road closures would be conducted in accordance with Arizona Department of Transportation's road closure protocols. Traffic management personnel would be placed at both mile markers. Test firings would occur after the road segment has been cleared of all vehicles. Last, emergency access will be coordinated between the USAYPG Public Safety Office and law enforcement or emergency responders on the scene.

As to your comments concerning munition-ignited wildfires, such fires are typically small in size due to the low density of vegetation. On USAYPG, there has been approximately 25 small wildfires events that burned a total of 170 acres from 2003 to present. A total of 87 wildfires were recorded at BMGR East from 2006-2011. The fires are typically located within the target complex and are typically less than 10 acres. In the past five years, BMGR East has recorded 53 munition-ignited. There have been no munition-ignited wildfires since in BMGR West since 2012.

However, during wet years, there is an increase in vegetation that can carry wildfire. For example, in 2005 a wildfire on BMGR East burned approximately 130,000 acres. In the same year, the King Valley Fire on USAYPG burned 3,000 acres on USAYPG and 26,000 acres on Kofa NWR for a total of about 29,000 acres. The size of both fires were attributed to the heavy winter rains that year. Though a possibility exists that munitions could ignite large wildfires, the probability for such events is relatively low.

An additional factor affecting wildfires is the presence of non-native, invasive plants within operational areas. To that end, all three installations involved in the ERCA project manage invasive species through their respective Integrated Natural Resources Management Plans (INRMPs) and Integrated Pest Management Plans. All applicable management measures from the INRMPs will be implemented as part of the ERCA Project. Last, a best management practice requiring inspection and cleaning of vehicles subsequent to working in or traveling through weed infested areas has been added to the EA.

You expressed the need to evaluate other testing activities that could occur in the new impact area within USAYPG. Like the ERCA Project, other uses of the new impact area would entail testing of various munitions. In general, the impacts characterized for ERCA would also characterize impacts associated with other testing activities. However, unlike ERCA, these activities would be wholly contained within USAYPG’s boundary. Overflights across Kofa NWR and closure of US 95 would not be required.

Last, you suggested adding additional visual elements to the maps in the EA. Maps in the final EA will be updated accordingly.

Thank you again for your comments. We understand your concerns for public safety and potential impacts to wildlife habitat. USAYPG is committed to ensuring the safety of the public as well as protection of environmental resources. A copy of this letter is also being furnished to Ms. Sandra Bahr of the Sierra Club – Grand Canyon Chapter.

Sincerely,

Gordon K. Rogers
Garrison Manager

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DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND HEADQUARTERS
UNITED STATES ARMY GARRISON, YUMA
301 C STREET
YUMA AZ 85365-9498

REPLY TO ATTENTION OF

May 23, 2017

Environmental Sciences Division

Mr. Roy M. Browning
Assistant Chief Patrol Agent, USBP-Yuma Sector
4035 S. Avenue A
Yuma, AZ 85365

Attn: Mr. Michael A. Ringler, Special Operations Supervisor

Dear Mr. Browning:

Thank you for your submittal of comments concerning the Extended Range Cannon Artillery Project (ERCA) at U.S. Army Yuma Proving Ground (USAYPG) and the Barry M. Goldwater Range.

We note your comment that the Environmental Assessment for the project has been reviewed and that the U.S. Border Patrol-Yuma Sector has no objections to the project. We will also honor your request to coordinate with you and Mr. Ringler upon implementation of the project.

Thank you for your interest and support of USAYPG's mission.

Sincerely,

Gordon K. Rogers
Garrison Manager

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND HEADQUARTERS
UNITED STATES ARMY GARRISON, YUMA
301 C STREET
YUMA AZ 85365-9498

REPLY TO ATTENTION OF

May 23, 2017

Environmental Sciences Division

Christa Weis, Refuge Manager
Kofa National Wildlife Refuge
Southwest Arizona Refuge Complex
9300 E. 28th St.
Yuma, AZ 85365

Dear Ms. Weis,

Thank you for meeting with our team on March 29 to discuss your comments on the Environmental Assessment for the Extended Range Cannon Artillery. We feel this meeting helped us better understand your concerns for safety, public access to the refuge, refuge operations, and potential impacts to wildlife and the wildlife habitat. We want to assure you U.S. Army Yuma Proving Ground (USAYPG) is committed to public safety and to supporting your challenging mission of refuge management. I've highlighted a couple of key points from our meeting below.

