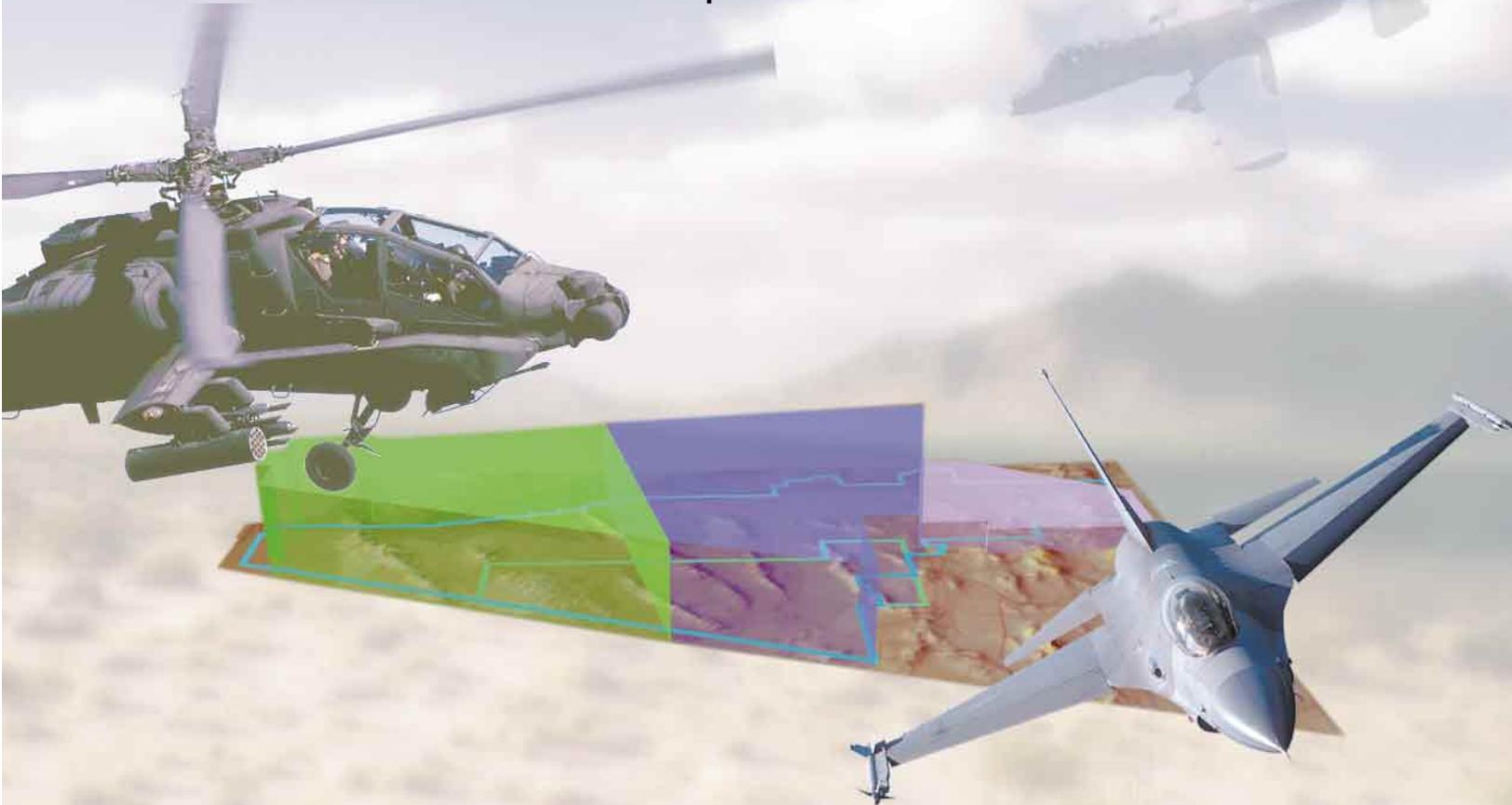


RENEWAL OF THE BARRY M. GOLDWATER RANGE LAND WITHDRAWAL Community Report

September 1998



Lead Agency:
U.S. DEPARTMENT OF THE AIR FORCE

Cooperating Agencies:

U.S. DEPARTMENT OF THE NAVY



**U.S. DEPARTMENT
OF THE INTERIOR,
Bureau of Land Management**



**U.S. DEPARTMENT
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Fish and Wildlife Service**



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Why the Community Report was Prepared

This Community Report is a summary of the draft Legislative Environmental Impact Statement (LEIS) for the proposed renewal of the Barry M. Goldwater Range (BMGR) land withdrawal. The draft LEIS is nearly 600 pages long and contains a lot of detailed information. This Community Report was prepared for people who want to know just the basic facts about the environmental process and the potential environmental impacts associated with the Congressional decision to either renew or not renew the BMGR.

This Community Report contains important information about the BMGR in a condensed format. It does not take the place of the draft LEIS. The entire draft LEIS provides detailed resource discussions and includes extensive data tables, maps, literature citations, and appendices. If you are interested in an overview of the alternatives and scenarios being considered and how they might affect the environment, this Community Report is a good place to start. If you want more information, the draft LEIS is available for your review. For more information on the draft LEIS and its availability contact:

Lt. Miki Krejcarek
Luke Air Force Base
Public Affairs Office
Telephone: (602) 856-5853

If you would like to comment on the proposed range renewal, please send your comments to:

Ms. Linda Woestendiek
BMGR LEIS
P.O. Box 67132
Phoenix, Arizona 85082-7132

To ensure that your comments can be appropriately considered in the final LEIS, please make sure they are postmarked by December 31, 1998.

Some of the topics discussed in this Community Report include:

- The process of how the range is authorized
- Why the Department of Defense needs the BMGR land withdrawal
- The process of identifying alternatives and scenarios to consider
- Descriptions of the alternatives and scenarios
- The purpose of and need for the BMGR
- A discussion of the environmental resources analyzed in the LEIS

The Goldwater Range Renewal Decision

The BMGR is a military reservation that occupies 2,668,100 acres (4,169 square miles) of federal public lands in southwestern Arizona (Figure 1). This range has served many purposes since it was established during World War II, but above all else, it has been and continues to be one of the nation's finest and most productive reservations for teaching military aircrews how to fly, fight, and survive in aerial combat. No end to the continuing national defense need for the BMGR is foreseen.



“If we can train to the point where we know our aircraft, our weapons, and our tactics inside-out, we can beat anybody. But we have to be able to train in the aircraft in an environment that is as realistic as possible. We have to be able to train the way we expect to fight.”
Capt. Tom Abbot, U.S. Air Force, F-16 pilot and Persian Gulf War Veteran.

The BMGR is available for military use through an Act of Congress, which withdrew the affected federal lands from the normal types of public land use and reserved the properties for certain authorized uses by the Department of Defense. When the range was first established on 5 September 1941, the land withdrawal instrument was an Executive Order signed by then President Franklin Roosevelt. At that time, the BMGR as well as many other military training ranges and bases were legally established under the executive power of the President.

Following World War II, a period of national emergency, Congress sought a more deliberative peacetime approach for establishing

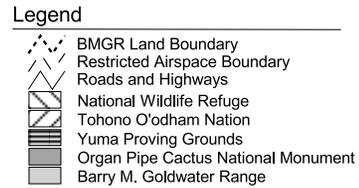
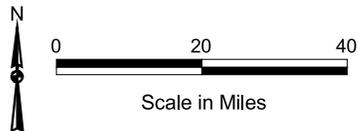
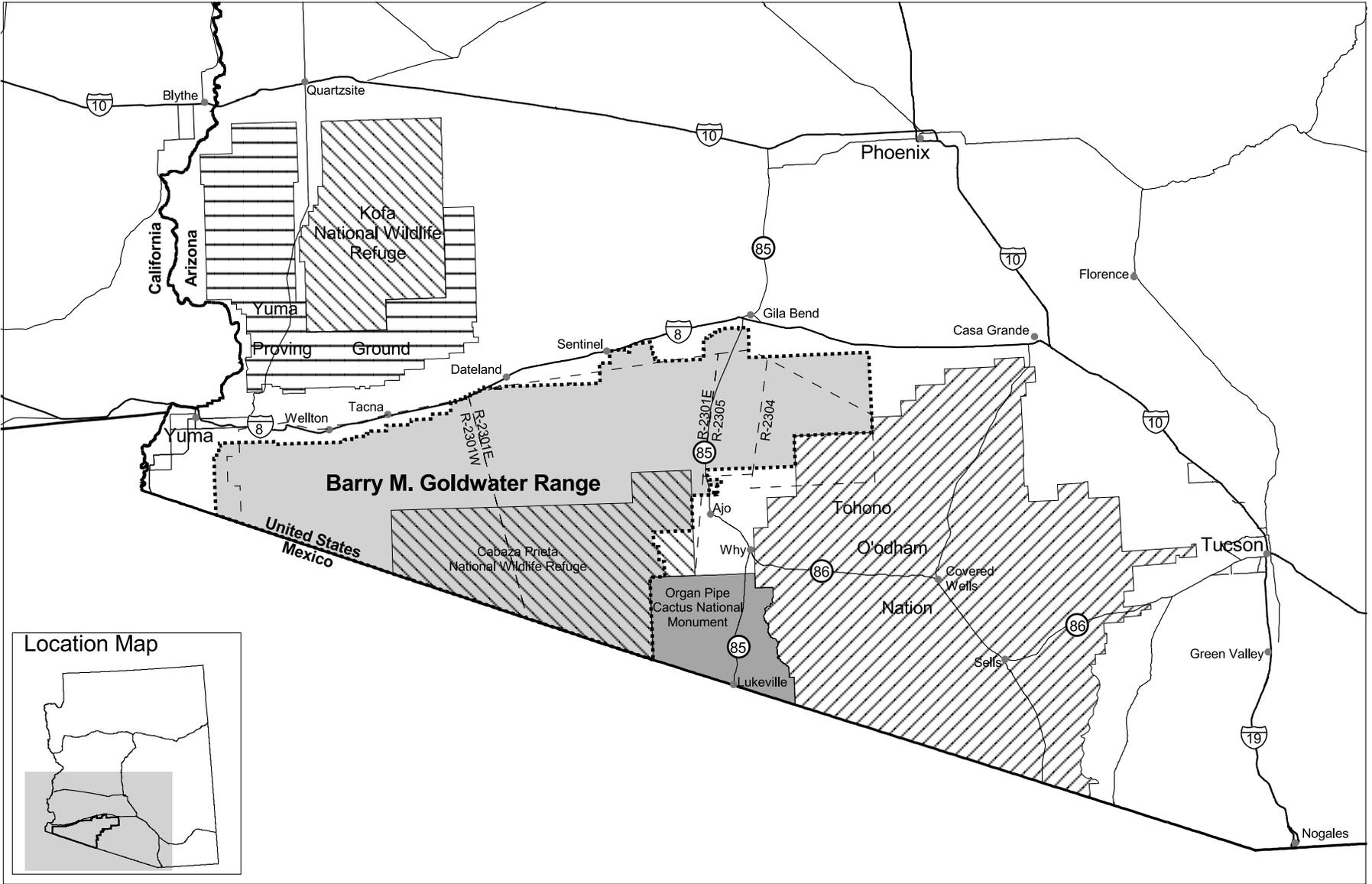
and renewing military reservations. The result was the Defense Withdrawal Act of 1958 (Public Law 85-337), which provided that all future military withdrawals of more than 5,000 acres would require Congressional approval. In accordance with Public Law 85-337, Congress passed the Military Lands Withdrawal Act of 1986 (Public Law 99-606), which renewed the BMGR for 15 years with the option to request a further renewal should a continuing military need for the range be identified.

Public Law 99-606 also directs that if there is a continuing military need for the range beyond 6 November 2001 (the expiration date of the current land withdrawal) a draft

Public Law 99-606

Public Law 99-606 states that the BMGR is “... reserved for use by the Secretary of the Air Force for—

- (A) an armament and high-hazard testing area;
- (B) training for aerial gunnery, rocketry, electronic warfare, and tactical maneuvering and air support; and
- (C) ... other defense-related purposes consistent with the purposes specified in this paragraph.”



**Barry M. Goldwater
Range and Vicinity**

Figure 1



The Air Force, Marine Corps, Navy, Air National Guard, Air Force Reserve, and Army National Guard all depend on the BMGR for aircrew training. Here an Army National Guard aircrew trains on the range in an AH-64 "Apache" gunship.

Land Withdrawals

"Withdrawing" federal lands means to withhold them by executive or legislative action from settlement, sale, location, or entry under some or all of the general land, mining, and mineral laws in order to limit or prohibit activities normally permitted under those laws.

"Reserving" federal lands means designating withdrawn areas for specified public (or governmental) purposes or programs. For example, military reservations established in areas formerly a part of the public domain consist of lands that have been withdrawn and then reserved, nearly always in the same executive or legislative action, for the purpose of military use.

environmental impact statement must be published to address the proposed renewal of the BMGR land withdrawal.

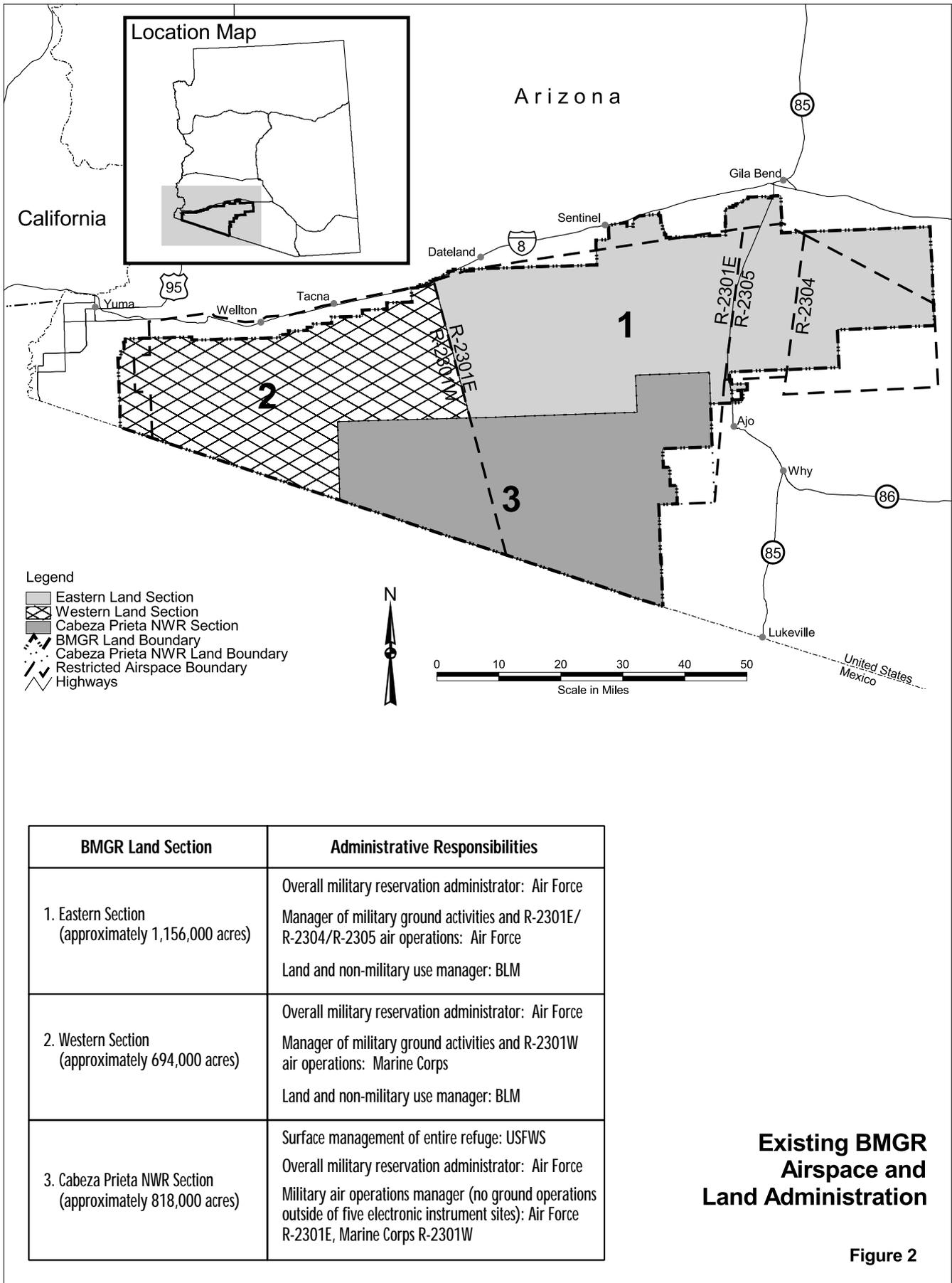
The Secretary of the Air Force has identified a continuing military need for the BMGR and prepared the draft LEIS as one of the required components in the application to Congress to renew the range. If Congress decides to renew the range, it is anticipated that a new military lands withdrawal act would be passed. A new act would allow Congress, based on the joint recommendations of the Air Force and the Bureau of Land Management (BLM), to redefine the size, duration, and terms of the BMGR land withdrawal to support the projected need for the military reservation. Alternatively, Congress could extend the duration of the BMGR land withdrawal by passing a new act or a resolution to continue the existing terms of Public Law 99-606.

Non-renewal of the BMGR would occur if Congress elects to allow the land withdrawal to expire as specified in Public Law 99-606. In this event, deactivating the BMGR would

likely require a period of several years in order to identify needed training mission changes; remove bombing and gunnery targets and other range infrastructure; clean-up and restore target sites and other use areas as necessary; and decontaminate the range to remove unexploded live ordnance, and toxic and hazardous materials. There would likely be a need to use the BMGR to support some continuing flying training missions during this deactivation period until needed mission changes could be completed.

Who Prepared this Report and the Draft LEIS?

As required by Public Law 99-606, the Air Force served as the lead agency for preparing the draft LEIS for the renewal of the BMGR. The Air Force also took the lead in preparing this Community Report on the proposed range renewal. Federal agencies that cooperated in the preparation of the draft LEIS and this Community Report included the Marine Corps, BLM, and the U.S. Fish and Wildlife Service (USFWS). The Marine Corps is a joint operator and user of the BMGR with the Air Force (Figure 2). The BLM is responsible for land management for the approximately 1.85 million acres of the range that lie outside of the Cabeza Prieta National Wildlife Refuge (NWR) and the USFWS manages the approximately 0.82 million acres of the range that lie within the refuge. The Arizona Game and Fish Department (AGFD), which manages the state's interests in wildlife and wildlife habitat and enforces wildlife laws throughout the state, also participated in document preparation.



The Scoping Process and Public Participation

The official scoping period for the proposed renewal of the BMGR began on February 9, 1996 with the publication of the Notice of Intent to prepare an LEIS, and concluded on April 1, 1996. The Air Force hosted eight public scoping meetings in Arizona to exchange information with interested parties, with a particular emphasis on obtaining input on the proposed alternatives. Briefly, the three alternatives include (1) renew the land withdrawal for an indefinite period of time until it is no longer needed, (2) renew the land withdrawal for 25 years with the option for an additional renewal, or (3) take no action and allow Congressional authorization for the range to expire in November 2001.



Public open houses held in Yuma and Phoenix in November 1997 gave interested citizens another opportunity to express their opinion about the proposed range renewal and to talk one-on-one with members of the range and draft LEIS management team.

During the scoping period, more than 300 comments were received from about 100 individuals. The most frequently made comments regarded the alternatives; several people who commented felt that the range of alternatives was too narrowly defined. Military use of the adjacent airspace and concerns about noise received the second

greatest number of comments. Several people said that they were concerned about how the BMGR lands are managed and suggested there might be a better way to protect the resources.