Based on the type of round we plan to fire, the remote location, our requirement to cease firing if people are observed in the area, and the trajectory to the impact area, there would be almost no risk to people using the refuge. The gun position and proposed impact area are several miles from the refuge, and the round would cross the refuge in an extremely remote area near the USAYPG boundary. We would coordinate with refuge staff to schedule around planned activities on the refuge well in advance of potential firing. Also we would schedule any firing activity to avoid high use periods for the refuge (October-January hunting season).

USAYPG would also place observers at strategic locations and conduct sweeps of this area via unmanned aerial systems to ensure to the best of our ability that there is no one present on that portion of the refuge before firing. We understand that the topography of the area will be extremely challenging for detection of people and we will try to focus around potential points of entry or likely areas of interest. If people are observed on the refuge within the area of concern, then firing would cease.

We would minimize our disturbance to bighorn sheep and other wildlife on the refuge during aerial safety sweeps by flying at high enough altitude to reduce reaction of any sheep in the vicinity. The unmanned aerial system is much quieter than conventional aircraft and is equipped with cameras that can be used for identifying people or vehicles in the area.

We anticipate the intermittent closure of US Highway 95 upon actual firing of a round for short periods. Our initial estimate is that the road would only be closed for

about 15 minutes per shot. We would also make every effort to schedule our activities around low traffic periods on US Highway 95.

As always, it is a pleasure working with you and thank you for your comments. We truly value your commitment to managing the natural resources on the refuge and we appreciate the support that you provide to our natural resources program as well as our military mission.

Sincerely,

Gordon K. Rogers
Garrison Manager

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND HEADQUARTERS
UNITED STATES ARMY GARRISON, YUMA
301 C STREET
YUMA AZ 85365-9498

REPLY TO ATTENTION OF

May 23, 2017

Environmental Sciences Division

Ms. Julie Engel
President/CEO, Greater Yuma EDC
899 Plaza Circle Drive, Suite 2
Yuma, AZ 85365

Dear Ms. Engel:

Thank you for your submittal of comments concerning the Extended Range Cannon Artillery Project (ERCA) at U. S. Army Yuma Proving Ground (USAYPG) and the Barry M. Goldwater Range.

Your statement of support for the ERCA Project is noted and will be incorporated into our administrative record. Thank you for your interest and support of USAYPG's mission.

Sincerely,

Gordon K. Rogers
Garrison Manager

ERCA

Appendix H

NEPA Cooperating Agency Letters

UNITED STATES MARINE CORPS
MARINE CORPS AIR STATION YUMA
BOX 99100
YUMA, ARIZONA 85369-9100

6280
CO
2 May 16

Gordon K. Rogers
Garrison Manager Department of the Army
Installation Management Command Headquarters
United States Army Garrison, Yuma 301 C Street
Yuma, AZ 85365-9498

Dear Mr. Rogers:

Marine Corps Air Station (MCAS) Yuma has received your request for support in the development of an Environmental Assessment (EA) to evaluate the potential for direct, indirect, and cumulative effects to the natural and human environmental associated with your proposed Extended Range Cannon Artillery (ERCA) test program.

Both, my Environmental and Range staff will assist in the development of your environmental documentation on a not to interfere basis with regards towards MCAS Yuma aviation and ground training priorities.

The Community Plans and Liaison Officer (Ms. Mary E. Finch) will develop an Interservice Support Agreement (ISSA) or a Memorandum of Agreement (MOA) to codify the level and type of support to be provided. She can be reach at (928)269-3637. If you should need any further assistance, the environmental point of contact is Mr. David Rodriguez at (928) 269-2282 or email at david.rodriguez5@usmc.mil.

RICARDO MARTINEZ
Colonel, United States Marine Corps
Commanding Officer
Marine Corps Air Station Yuma

DEPARTMENT OF THE AIR FORCE
AIR EDUCATION AND TRAINING COMMAND

DEC 16 2015

MEMORANDUM UNITED STATES ARMY YUMA PROVING GROUNDS
ENVIRONEMENTAL SCIENCES DIVISION
301 C STREET
YUMA, AZ 85365-9498

FROM: HQ AETC/A3O
1 F STREET SUITE 2
RANDOLPH AFB TX 78150-4325

SUBJECT: Establishment of Environmental Planning Partnership under the National Environmental Policy Act (NEPA)

1. AETC agrees to become a cooperating agency with the US Army to evaluate the potential for direct, indirect, and cumulative effects to the natural and human environment associated with the Extended Range Cannon Artillery (ERCA) test program on the Barry M Goldwater Range, East. Please work directly with Mr Chas Buchanan and his staff at the 56 Range Management Office. He can be reached at DSN 896-8520.

2. My point of contact here on the AETC staff is Mr. Brad Marcum, A3OF, DSN 487-8253.

LOUIS W. HANSEN, Lt Col, USAF
Chief, Operations and Readiness Division
Directorate of Intelligence, Operations,
and Nuclear Integration

DEPARTMENT OF THE ARMY
UNITED STATES ARMY YUMA PROVING GROUND
301 C STREET
YUMA AZ 85365-9498

REPLY TO
ATTENTION OF

Environmental Sciences Division

10 November 2015

MEMORANDUM FOR HQs Air Education and Training Command, Operations and Readiness Division Directorate of Intelligence, ATTN: COL Louis W. Hansen, 266 F Street West, Randolph AFB, TX 78150-4319

SUBJECT: Establishment of Environmental Planning Partnership Under the National Environmental Policy Act (NEPA)

1. The United States Army Garrison Yuma Proving Ground (USAG YPG) has initiated preparation of an Environmental Assessment (EA) pursuant to the National Environmental Policy Act (NEPA) to evaluate the potential for direct, indirect, and cumulative effects to the natural and human environment associated with the Extended Range Cannon Artillery (ERCA) test program. The ERCA program would test fire long range artillery projectiles approximately 70 kilometers within the Kofa Firing Range at Yuma Proving Ground (YPG) and at the Barry M. Goldwater Range (BMGR) jointly administered by Marine Corps Air Station Yuma and Luke Air Force Base (LAFB).

2. Our respective environmental staff has preliminarily coordinated on the use of BMGR East at LAFB for the ERCA program. Within BMGR East, the ERCA program would fire at selected targets within existing air-to-ground target areas (North TAC and South TAC).

3. USAG YPG's NEPA planning process for the ERCA program is now underway. Therefore, I request LAFB's formal participation in this undertaking as a Cooperating Agency pursuant to NEPA regulations at 40 CFR 1501.6. I believe LAFB's participation in the environmental planning process would result in a thorough and complete EA. As a Cooperating Agency, LAFB would provide assistance in several ways. This may include assistance in further developing alternatives for the testing program at BMGR East; providing technical literature and documentation on environmental resources; facilitating and participating in site visits to BMGR East; and reviewing and providing comments on the EA.

4. I request a written confirmation at your earliest convenience to formally establish the environmental planning partnership under NEPA. Your written confirmation would further facilitate coordination between USAG YPG and LAFB.

5. Thank you for your assistance. If you have any questions, please contact Mr. Daniel Steward, Wildlife Biologist, at (928) 328-2125 or email daniel.m.steward.civ@mail.mil.

MURRAY.RANDY.1059135283

Digitally signed by MURRAY.RANDY.1059135283
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=MURRAY.RANDY.1059135283
Date: 2015.11.17 16:09:34 -07'00'

RANDY MURRAY
COL, AV
Commanding

DEPARTMENT OF THE ARMY
UNITED STATES ARMY YUMA PROVING GROUND
301 C STREET
YUMA AZ 85365-9498

REPLY TO ATTENTION OF

TEDT-YPY-MW 10 November 2015

MEMORANDUM FOR Colonel Ricardo Martinez, Commanding Officer, U.S. Marine Corps Air Station (MCAS), Box 99100, Yuma, AZ 85369-9106

SUBJECT: Request MCAS Yuma Support of YPG Long Range Artillery Test Effort

1. The Yuma Proving Ground's (YPG) Yuma Test Center (YTC) has initiated an effort to conduct testing of long range artillery which would require firing a 155mm projectile out to a range of 70 kilometers (43.5 miles). This request is two-fold, the first is for administrative support of a YPG-led Environmental Assessment (EA) and the second is for allowed use of ground and air space on the MCAS Yuma (MCASY) managed portion of the Barry M. Goldwater Range (BMGR) to support such test event.