Coordination with agencies having management responsibilities for the BMGR has

February / March 1996

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
18	19	20 Glendale Community College Phoenix	21	22	23	24 Tribal Council Chambers, Sells, Tohono O'odham Nation
25	26 University of Arizona Medical College, Tucson	27 Ajo Community Center, Ajo	28 Santa Rosa Boarding School, Santa Rosa, Tohono O'odham	29	1 March	2
3	4 Yuma Civic Center, Yuma	5 Union High School, Gila Bend	6 Ironwood Elementary School, Casa Grande	7	8	9

Public scoping meetings were held in eight locations.

occurred throughout the draft LEIS process. Public participation in the process has also continued. The agencies cooperating in the preparation of the draft LEIS have continued an ongoing program of BMGR partner management meetings. These meetings are open to the public and are held approximately on a quarterly basis. Participants in recent meetings included individual members of Native American tribes and representatives of several civic organizations. Parties interested in the range renewal process have also been kept informed through a series of newsletters that have been mailed to more than 1,200 individuals. Topics addressed in the newsletters have included:

- upcoming public meetings
- how the public can get involved in the project
- the results of public scoping
- procedures for recreational access to the range
- descriptions of range renewal alternatives and scenarios
- descriptions of biological and cultural resource studies on the BMGR



To date, the public participation process has included eight public scoping meetings and two open houses. Open exchanges about range issues have also occurred at the quarterly BMGR Partners meetings.



The exchange of information and ideas has been two-way. The government has developed a deeper understanding of public concerns. In return, the public has gained a clearer view of how and why the military uses the range and the steps being taken to protect its environment.

The Air Force carefully noted the public and agency comments on the future administration and management of the BMGR. Based on this input, the Air Force developed sub-alternatives (or scenarios as they are called in this report and in the draft LEIS) to address range administration and management. Scenarios have also been developed to evaluate the consequences of not renewing some lands that are a part of the existing range. The Air Force hosted public open house meetings in Tucson on November 5, 1997 and in Yuma on November 6, 1997 to inform the public about the scenarios and to ask for input on them. In addition to the government agency representatives who attended, 100 people from the public came to the Yuma open house and 42 people attended in Tucson. About 80 people made comments; both support and opposition were noted for nearly all of the primary alternatives and the scenarios.

Descriptions of the Proposed Action, Alternatives, and Scenarios

The draft LEIS proposes primary and sub-alternatives pertaining to the pending Congressional decision of whether or not to renew the BMGR land withdrawal. The primary alternatives address the decision to renew or not renew the range.

The sub-alternatives (referred to as scenarios in this report) would be relevant only if the BMGR land withdrawal is to be renewed by either the proposed action or the alternative action. The scenarios pertain to (a) whether administration of the range should be directed by one or two military departments, (b) the land area of the range, and (c) which agency or agencies should administer management of the natural and cultural resources of the range.



Ongoing decontamination programs remove inert munitions and target debris from the range and detonate unexploded live ordnance where it is found. Not all munitions can be found during target cleanup operations. After nearly six decades of training, the risk of unexploded but still dangerous munitions being present in undetermined locations must be recognized.

The Air Force identified the primary alternatives when the Notice of Intent to prepare the draft LEIS was published. In summary form, these three alternatives follow:

- The **proposed action** is to renew the land withdrawal and reservation of the BMGR for an indefinite period of time until Congress, through consultation with the secretaries of the military department(s) concerned, determines that a continuing military need for the range does not exist. A periodic Congressional review (every 15 years) would formally assess the continuing military need for the range land, military



accountability for range use and stewardship, environmental issues associated with military use of the range, and the status of permitted non-military land uses. Congress could adjust the terms and conditions of the withdrawal if warranted by the findings of the 15-year review.

- The **alternative action** is to reauthorize the land withdrawal and reservation of the BMGR for a period of 25 years. The military would have the option to request further renewal of the range if a continuing military need for the land withdrawal beyond the 25-year period is identified.

- The **no-action alternative** would not renew the range. This alternative would be implemented if Congress allows the current authorization for the BMGR land withdrawal under Public Law 99-606 to expire without reauthorization. The range would be deactivated under this alternative and military use of the formerly withdrawn lands would no longer be authorized.

The scenarios were developed to provide alternative means of addressing issues raised by the cooperating agencies and public during scoping and preparation of the draft LEIS. A summary of the scenarios proposed in the draft LEIS follows.

Scenario A1 would renew the BMGR as one military reservation reserved for use by the Secretary of the Air Force. The Air Force would continue to serve as the designated overall military administrator for the entire BMGR and as the scheduling agency, principal user, and military manager of the eastern land section and associated restricted airspace. The Marine Corps (which is under the Department of the Navy) would remain as the delegated scheduling agency, principal user (along with the Navy), and manager of its own activities within the western land section and the associated restricted airspace. The Air Force would continue to hold management control and environmental approval authority for the eastern and western land sections of the range.

Scenario A2 would renew the BMGR as two military reservations with one reserved for use by the Secretary of the Air Force and the other for use by the Secretary of the Navy. The Air Force would continue to be the designated using and scheduling agency for the eastern land section of the BMGR and associated restricted airspace. Rather than being delegated responsibilities for the western section, the Marine Corps would

become the designated using and scheduling agency for the western land section and associated airspace. With this designation, they would assume full responsibility for environmental compliance issues for that portion of the range.

Scenario B1 proposes that the full existing land area of the BMGR be withdrawn so the range would continue to include about 2,668,100 acres of public lands.

Scenario B2 would reduce the size of the BMGR by withdrawing up to approximately 111,000 fewer acres than the existing reservation. Three parcels of land, shown as Areas 1, 9, and 13 on Figure 3A, could potentially be excluded from the renewed land withdrawal. The Air Force currently manages the Sand Tank Mountains (Area 1) and Sentinel Plain (Area 9) to prevent unauthorized entry into adjacent live-fire ranges and



to exclude land uses that would be incompatible with the noise and safety concerns associated with air-to-ground gunnery, bombing, and rocketry in the live-fire ranges. However, there are no direct military operations on these lands and they would not need to be included in the BMGR if future non-military land management would maintain the access and encroachment control functions. The range properties surrounding the Ajo Airport (Area 13) do not support range operations. The three areas proposed for non-renewal are functionally independent from each other so all or part of one, two, or three parcels could be excluded from a renewed BMGR.

Advanced training in frontline aircraft, such as this F-18, is the hallmark of the air combat education aircrews receive on the BMGR. Although some use of the range airspace for flight training could continue if the range is not renewed, the no-action alternative would preclude 73 percent of the missions currently flown because they require the use of aircraft weapons.

Scenario C1 would maintain the agency responsibilities and interagency agreements in effect under Public Law 99-606 for the management of natural and cultural resources. The BLM would continue to be responsible for land management within the eastern and western land sections of the BMGR under the Federal Land Policy and Management Act. The Lower Gila South Resource Management Plan Goldwater Amendment implemented by the BLM in 1990 would remain in effect until updated by this agency. Surface management within the Cabeza Prieta NWR section would continue to be administered by the USFWS. The AGFD would continue to manage the state's interests in wildlife and wildlife habitat and enforce Arizona wildlife laws throughout the BMGR. Air Force and Marine Corps involvement in resource management would continue as a result of the requirements for these agencies to ensure that their activities are in compliance with federal environmental laws and regulations. In addition, these agencies would have a continuing responsibility to develop and implement their own natural and cultural resource management plans for the range under the Sikes Act.

Scenario C2 proposes that the Department of Defense take the lead responsibility for managing natural and cultural resources and non-military use within the eastern and western range sections. The BLM would serve in an advisory role to the Department of Defense, and the USFWS and AGFD would retain their existing roles. A new resource management plan that integrates military operations, non-military land use, and natural and cultural resource management needs would be prepared following renewal of the range land withdrawal.

Scenario C3 proposes that federal interagency collaboration for the management of



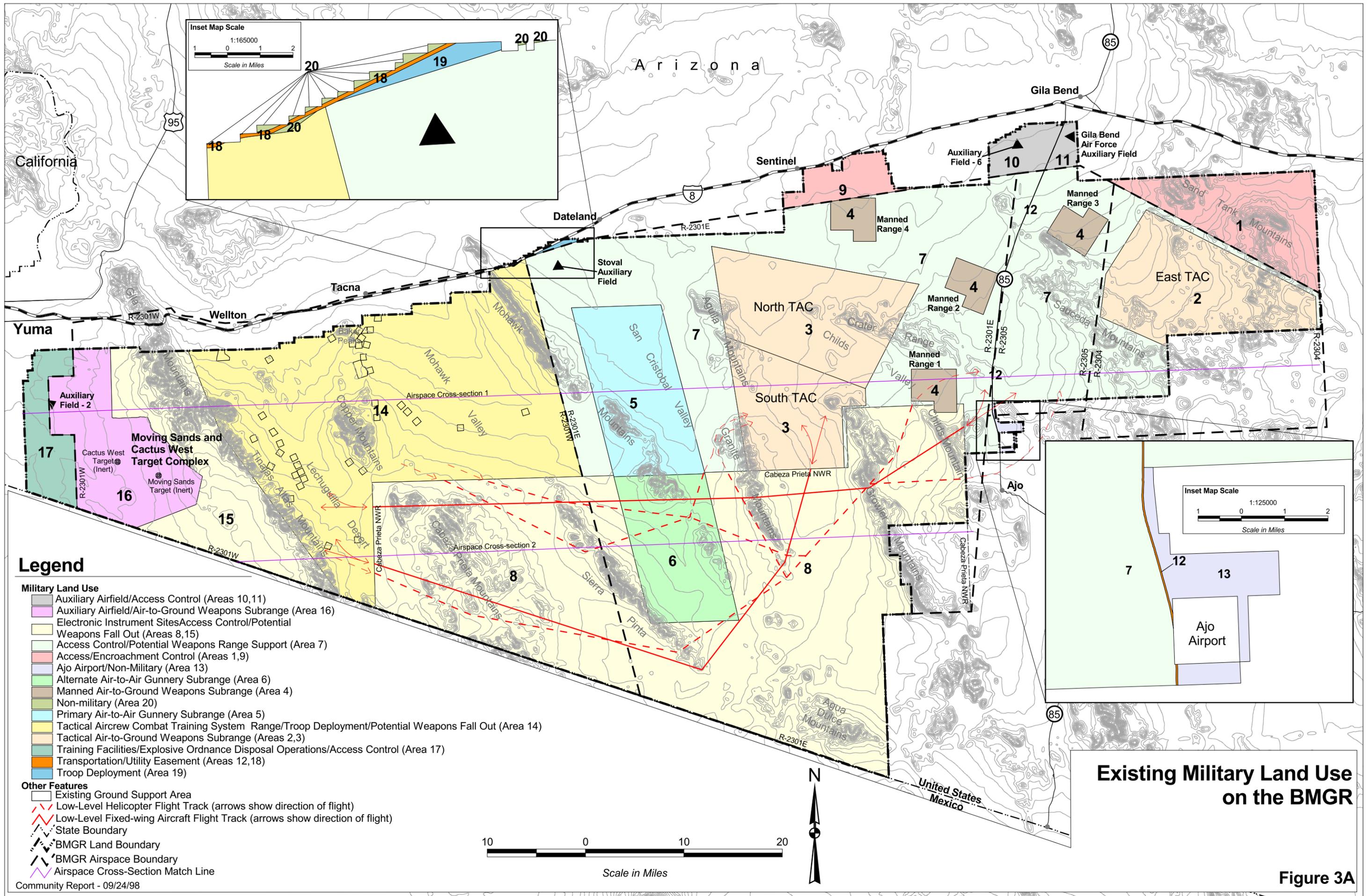
Heightened awareness of the range environment has raised widespread interest in its management. A number of agencies have natural or cultural resource management responsibilities for the range. Finding ways to make management more effective was an important range renewal scoping issue.