2. YPG's YTC is the Army's primary artillery test facility. YTC supports the entire acquisition lifecycle testing of artillery weapons and ammunition from initial concepts, demonstrations to formal development, safety qualifications, operational tests, production acceptance tests and stockpile surveillance. In FY15, YTC's firing ranges, support facilities, infrastructure, instrumentation and personnel supported test firing of more than 40,000 artillery rounds. The latest developments in artillery feature extended ranges achievable via a combination of a longer cannon, high capacity propelling charge and a rocket assisted projectile. The objective range that the Army seeks to demonstrate from a cannon launched projectile is 70 km (43.5 miles). YPG land and airspace boundaries can accommodate such distances, but it requires firing over public roads and occupied areas of the range.

3. YPG's YTC seeks an option that would enable containment of the entire projectile trajectory within military controlled ground and air space. The support required from MCASY during development of the EA would include participation by the various range and environmental staff in administrative activities such as telephone conferences, site visits and/or document reviews. It may also require the staff to provide data, documents, surveys, etc. to support selection of a suitable firing point and analysis of the prosed action as part of the EA process. If the EA process is favorable and the extended range cannon artillery test program materializes, the support required from the MCASY range staff would include planning and coordination activities associated with scheduling use of the selected test site and airspace. It is understood that reimbursement may be required to offset any costs associated with support of this effort.

4. The proposed location for the firing point is on the north east portion of the MCASY managed portion of BMGR (vicinity of Baker's peak, refer to enclosure). The exact point is yet to be determined pending MCASY approval and EA analysis. The ground footprint required at that location is approximately 1.5 acres. During a test operation, this location

would be set up with items such as a howitzer, instrumentation, protective barricades, generators, support vehicles etc. Typical test event duration is 1 week, with ground setup activities occurring the first 2-3 days followed by 2 days of active firing (non-continuous, i.e. fire 3 hours in the morning and 2 hours in afternoon) concluding with 2 days of equipment teardown and site cleanup. The approximate frequency of occurrence would be 3 times a year.

5. The projectile impact would be at a pre-existing target on BMGR East's North TAC, which requires coordination with Luke Air Force Base (LAFB) range management personnel. Preliminary coordination with LAFB is underway and they will be a cooperating agency in this effort. Participation in this effort demonstrates multi-branch military range cross-utilization and can ultimately play a positive role in public relations for Arizona based U.S Marine Corps (USMC), Army and Air Force ranges. Additionally it honors reciprocity for the numerous USMC training events conducted at YPG throughout the year.

6. The YPG technical point of contact for this effort is Mr. Esteban (Steve) Flores at DSN: 899-7483, Commercial: (928) 328-7483, or Email: esteban.v.flores.civ@mail.mil. Please do not hesitate to call him with any questions you may have.

RANDY MURRAY
COL, AV
Commanding

DEPARTMENT OF THE ARMY
UNITED STATES ARMY YUMA PROVING GROUND
301 C STREET
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REPLY TO
ATTENTION OF

Environmental Sciences Division

10 November 2015

MEMORANDUM FOR HQs Air Education and Training Command, Operations and Readiness Division Directorate of Intelligence, ATTN: COL Louis W. Hansen, 266 F Street West, Randolph AFB, TX 78150-4319

SUBJECT: Establishment of Environmental Planning Partnership Under the National Environmental Policy Act (NEPA)

1. The United States Army Garrison Yuma Proving Ground (USAG YPG) has initiated preparation of an Environmental Assessment (EA) pursuant to the National Environmental Policy Act (NEPA) to evaluate the potential for direct, indirect, and cumulative effects to the natural and human environment associated with the Extended Range Cannon Artillery (ERCA) test program. The ERCA program would test fire long range artillery projectiles approximately 70 kilometers within the Kofa Firing Range at Yuma Proving Ground (YPG) and at the Barry M. Goldwater Range (BMGR) jointly administered by Marine Corps Air Station Yuma and Luke Air Force Base (LAFB).