natural and cultural resources on the BMGR would be mandated with the range renewal. Federal participants would include the Air Force, Marine Corps, BLM, and USFWS, but other federal agencies with direct responsibility for lands or resources on the BMGR could become members if their participation would enhance integrated resource management. AGFD would also participate as a full member of the management framework. A collaborative interagency management framework would enhance opportunities to effectively pool the expertise, staffing, and other resources of the involved agencies. This is expected to increase management efficiency and lower costs by reducing or eliminating redundant tasks, using personnel in geographically advantageous locations, and ensuring that critical management needs are not overlooked. A new integrated natural and cultural resources management plan would be collaboratively prepared that would satisfy the requirements of both the Federal Land Policy and Management Act and the Sikes Act.

Should Congress decide to renew the BMGR and select the terms expressed by Scenarios A1, B1, and C1, the effect would be to continue the corresponding conditions of Public Law 99-606. Selecting any other mix of scenarios as components of a range renewal would be a change from the terms established by Public Law 99-606.



Military use has required the disruption of only very limited areas of the range surface but at the same time has precluded uses such as mining, grazing, and agriculture. As a result, the range environment is highly prized for its natural and cultural resource values.

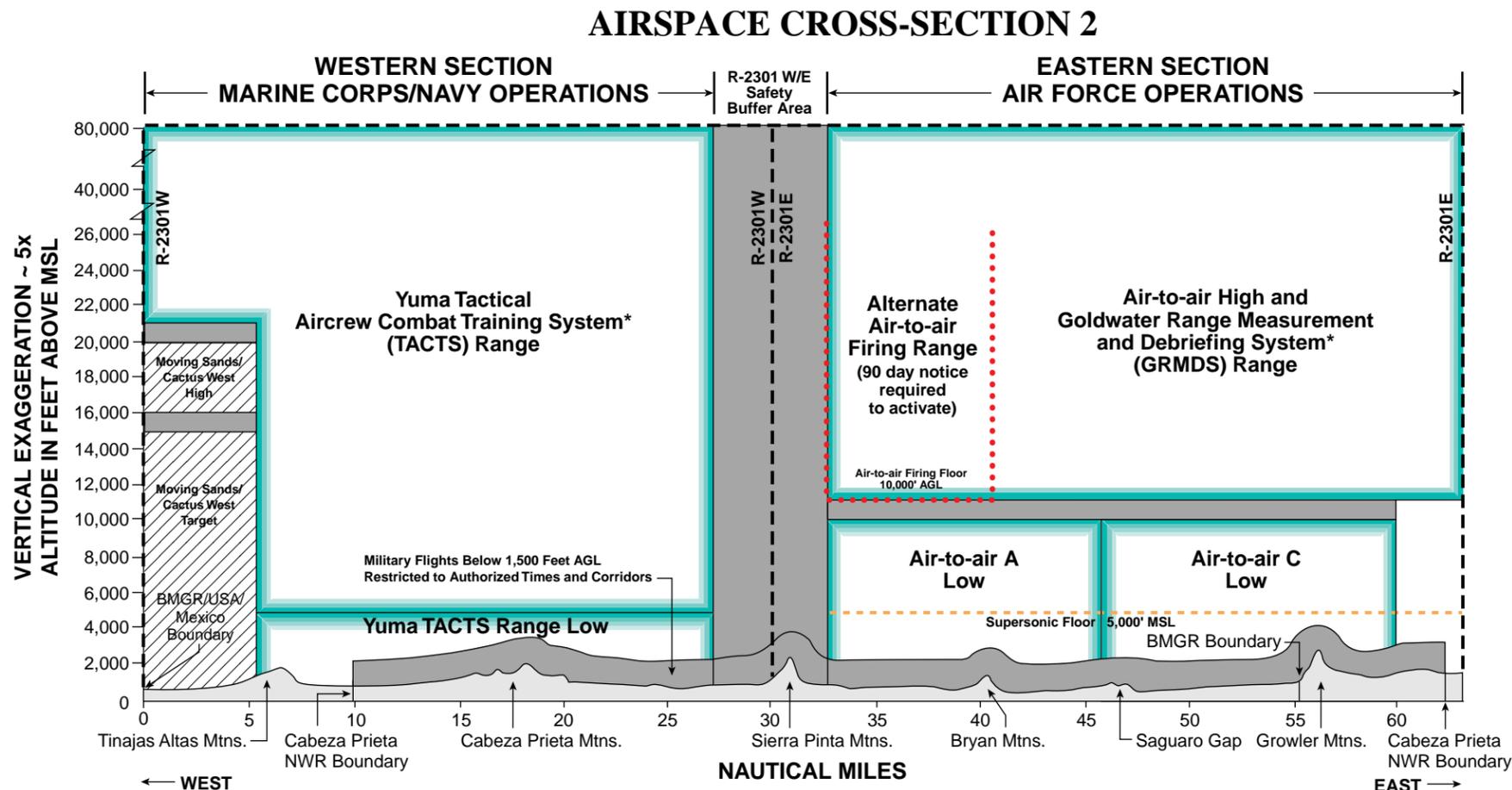
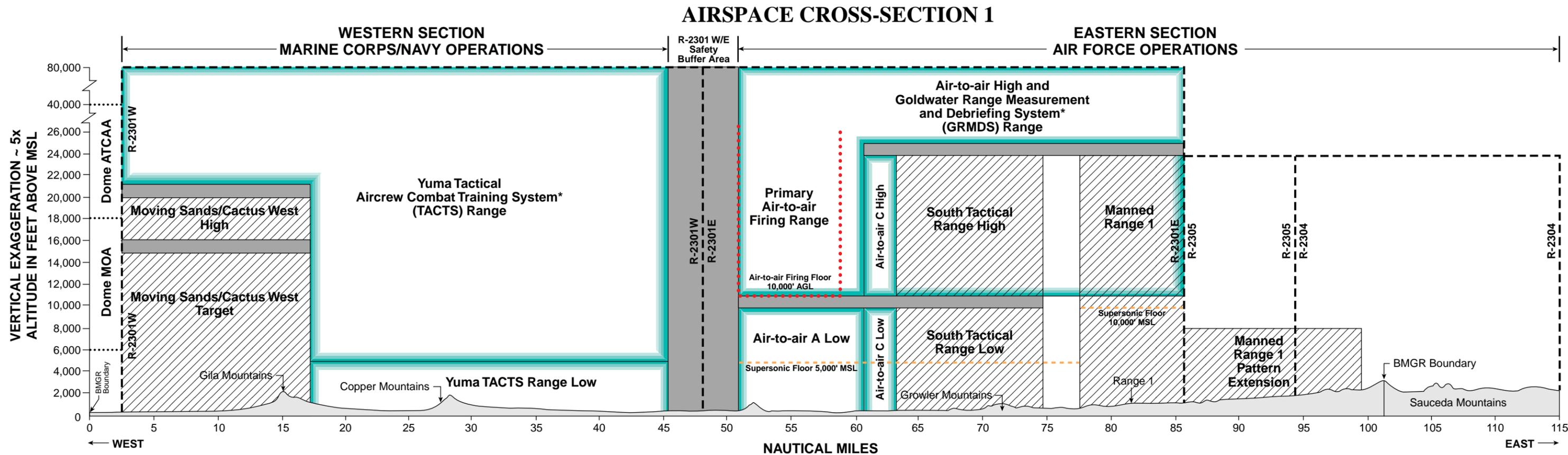


Legend

- Military Land Use**
- Auxiliary Airfield/Access Control (Areas 10,11)
 - Auxiliary Airfield/Air-to-Ground Weapons Subrange (Area 16)
 - Electronic Instrument Sites/Access Control/Potential Weapons Fall Out (Areas 8,15)
 - Access Control/Potential Weapons Range Support (Area 7)
 - Access/Encroachment Control (Areas 1,9)
 - Ajo Airport/Non-Military (Area 13)
 - Alternate Air-to-Air Gunnery Subrange (Area 6)
 - Manned Air-to-Ground Weapons Subrange (Area 4)
 - Non-military (Area 20)
 - Primary Air-to-Air Gunnery Subrange (Area 5)
 - Tactical Aircrew Combat Training System Range/Troop Deployment/Potential Weapons Fall Out (Area 14)
 - Tactical Air-to-Ground Weapons Subrange (Areas 2,3)
 - Training Facilities/Explosive Ordnance Disposal Operations/Access Control (Area 17)
 - Transportation/Utility Easement (Areas 12,18)
 - Troop Deployment (Area 19)
- Other Features**
- Existing Ground Support Area
 - Low-Level Helicopter Flight Track (arrows show direction of flight)
 - Low-Level Fixed-wing Aircraft Flight Track (arrows show direction of flight)
 - State Boundary
 - BMGR Land Boundary
 - BMGR Airspace Boundary
 - Airspace Cross-Section Match Line

Existing Military Land Use on the BMGR

Figure 3A



- #### LEGEND
- Air-to-air Maneuvering Subrange
 - Air-to-ground Attack Subrange
 - Air-to-air Gunnery Subrange
 - Supersonic Air Speed Floor (R-2301E Only)
 - Restricted Airspace Boundary
 - Military Operations Area/Air Traffic Control Assigned Airspace (MOA/ATCAA)
 - Airspace Buffer Zone
- AGL = Above Ground Level
 ATCAA = Air Traffic Control Assigned Airspace
 MOA = Military Operations Area
 MSL = Mean Sea Level

*The GRMDS and TACTS are electronically instrumented ranges used to track and measure aircraft maneuvers/performance and simulate weapons use.

Figure 3B

~~Purpose of and Need for Renewing the BMGR~~

As the twentieth century draws to a close, the United States has emerged as the world's preeminent military power. This strength is the result of many factors. Without a doubt, however, the dominance of American military power is principally the result of a nationally shared long-term commitment to maintain armed forces that can deter or defeat attacks against this country as well as defend the nation's overseas interest when necessary. One outstanding factor contributing to the quality of the nation's armed forces is the U.S. military focus on the indispensable importance of training for maintaining a strong and capable force that is well prepared to respond to the nation's defense needs.

The purpose of renewing the BMGR land withdrawal is in direct response to the fact that high-quality training is essential for teaching people how to react, think, and survive in combat as well as how to use weapons and other technology decisively. Training is also essential to mold individuals into effective military units and to meld various units into cohesive and capable forces.

“Untutored courage is useless in the face of educated bullets.”

General George S. Patton, Jr., Calvary Journal.

“Train like you will fight, fight like you trained.”

Warrior's maxim.

Nowhere is the critical importance of training more evident than in aerial warfare. Combat in aircraft that can aggressively maneuver to destroy other aircraft, attack an enemy on the ground or at sea, move troops or supplies in and out of forward battle areas, or perform reconnaissance of an enemy's position and strength is a phenomenon born of this century. By the very nature of aircraft and flying alone, it is among the most technologically advanced and tactically challenging forms of warfare. The ever increasing sophistication of combat aircraft and the weapons systems used by and against them has made thorough, ongoing training essential for military aircrews. No participant in any form of tactical aviation is likely to survive in combat, much less prevail, without superior training. Aircrews must know every aspect of their aircraft and weapons in order to employ them successfully.



Tactical aviation is one of the most complex and challenging forms of warfare. Second chances do not come often in combat. Aircrews must learn their craft in training.

The sophistication of aircraft and weapons system technology cannot be counted on to compensate for inadequate training. Engineers and test pilots team to develop aircraft that are capable of meeting specified objectives, but military aircrews must ultimately complete the marriage of aircraft, weapons, and tactics to form a combat ready force. This union can only be completed in the air in a training environment where aircrews are challenged by conditions and tactical situations that are as realistic as the need for safety can tolerate.

Combat ready aircrews are also the ones that will (1) first develop new tactics to counter emerging changes in an adversary's aircraft, aircraft weapons, air defense systems, or tactics and (2) identify operational deficiencies in their own aircraft or tactics. Making

these discoveries in training rather than actual battle pays great dividends in terms of lives saved and combat effectiveness.

For the Air Force, Marine Corps, Navy, Air National Guard, Army National Guard, and Air Force Reserve, the fundamental purpose of renewing the BMGR land withdrawal is to preserve a component of the national defense training base that is indispensable to their abilities to produce the combat-ready aircrews needed to defend the nation and its interests. The exceptional value of the BMGR for supporting high quality aircrew training stems from a combination of attributes that is available nowhere else. Chief among these attributes are:

- **Size of the Range**—With a land area of 4,169 square miles, the BMGR is the nation’s second largest military reservation (the Nellis Air Force Range in Nevada is about 13 percent larger) and is by far the largest dedicated almost solely to aircrew training. Overlain by about 57,000 cubic miles of restricted airspace reserved for military use, the range can be subdivided into as many as 16 subranges, which are operating areas for flight training in air-to-air and air-to-ground activities (see Figures 3A and 3B). More than 50 aircrews and aircraft may be operating simultaneously on these subranges while performing many independent training operations. Conversely, subranges may be combined into large



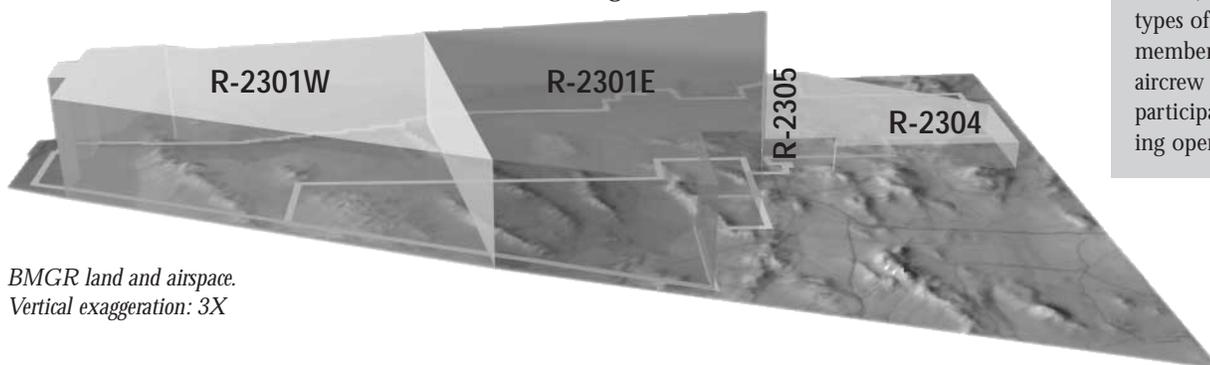
The position of Gila Bend Air Force Auxiliary Field (AFAF) within the BMGR is ideal for supporting flight training, refueling and rearming helicopters, recovering aircraft in emergencies, and managing range operations.

blocks of land and airspace to accommodate more complex training functions. Some advanced exercises use the entire range to conduct highly realistic training activities involving more than 80 aircraft.

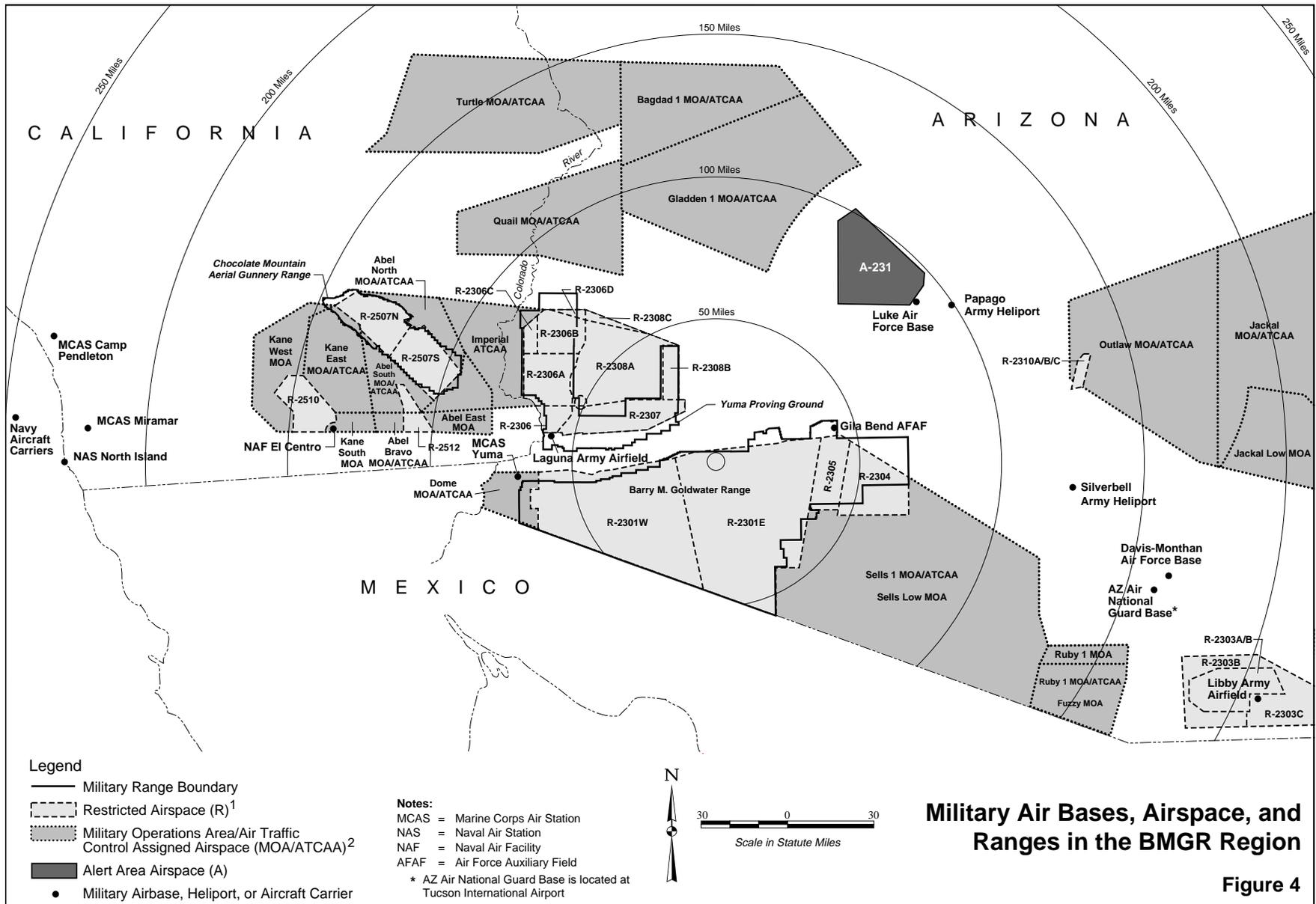
- **Supporting Military Bases and Airspace**—A basic requirement of tactical aviation training is for military bases, ranges, and airspace to be within reasonably close proximity of each other if training is to yield results that are effective in terms of costs and combat-ready aircrews. The BMGR is currently within the unrefueled flight radius of 12 Air Force, Marine Corps, Navy, Army, Air National Guard, and Army National Guard air bases in southern Arizona and California as well as Navy aircraft carriers in the Pacific Ocean (Figure 4). The training missions at these bases are also enhanced by the availability of military airspace outside of the BMGR. This airspace is used to support training that does not require the specific capabilities of the BMGR. This, in turn keeps the range available to support high priority training missions.