2. Our respective environmental staff has preliminarily coordinated on the use of BMGR East at LAFB for the ERCA program. Within BMGR East, the ERCA program would fire at selected targets within existing air-to-ground target areas (North TAC and South TAC).

3. USAG YPG's NEPA planning process for the ERCA program is now underway. Therefore, I request LAFB's formal participation in this undertaking as a Cooperating Agency pursuant to NEPA regulations at 40 CFR 1501.6. I believe LAFB's participation in the environmental planning process would result in a thorough and complete EA. As a Cooperating Agency, LAFB would provide assistance in several ways. This may include assistance in further developing alternatives for the testing program at BMGR East; providing technical literature and documentation on environmental resources; facilitating and participating in site visits to BMGR East; and reviewing and providing comments on the EA.

4. I request a written confirmation at your earliest convenience to formally establish the environmental planning partnership under NEPA. Your written confirmation would further facilitate coordination between USAG YPG and LAFB.

5. Thank you for your assistance. If you have any questions, please contact Mr. Daniel Steward, Wildlife Biologist, at (928) 328-2125 or email daniel.m.steward.civ@mail.mil.

RANDY MURRAY
COL, AV
Commanding

ERCA

Appendix I

Cultural Sites in STAC and NTAC

Range	Target No.	Site Number	Field Number	Site Description	Temporal/Cultural Affiliation	Report	NRHP Eligibility
NTAC	106	Y:08:001(ASM)		Artifact Scatter: plain and decorated sherds, flakes Features: 6 thermal features Featuresd: 1 cremation	Ceramic Period: Hohokam Classic Period: AD 1150-1450 Patayan I: A.D. 850-1050 Salado A.D. 1300-1450	1979. The Coronet REAL Project: Archaeological Investigations on the Luke Rangte, Southwestern AZ. Huckell, Bruce B. Arizona State Museum Archaeological Series 129	Eligible
NTAC	106	Y:08:021(ASM)	98A/B-103	Lithic scatter: 1 flake, 1 mano. Features: 1 thermal feature	Undertermined	2000 Footsteps on the Bajada. Edited by David B. Tucker. SWCA Cultural Resource Report No. 990140	Eligible
NTAC	106	Y:08:022(ASM)	98A/B-116	Lithic Scatter: 1 hammerstone, 3 cores, 20 flakes, 2 metates, 3 manos Features: 1 thermal feature	Undertermined	2000 Footsteps on the Bajada. Edited by David B. Tucker. SWCA Cultural Resource Report No. 990140	Eligible
NTAC	106	Y:08:034(ASM)	98A/B-084	Artifact Scatter: 11 sherds, 2 flakes, 2 metates, 1 mano Features: 15 thermal features	Undertermined	2000 Footsteps on the Bajada. Edited by David B. Tucker. SWCA Cultural Resource Report No. 990140	Eligible
NTAC	106	Y:08:035(ASM)	98A/B-055	Artifact Scatter: 2 sherds (1 vessel), 4 flakes, grinding slab. Features: 2 thermal features	Undertermined	2000 Footsteps on the Bajada. Edited by David B. Tucker. SWCA Cultural Resource Report No. 990140	Eligible
NTAC	106	Y:08:036(ASM)	98A/B-060	Flaked Stone Scatter: 165 flakes, 1 core	Undertermined	2000 Footsteps on the Bajada. Edited by David B. Tucker. SWCA Cultural Resource Report No. 990140	Eligible
NTAC	106	Y:08:037(ASM)	98A/B-059	Artifact Scatter: 18 sherds, 8 Flaked Stone, 2 shell. Features: 2 thermal features	Undertermined	2000 Footsteps on the Bajada. Edited by David B. Tucker. SWCA Cultural Resource Report No. 990140	Eligible
NTAC	106	Y:08:038(ASM)	98A/B-029	Lithic Scatter: 6 flakes, 1 slab metate Featrures: 2 thermal features	Undertermined	2000 Footsteps on the Bajada. Edited by David B. Tucker. SWCA Cultural Resource Report No. 990140	Eligible
NTAC	106	Y:08:039(ASM)	98A/B-045	Artifact Scatter: 1 flake, 1 metate, 14 sherds (vessels) Features: 1 thermal feature	Undertermined	2000 Footsteps on the Bajada. Edited by David B. Tucker. SWCA Cultural Resource Report No. 990140	Eligible
NTAC	106	Y:08:040(ASM)	98A/B-038	Historical Period Artifact Scatter: structure, well head, well, pump house platform	Undertermined	2000 Footsteps on the Bajada. Edited by David B. Tucker. SWCA Cultural Resource Report No. 990140	Eligible