Military Aircrew

Aircrew refers to the crew members that operate an aircraft or its various systems. Single seat fighter or attack aircraft, such as the F-16C or A-10, have one crew member—the pilot. Twin seat fighter or attack aircraft—such as the F-14, F-15E, or AH-65 (an attack helicopter)—carry a weapons systems officer in addition to the pilot. Transport aircraft—such as the C-130, CH-53 (a helicopter), or UH-60 (a helicopter)—are operated by a pilot, copilot navigator, load master, and other types of crew members. All aircrew members participate in training operations.



*BMGR land and airspace.
Vertical exaggeration: 3X*



¹ When activated, restricted airspace may be entered only by approved scheduled users. Aircraft and ground-based weapons may be fired in restricted airspace. Scheduled users are required to maintain safe separation from each other.

² MOA/ATCAAs are joint use airspace. When activated, MOA/ATCAAs may be entered by scheduled military users, civil users on an instrument flight plan with Air Traffic Control approval, or unscheduled civil users flying under the visual flight rules. MOAs include the airspace below 18,000 feet above mean sea level; ATCAAs include airspace above that altitude. No aircraft or ground-based weapons may be used in MOA/ATCAAs. Scheduled and unscheduled users are required to "see and avoid" each other.

- Electronic Training Support Instrumentation**—The Air Force and Marine Corps each maintain electronic instrumentation systems on the BMGR to support advanced air combat training. These systems track, measure, record, and replay the simultaneous flight maneuvers and simulated weapons use of aircraft participating in training for air-to-air attack, evasion, and countermeasures. The Marine Corps system can also be used to simulate air-to-ground attacks. As a result of electronic upgrades, both systems will soon be able to accommodate up to 36 aircraft at a time or be linked to provide simultaneous coverage of the entire range. These systems allow training aircrew and commanders to critically review their performances, much as a coach and athletic



The exceptional size of the tactical range, diverse terrain, electronic instrumentation, and realistic battlefield simulations (like this target airfield complex) provide all of the resources needed to teach aircrews effective attack tactics.

team review a game film.

- Year-round Flying Weather**—The desert climate of southern Arizona typically provides 360 or more days of visual flying weather per year. Good weather means that training missions and courses can be completed on schedule to produce results that are effective both in terms of costs and aircrew education. The year-round flying weather at the BMGR currently prompts the armed services to deploy about 1,200 aircrews and aircraft to the range each year to receive training on its weapons ranges without being concerned that the training will be cancelled by poor weather.

Tactical Aviation

Tactical aviation refers to the whole spectrum of moves and counter-moves that aircrews and aircraft perform to fight a war directly against enemy forces within the air-to-air (aircraft versus aircraft) or air-to-ground (aircraft versus ground forces) combat arenas or that provide air transport (airlift) support to friendly ground forces in the battle area.

- Varied Terrain**—The highly varied terrain of the BMGR, which includes 23 low-elevation angular mountain ranges or outcrops widely separated among broad valley plains, is ideally suited to its use for tactical aviation training. Coupled with the placement of simulated airfields, tank groups, and other types of targets, the terrain helps to present training aircrews with diverse but realistic battlefield problems that they must learn to solve quickly. Because of the tactical diversity that BMGR managers have generated through the use of terrain in target development, aircrews find each training flight to be fresh and instructional, not repetitious.

“The Goldwater Range, of course, was large enough that it could accommodate almost any type of aerial weapons delivery and aerial combat tactics, if you will—which made it a unique place, and there’s none other like it in the world.”

LtCol Jake Sorensen, USAF (Ret)
F-4 Phantom II pilot and Vietnam War veteran.



Integrated training on the BMGR can enhance the readiness of both aircrews and combat support troops, shown here rearming an AH-1 “Cobra” gunship with 2.75-inch rockets.

■ **Integrated Full Service Training**—The full merit of the BMGR as a training asset is more than the sum of the previously listed attributes. Its role must also be assessed within the context of the air power training needs of the Department of Defense. The BMGR—in conjunction with the military airfields, additional military air-space, and low-level training routes within its operational region—forms the equivalent of a full service tactical aviation training university. Each component of this university provides essential services and each is dependent on others to support individual training missions. The BMGR, however, is the cornerstone without which the instructional values of the other elements could not be realized.

“So although the weapons have changed, the openness of it, the ability to use it without interference, is something you could never buy back. If you ever lose it, it’s gone. You can forget it.”

LtCol Don Meador, USAF (Ret)
Flew AT-6 aircraft on the range as an instructor in 1943 and F-84 aircraft in 1954.

The last 57 years of military training on the BMGR have been highly productive in terms of both the quality and quantity of aircrews produced. This achievement is remarkable considering the extraordinary evolution in aircraft and other air combat technologies that have occurred over this time frame. The BMGR was initially established to accommodate training in propeller-driven aircraft with flight performances and weapons systems that were quite primitive by modern standards. The range, however, has had the flexibility inherent in its size and other attributes to effectively support aircrew efforts to master each technological advancement and the associated changes in air combat tactics. If the future of military aviation promises one constant, it is continued change. The aircrews that will be called upon to implement these changes will continue to need the flexibility of the BMGR to support their training.



Training on the BMGR—in aircraft such as this F-16 at Luke AFB—is supported by military air bases in Arizona and California.

Overview of the BMGR Environment

Although the BMGR is presently uninhabited, major components of the range environment are connected to and interrelated with past and present human uses. Evidence suggests that the earliest humans, hunters of large mammals such as mammoths, arrived in the range area around 11,000 years ago and possibly earlier. Within the last 1,500 years, the range area has witnessed use by Hohokam, Patayan, and possibly Trincheras peoples whose descendants include contemporary Native American groups.



Approximately 87 percent of the BMGR remains untouched by military operations and most of the surface lands used by the military have negligible or low levels of disturbance.



Water, a rare and precious resource on the BMGR, helps to support the diverse wildlife populations on the BMGR.

From the 1500s to the 1700s, European missionaries and explorers crossed the BMGR region along north/south routes between present day Mexico and the United States and along east/west routes connecting Tucson and Yuma. Beginning with the discovery of gold in California in 1849, hundreds of American pioneers endured wagon, foot, and horseback travel through the range to seek their fortunes in the gold fields or pursue other economic opportunities on the west coast. In the late 1800s and early 1900s, the discovery of ore deposits within the present range led to an increase in prospecting and mining activities. At the same time, cattle ranchers settled in the area and began grazing livestock on the sparse vegetation of portions of the range. A few miners and ranchers managed to sustain some type of living, but most moved on after a short period. These meager activities continued at a variable pace until just before the United State's entry into World War II, when the BMGR was established and reserved for

military use. Civilian economic uses and development have been excluded from the BMGR ever since.

The establishment of the BMGR has had the initially unplanned effect of protecting what is today one of the largest and best preserved remaining tracts of Sonoran Desert. The geology and water resources of the range are characterized by rugged mountains, broad valleys, sand dunes, and natural surface water catchments. In terms of biological resources, more than 275 kinds of plants may occur on the range and at least 56 species of mammals. More than 150 species of birds, 6 species of amphibians, and 44 species of reptiles have been reported as represented on the range.

The present day human environment of the BMGR continues to be dominated by military land and airspace use. Pilots are trained in air-to-air, air-to-ground, and surface-to-air combat on several different types of training ranges. Effective aircrew training necessarily produces noise as well as health and safety concerns from the use of aircraft and air-to-air and air-to-ground weapons. Non-military uses of the range must be compatible with the military mission. Present day non-military land uses of the range include surveillance of the international border, transportation and utility rights-of-way, recreation, and natural and cultural resource management. The Cabeza Prieta NWR comprises nearly one-third of the BMGR lands. The airspace over the refuge is used for aircrew training; however, military land use within the refuge is limited to five electronic instrument sites. The use of BMGR airspace by civil aviation is generally prohibited because of the hazards that military training activities present.



The Cabeza Prieta NWR was originally established for the protection of desert bighorn sheep, perhaps depicted in this ancient petroglyph.

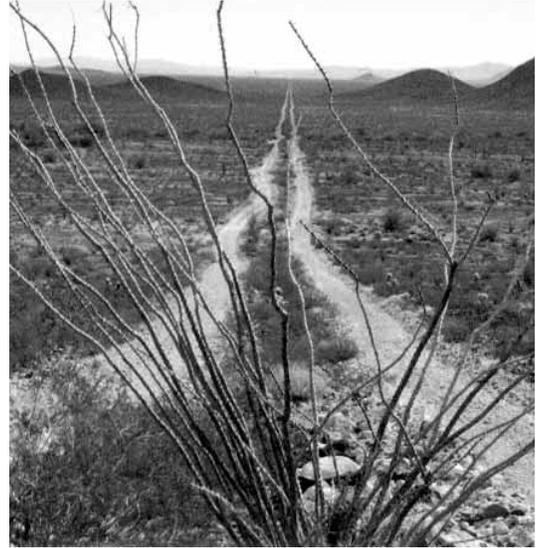
The greater BMGR region is increasingly active as a center for social and economic development. The region continues to be an important crossroads for travel between the United States and Mexico and between Arizona and California. With the passage of the North American Free Trade Agreement and the establishment of the North American Development Bank, an increased amount of attention has been placed on the opportunities in both the United States and Mexico for continued regional economic growth. Military installations that rely on the range to support some component of their training mission contribute to the regional economy through direct employment and expenditures in major growing metropolitan communities such as Phoenix, Tucson, and Yuma.



Chuckwalla

Airspace and Range Operations

Although the proposed renewal of the BMGR pertains specifically to the range land withdrawal, from the perspective of military operations the range must be viewed as an integrated composite of lands and overlying restricted airspace. Both lands and airspace are needed to support the types of tactical aviation training that occur on the range. The range lands and airspace are subdivided at two levels to support training. First, the range is separated into Air Force and Marine Corps operating areas (see Figure 2). When necessary, the entire range land and airspace area can be scheduled by either service to accommodate large exercises. At the second level, the range is further partitioned into several aviation subranges and auxiliary airfield operating areas. The subranges are configured to maximize the available training space on the BMGR.



Double-bladed roads mark common boundaries between adjoining tactical ranges or adjoining tactical and manned ranges. These identifiable boundaries help aircrews training in adjoining ranges keep their activities safely separated.