Range	Target No.	Site Number	Field Number	Site Description	Temporal/Cultural Affiliation	Report	NRHP Eligibility
NTAC	111	Y:08:054(ASM)	98A/B-112	Flaked Stone Scatter: 13 flakes Features: 1 thermal feature	Undertermined	2000 Footsteps on the Bajada. Edited by David B. Tucker. SWCA Cultural Resource Report No. 990140	Eligible
NTAC	111	Y:08:055(ASM)	98A/B-108	Feature Scatter: Features: 1 thermal feature	Undertermined	2000 Footsteps on the Bajada. Edited by David B. Tucker. SWCA Cultural Resource Report No. 990140	Eligible
NTAC	111	Y:08:056(ASM)	98A/B-124	Feature Scatter: 1 thermal feature	Undertermined	2000 Footsteps on the Bajada. Edited by David B. Tucker. SWCA Cultural Resource Report No. 990140	Eligible
NTAC	111	Y:08:057(ASM)	98A/B-106	Artifact Scatter: 7 Papago Red Sherds, 6 flaked stone, 1 mano Features: 6 thermal features, 1 rock cluster	Historic Tohono O'odham: A.D. 1700-1860	2000 Footsteps on the Bajada. Edited by David B. Tucker. SWCA Cultural Resource Report No. 990140	Eligible
NTAC	111	Y:08:058(ASM)	98A/B-071	Artifact Scatter: 7 sherds, 4 flaked Stone, 5 grinding slabs, 1 mano Features: 11 thermal features	Ceramic Period. Hohokam Sedentary Period: A.D. 975-1150	2000 Footsteps on the Bajada. Edited by David B. Tucker. SWCA Cultural Resource Report No. 990140	Eligible
NTAC	111	Y:08:059(ASM)	98A/B-118	Flaked Stone Scatter: 2 Flakes Features: 3 Thermal Features	Undetermined	2000 Footsteps on the Bajada. Edited by David B. Tucker. SWCA Cultural Resource Report No. 990140	Eligible
NTAC	111	Y:08:060(ASM)	98A/B-125	Features: 3 Thermal Features	Undetermined	2000 Footsteps on the Bajada. Edited by David B. Tucker. SWCA Cultural Resource Report No. 990140	Eligible
NTAC	111	Y:08:258(ASM)	BMGR-01-A-22	Flaked Stone Scatter: 1 hammerstone, 1 chopper, 2 cores, 7 flakes Features: 3 Thermal Features	Undetermined	2006 NTAC 2001: Intensive Archaeological Survey of 8,434 Acres on the North Tactical Range, Barry M. Goldwater Range East, Arizona. Christopher J. Doolittle, et.al. Cultural Resource Studies in the Western Papagueria 9. Luke AFB, AZ	Eligible
NTAC	111	Y:08:262(ASM)	BMGR-01-A-26	Flake Scatter: 1 Flake Features: 2 Thermal Features	Undetermined	2006 NTAC 2001: Intensive Archaeological Survey of 8,434 Acres on the North Tactical Range, Barry M. Goldwater Range East, Arizona. Christopher J. Doolittle, et.al. Cultural Resource Studies in the Western Papagueria 9. Luke AFB, AZ	Eligible