Restricted Airspace

Restricted airspace is designated by the Federal Aviation Administration to denote defined airspace areas where military activities such as aerial gunnery, artillery firing, or missile firings can occur. Restricted areas are depicted on aeronautical charts to alert the crews of aircraft not participating in restricted airspace activities of the potential presence of such hazards. The Federal Aviation Administration delegates control of restricted airspace to a responsible military agency.



World War II vintage auxiliary airfields continue to serve as forward arming and refueling points for helicopter operations. The aircraft shown is an AH-1 "Cobra" gunship.

On the Air Force side, there are four manned ranges, three tactical ranges, an air-to-air firing range, and high and low altitude air combat maneuvering ranges supported by electronic instrumentation (see Figures 3A and 3B). Each manned range complex is laid out nearly identically and each has three

bull's-eye type bombing targets and four strafe targets. These standardized ranges are used to teach the fundamentals of air-to-ground bombing, strafing, and rocketry. Ground personnel at these ranges control the aircraft traffic and score the accuracy of each aircrew's attack.

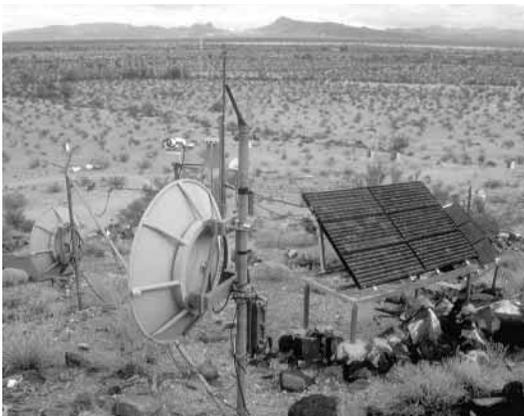
Tactical ranges are used to teach aircrews to apply the air-to-ground bombing, strafing, and rocketry fundamentals learned on the manned ranges against targets that have been constructed to simulate a realistic battlefield. The airspace reserved for each tactical range is large enough to accommodate realistic avenues of attack and escape for each target.

The multiple examples of weapons ranges on the Air Force side of the BMGR are ideally suited for student aircrew training. The several manned and tactical ranges serve as classrooms in which large numbers of student aircrews can receive the volume of training needed to become competent in each type of weapons delivery tactic.

The primary air-to-air firing range location has been used for aerial gunnery training since at least the 1960s. The air-to-air firing range does not include developed facilities but does require an underlying ground impact area for expended cannon munitions and tow target debris.

An alternate air-to-air firing range is designated over the Cabeza Prieta NWR. The Air Force must give the USFWS 60 days of notice prior to activating this range for use. The alternate air-to-air firing range has not been used since 1994, but could be necessary for future training needs. Continued inclusion of the Cabeza Prieta NWR in the BMGR is also deemed necessary to support future training with long-range weapons that would be launched from aircraft above the refuge but impact targets in Air Force tactical ranges.

The electronic training support instrumentation system (officially referred to as the Goldwater Range Measurement and Debriefing System) used by the Air Force functions through small instrument sites in dispersed locations underlying the R-2301E airspace (see Figures 3A and 3B). The R-2301E airspace forms the lateral boundaries of the air combat maneuvering range, in which flight training supported by this system is performed.



Electronic instruments enhance the training benefits by measuring and recording aircrew performance for post-mission evaluations.



“We had air-to-ground gunnery with the F-84F. We had air-to-air gunnery, and that’s one reason I wanted to come here. Because without a range like this, you have to learn a lot of things in combat.” LtCol Elbridge “Cap” Bates, USAF (Ret). World War II and Korean War veteran. Aircraft shown is an F-16 with its cannon firing.

The Marine Corps side of the BMGR is partitioned into four aviation subranges—the Yuma Tactical Aircrew Combat Training System high and low and the Moving Sands and Cactus West target complexes—and the Auxiliary Field 2 operating area (see Figures 3A and 3B). The Yuma Tactical Aircrew Combat Training System Range is an electronic training support system that functions through dispersed instrument sites underlying the R-2301W airspace. One of these sites is within the Cabeza Prieta NWR. The Moving Sands and Cactus West targets serve the same functions as the Air Force manned ranges. Aircrews use the standardized Moving Sands and Cactus West targets to practice the mechanics of bombing and strafing. A simulated flight deck of a Landing Helicopter Assault Ship and a runway with an unimproved surface are located at Auxiliary Field 2. This facility is used to train helicopter and fixed-wing aircraft aircrews.

Most of the Marine Corps squadrons that use the BMGR are operational (meaning combat ready) rather than student training units. Consequently, part of the training emphasis on the west side of the range is on exercises that build teamwork between Marine air and ground units. Ground units with specialties in air defense, communications, air control, electronic warfare, and forward airfield support are deployed on the BMGR to participate in these periodic exercises. Thirty-six ground support areas are presently



Auxiliary Field 2 has been redeveloped to simulate the flight deck of a Landing Helicopter Assault Ship to give helicopters and AV-8B “Harrier” pilots training in ship board take-off and landing operations. Other auxiliary fields on the range are used for a variety of training functions.

designated within the western section of the range to provide approved off-road locations for ground unit deployments (see Figure 3A).

The Marine Corps also makes limited use of established low-level flight corridors within the restricted airspace overlying the Cabeza Prieta NWR (see Figures 3A and 3B).

These corridors are used twice annually for an advanced Marine Corps aviation tactics course known as the Weapons Tactics Instructor course. The current total annual fixed-wing aircraft overflight time on these corridors varies between 7 and 14 hours. A Marine Corps proposal, which would require USFWS concurrence to implement, would permit up to 60 hours of fixed-wing overflight time annually. The total annual helicopter overflight time within the low-level corridors varies between 5 and 10 hours.



Live high explosives (HE) munitions (armed with exploding warheads) are approved for use on only five BMGR targets, including this HE Hill target. About 0.1 percent of the range surface lies within the impact footprint of the live munition delivered on the range.

Almost 360,000 acres, or 13.5 percent of the BMGR surface (including the Cabeza Prieta NWR) is or has been used over the last 20 years to directly support military operations. These direct use acres include locations currently or formerly used to receive expended air-to-air gunnery munitions and target debris, air-to-ground target layouts or simulations (such as bull's-eye targets or simulated airfields), air-to-ground munitions impact areas, explosive ordnance disposal cleanup areas, auxiliary airfields, maintenance areas, ground support training areas, developed training sites (such as a Marine Corps rifle range west of Auxiliary Field 2), and retired target or test areas. The levels of physical disturbance caused by these uses to soil surfaces and vegetation varies over a wide spectrum from negligible to complete disruption.

Of the 360,000 direct use acres, almost 188,000 acres serve as the primary and alternate receiving areas for expended aerial gunnery training munitions and targets. The alternate air-to-air gunnery range overlies about 87,000 acres of the Cabeza Prieta NWR. Although formerly used aerial tow targets (known as DARTs) are visually noticeable due to their shiny aluminum skins, the physical disturbance from the widely and unevenly scattered munitions and target fallout is cumulatively negligible.



A salvaged World War II vintage M4 "Sherman" tank serves as a training target. About 95 percent of the over 600 individual targets on the BMGR are authorized for inert training munitions only. Less than 0.7 percent of the range surface lies within the impact footprint of the inert munitions delivered on the range.

Military operations within the BMGR are supported by 572 miles of primary, secondary, or tertiary roads. These established roads provide surface access to, between, or within the various functional areas of the range. In addition to these roads, vehicles required for training, target range cleanup, or maintenance functions are driven off of established roads in ground support areas or within tactical and manned ranges for explosive ordnance disposal cleanup and target maintenance.

The remaining cumulative military surface use area is almost 172,000 acres or about 6 percent of the total BMGR area. Nearly 69 percent of this remaining cumulative surface use is located within the three tactical ranges (see Figure 3A). An additional almost 21 percent of this use is associated with the layout and use of the four manned ranges and almost 7 percent of this use is associated with the designated Marine Corps ground support areas (see Figure 3A). The remaining 3 percent of the 162,000-acre military surface use area is scattered about the range in the form of auxiliary airfields, retired target and test areas, developed training sites, maintenance and cleanup support areas, and the Moving Sands and Cactus West targets.

The levels of surface disturbance associated with the 162,000 acres of military use areas range from low to complete. Areas rated as having locations with high to complete levels of surface disturbance, however, are limited to less than 2 percent of the BMGR surface.

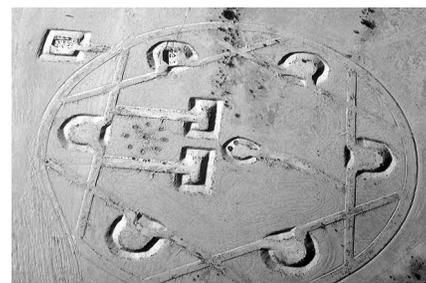
Renewal of the BMGR under the terms of either the proposed or alternative actions would preserve the range for continued military use. The effect of this action on military readiness would be positive as it would maintain Department of Defense access to one of its premiere tactical aviation training ranges.



This Stinger surface-to-air missile equipped "Humvee" is one of several types of vehicles used on the range. The crew of this vehicle is participating in an integrated air and ground training exercise.

Non-renewal of the BMGR would adversely affect military access to the type and quality of tactical aviation training capabilities needed both in the BMGR region and within the Department of Defense-wide range system. Although some military use of the range airspace could potentially continue, non-renewal would require permanent suspension of all training with aircraft weapons that requires direct or indirect surface impacts. Aviation weapons training is a principal mission of the BMGR. Of the nearly 73,000 individual training flights flown on the BMGR in 1996, almost 54,000, or 73 percent, required the use of air-to-ground or air-to-air weapons.

The loss of this training capacity would deeply compromise the abilities of the military air bases in Arizona and California that are dependent on the BMGR to adequately train either student or operational aircrews. Without the BMGR, the needed training could not be readily obtained within the operating regions of the affected air bases. The Department of Defense would likely have to relocate many air units to bases with weapons range support. No single range and air base complex is available, however, to absorb either the diverse types or volume of training performed at the BMGR. Rather, BMGR training missions would have to be parceled out to a series of bases with range access. The general effects of these changes would include lower quality training, higher training costs, lost residual training capacity, and reduced flexibility to meet emerging training needs. The Department of Defense would also lose its capability to serve air units throughout the nation and from some overseas bases that are periodically deployed to the BMGR to receive training that is seasonally or permanently unavailable at their home base locations.