Range	Target No.	Site Number	Field Number	Site Description	Temporal/Cultural Affiliation	Report	NRHP Eligibility
NTAC	111	Y:08:263(ASM)	BMGR-01-A-27	Features: 2 Thermal Features	Undetermined	2006 NTAC 2001: Intensive Archaeological Survey of 8,434 Acres on the North Tactical Range, Barry M. Goldwater Range East, Arizona. Christopher J. Doolittle, et.al. Cultural Resource Studies in the Western Papagueria 9. Luke AFB, AZ	Eligible
NTAC	111	Y:08:264(ASM)	BMGR-01-A-28	Artifact Scatter: 3 sherds, 4 flakes Features: 1 Thermal Feature	Undetermined	2006 NTAC 2001: Intensive Archaeological Survey of 8,434 Acres on the North Tactical Range, Barry M. Goldwater Range East, Arizona. Christopher J. Doolittle, et.al. Cultural Resource Studies in the Western Papagueria 9. Luke AFB, AZ	Eligible
NTAC	111	Y:08:272(ASM)	BMGR-01-A-37	Artifact Scatter: 8 sherds (1 vessel), 1 hammerstone, 1 core, 1 tested cobble, 7 flakes, 1 shatter, 1 metate. Features: 3 thermal features	Undetermined	2006 NTAC 2001: Intensive Archaeological Survey of 8,434 Acres on the North Tactical Range, Barry M. Goldwater Range East, Arizona. Christopher J. Doolittle, et.al. Cultural Resource Studies in the Western Papagueria 9. Luke AFB, AZ	Eligible
STAC	208	Y:8:232	BMGR-00-D-03	Artifact Scatter: Features: 5 Thermal Features	Undetermined	2005. STAC 2000: Intensive Archaeological Survey of 5,575 Acres on the South Tactical Range, Barry M. Goldwater Range East, AZ. Doolittle, Christopher J., et. al. Cultural Resource Studies in the Western Papagueria 6. Luke AFB, AZ.	Eligible
STAC	208	Y:8:228	BMGR-00-D-07	Artifact Scatter, Features: 8 Thermal Features	Hohokam/O'odham	2005. STAC 2000: Intensive Archaeological Survey of 5,575 Acres on the South Tactical Range, Barry M. Goldwater Range East, AZ. Doolittle, Christopher J., et. al. Cultural Resource Studies in the Western Papagueria 6. Luke AFB, AZ.	Eligible

Range	Target No.	Site Number	Field Number	Site Description	Temporal/Cultural Affiliation	Report	NRHP Eligibility
STAC	208	Y:8:176	BMGR-98A/B-31	Ceramic Scatter: 132 sherds (4 vessels)	Patayan/O'odham	2000. South TAC II: Archaeological Survey of 7,083 Acres in the Northeastern Growler Valley on the Barry M. Goldwater Air Foirce Range in Southwestern AZ. Edited by David B. Tucker. SWCA Cultural Resource Report No 99-203	Eligible
STAC	211	Y:8:012	N/A	Artifact: 1 hammerstone Featrures: 1 circular concentration of boulders Petroglyphs: 6 panels	Hohokam	1996. Across the Growler Valley from the Granite to the Growler Mountains: Cultural Resources Sample Survey of the South Tactical Range Barry M. Goldwater Air Force Range, southwestern AZ. Olszewski, Deborah I., et. al.Dames and Moore Intermountain Cultural Resources Services Research Paper No. 26	Eligible
STAC	211	Y:8:122	BMGR-97-A-07	Artifact Scatter, Features: 38 thermal features - 9 Loci	Hohokam/Patayan/Trincheras	2000. Desert Foragers and Farmers of the Growler Valley. Edited by Richard V.N. Ahlstrom and Jerry D. Lyon. SWCA Cultural Resource Report No. 98-140	Eligible
STAC	211	Y:8:129	BMGR-97-A-10	Artifact Scatter Features: 2 thermal features	Hohokam/Patayan	2000. Desert Foragers and Farmers of the Growler Valley. Edited by Richard V.N. Ahlstrom and Jerry D. Lyon. SWCA Cultural Resource Report No. 98-140	Eligible
STAC	211	Y:8:130	BMGR-97-A-11	Feature Scatter: 1 Thermal Feature	Undetermined	2000. Desert Foragers and Farmers of the Growler Valley. Edited by Richard V.N. Ahlstrom and Jerry D. Lyon. SWCA Cultural Resource Report No. 98-140	Eligible
STAC	211	Y:8:131	BMGR-97-A-12	Artifact Scatter, 2 Thermal Features	Patayan	2000. Desert Foragers and Farmers of the Growler Valley. Edited by Richard V.N. Ahlstrom and Jerry D. Lyon. SWCA Cultural Resource Report No. 98-140	Eligible

Range	Target No.	Site Number	Field Number	Site Description	Temporal/Cultural Affiliation	Report	NRHP Eligibility
STAC	211	Y:8:132	BMGR-97-A-69	6 Thermal Features	Undetermined	2000. Desert Foragers and Farmers of the Growler Valley. Edited by Richard V.N. Ahlstrom and Jerry D. Lyon. SWCA Cultural Resource Report No. 98-140	Eligible
STAC	211	Y:8:133	BMGR-97-A-13	Artifact Scatter, 1 Thermal Feature	Ceramic Period	2000. Desert Foragers and Farmers of the Growler Valley. Edited by Richard V.N. Ahlstrom and Jerry D. Lyon. SWCA Cultural Resource Report No. 98-140	Eligible
STAC	211	Y:8:156	BMGR-97-A-15	Artifact Scatter, 8 Thermal Features	Ceramic Period	2000. Desert Foragers and Farmers of the Growler Valley. Edited by Richard V.N. Ahlstrom and Jerry D. Lyon. SWCA Cultural Resource Report No. 98-140	Eligible
STAC	211	Y:8:157	BMGR-97-A-32	Artifact Scatter, 3 Thermal Features	Ceramic Period	2000. Desert Foragers and Farmers of the Growler Valley. Edited by Richard V.N. Ahlstrom and Jerry D. Lyon. SWCA Cultural Resource Report No. 98-140	Eligible
STAC	211	Y:8:158	BMGR-97-A-42	2 Thermal Features	Undetermined	2000. Desert Foragers and Farmers of the Growler Valley. Edited by Richard V.N. Ahlstrom and Jerry D. Lyon. SWCA Cultural Resource Report No. 98-140	Eligible
STAC	211	Y:8:159	BMGR-97-A-47	Artifact (Core), 2 Thermal Features	Undetermined	2000. Desert Foragers and Farmers of the Growler Valley. Edited by Richard V.N. Ahlstrom and Jerry D. Lyon. SWCA Cultural Resource Report No. 98-140	Eligible
STAC	211	Y:8:160	BMGR-97-A-31	Artifact Scatter 3 Thermal Features - 3 Loci	O'odham	2000. Desert Foragers and Farmers of the Growler Valley. Edited by Richard V.N. Ahlstrom and Jerry D. Lyon. SWCA Cultural Resource Report No. 98-140	Eligible
STAC	211	Y:8:161	BMGR-97-A-49	1 Thermal Feature	Undetermined	2000. Desert Foragers and Farmers of the Growler Valley. Edited by Richard V.N. Ahlstrom and Jerry D. Lyon. SWCA Cultural Resource Report No. 98-140	Eligible

Range	Target No.	Site Number	Field Number	Site Description	Temporal/Cultural Affiliation	Report	NRHP Eligibility
STAC	211	Y:8:162	BMGR-97-A-34	1 Thermal Feature	Undetermined	2000. Desert Foragers and Farmers of the Growler Valley. Edited by Richard V.N. Ahlstrom and Jerry D. Lyon. SWCA Cultural Resource Report No. 98-140	Eligible
STAC	211	Y:8:164	BMGR-97-A-80	Lithic Scatter:	Ceramic Period	2000. Desert Foragers and Farmers of the Growler Valley. Edited by Richard V.N. Ahlstrom and Jerry D. Lyon. SWCA Cultural Resource Report No. 98-140	Eligible
STAC	215	Y:12:045	BMGR-97-A-45	Artifacts: Featurers: 2 thermal features	Ceramic Period	2000. Desert Foragers and Farmers of the Growler Valley. Edited by Richard V.N. Ahlstrom and Jerry D. Lyon. SWCA Cultural Resource Report No. 98-140	Eligible