Tactical targets on the BMGR, such as this replica of a Russian surface-to-air missile complex, present training aircrews with highly realistic battlefield simulations.

Non-military Land and Airspace Use

Although the primary purpose of the BMGR is to support military training, selected non-military uses are permitted as long as those uses are compatible with the overriding military mission. Non-military use of the BMGR is also affected by whether the use is occurring in the eastern, western, or Cabeza Prieta NWR sections of the range, and by the land use prescriptions of the BLM Lower Gila South Resource Management Plan Goldwater Amendment. Current non-military users include the BLM, USFWS, U.S. Border Patrol, various utilities, and the public. Non-military land uses of the range include recreation, international border surveillance, utility rights-of-way, and natural and cultural resources management.



Off-range land uses near the BMGR often require a complete transformation of the native desert habitat.

The BLM manages non-military use of the eastern and western land sections of the BMGR through the Lower Gila South Resource Management Plan Goldwater Amendment. In addition to providing a management framework for the eastern and western land sections of the BMGR, the Goldwater Amendment designates more than 15 percent of the total BMGR area as special preservation, recreation, or conservation areas (Table 1 and Figure 5).

The Cabeza Prieta NWR portion of the BMGR constitutes approximately one third of the total range area and is administered by the USFWS. The Cabeza Prieta NWR is assigned a dual land status – military reservation as well as wildlife refuge. As a military reservation, the Cabeza Prieta NWR primarily provides a receiving area for expended

aerial munitions and targets. Although munitions rarely fall on the refuge under current operations, some weapons firing tests require access control of the refuge to protect public safety. As a national wildlife refuge, the purpose of the Cabeza Prieta NWR is the conservation and development of natural wildlife and plant resources. In 1990, Congress reaffirmed the dual land status by designating most of the Cabeza Prieta NWR as a wilderness despite the auditory and visual intrusions from defense training activities that take place over the refuge.

Under the proposed action and alternative action, land status and management of the BMGR would remain as they currently exist. Non-military land uses within the BMGR that remain compatible with the military mission would continue. Therefore, minimal

impacts on non-military land uses within the range boundaries would be expected.

In addition to non-military land use within the range boundaries, land status and use within five miles of the outside perimeter of the range were also inventoried and assessed for potential impact in the draft LEIS. The southern boundary of the BMGR is also the international border. On the Mexican side of the border, lands near the BMGR are primarily undeveloped native desert. Lands surrounding the BMGR in the United States are primarily owned or administered by the BLM, state of Arizona, Tohono O’odham Nation, National Park Service, and the USFWS. The BMGR and surrounding area are within portions of three Arizona counties: Yuma, Maricopa, and Pima. About one-quarter of the land within five miles of the range is privately owned, located primarily in the vicinity of the surrounding communities.

Land uses adjacent to the BMGR include livestock grazing; agriculture; rural residential; mixed-use areas associated with communities; and lands designated for recreation,



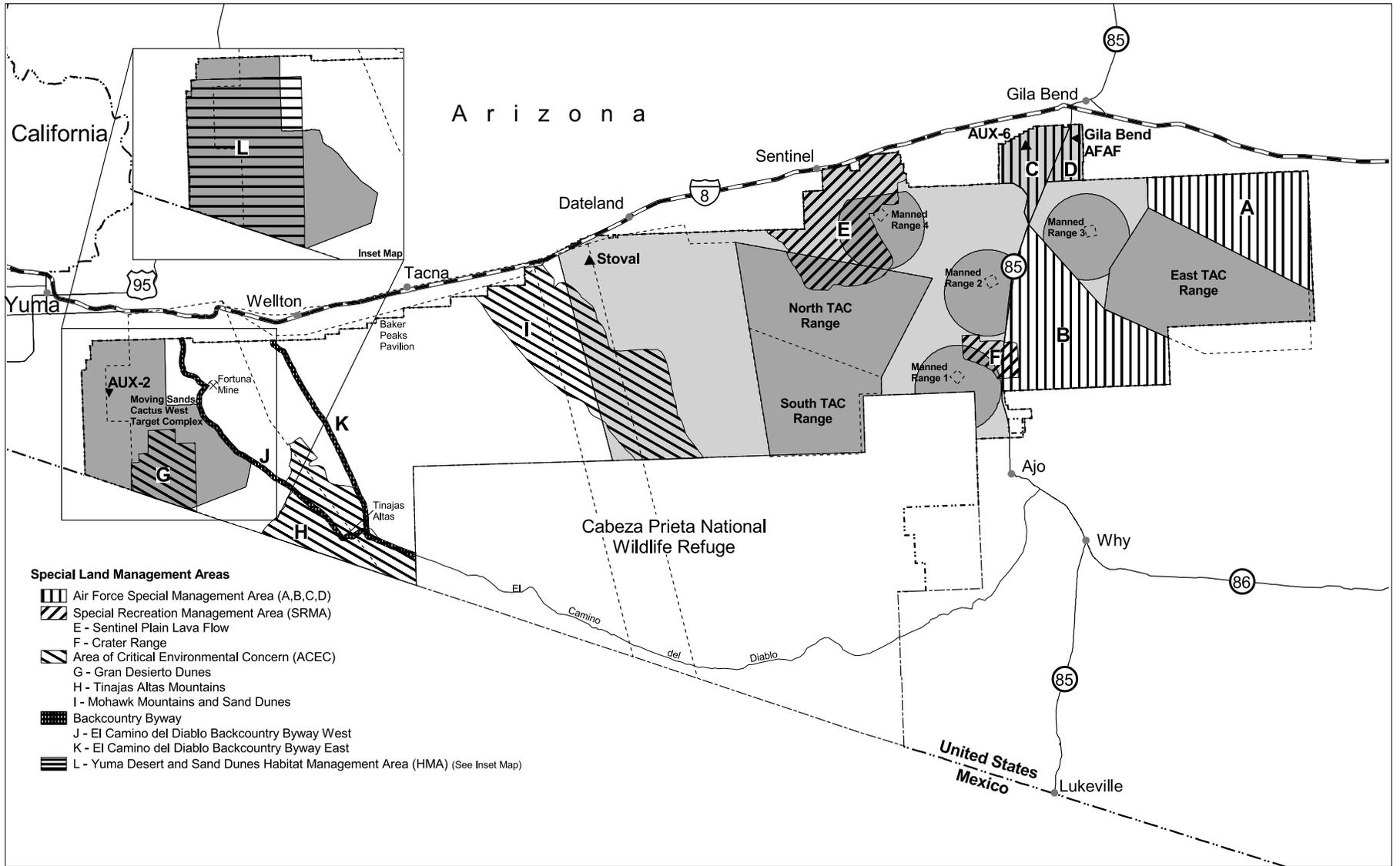
Among the diverse uses of the BMGR is airborne surveillance by the U.S. Border Patrol, whose task is halting the illegal flow of people and contraband across the U.S. - Mexican border.

protection, or conservation. Livestock grazing along the perimeter of the range occurs primarily on open rangelands administered by the BLM within Maricopa County. The agricultural corridors of the Gila and Colorado rivers include irrigated croplands and orchards along the western and northern borders of the BMGR. Primary crops include citrus, cotton, vegetables, and small grains. Rural residential use in the vicinity of the range is usually associated with agricultural areas, although scattered residential use occurs on private lands throughout the area along the range perimeter. Residential,

Table 1

Special Preservation, Recreation, and Conservation Areas Within the BMGR

BLM Designations	Name	Acreage	Percent of Eastern and Western Land Sections	Percent of Total BMGR Land Withdrawal
Area of Critical Environmental Concern	Mohawk Mountains and Sand Dunes	132,000	7.1	5.0
	Tinajas Atlas Mountains	60,500	3.3	2.3
	Gran Desierto Dunes	25,500	1.4	1.0
Special Recreation Management Area	Sentinel Plain Lava Flow	92,000	3.4	5.0
	Crater Range	11,920	0.6	0.4
Habitat Management Area	Yuma Desert and Sand Dunes	84,500	4.6	3.2
Backcountry Byway	El Camino del Diablo <i>(Proposed for designation)</i>	19,200	1.0	0.7



Special Land Management Areas

- Air Force Special Management Area (A,B,C,D)
- Special Recreation Management Area (SRMA)
E - Sentinel Plain Lava Flow
F - Crater Range
- Area of Critical Environmental Concern (ACEC)
- G - Gran Desierto Dunes
- H - Tinajas Altas Mountains
- I - Mohawk Mountains and Sand Dunes
- Backcountry Byway
- J - El Camino del Diablo Backcountry Byway West
- K - El Camino del Diablo Backcountry Byway East
- L - Yuma Desert and Sand Dunes Habitat Management Area (HMA) (See Inset Map)

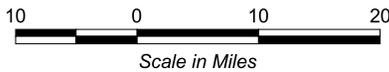
Legend

Restricted Military Operating or Hazard Area

- No Public Access Authorized
- Limited Public Access Authorized by Permit
- Public Access Within the Remainder of the BMGR is Authorized by Permit on a Near-continuous Basis

Base Features

- Auxiliary Airfield
- Sub-range Boundary
- BMGR Land Boundary
- Cabeza Prieta National Wildlife Refuge Boundary



**Military Operations Areas,
Special Land Management
Areas, and Access
Restrictions**

Figure 5



Over 400,000 acres of the eastern and western sections of the BMGR are identified as special management areas. These areas were designated to provide additional protection to wildlife, unique ecosystems, scenic and cultural resources, and special geologic landforms.

governmental, educational, commercial, and industrial uses in the vicinity of the range are associated with urbanized and agricultural centers along the principal highways in the region.

Land use zoning has been implemented for lands adjacent to the BMGR. Zoning designations influence future land use patterns. Within the communities of Yuma, Gila Bend, and Ajo, the majority of land is zoned as residential, commercial, industrial, and agricultural. Most lands in the vicinity of the BMGR outside of these communities are zoned as low-density residential, agricultural, and rural. Major land developments that have been proposed for the area adjacent to the range include the Yuma Area Service Highway to connect a Mexican port-of-entry to Interstate 8, the re-opening of the Phelps Dodge Ajo Incorporated Mine, and residential development.

Under the proposed action and alternative action, the renewal of the range would not affect general patterns of land status or use along the perimeter of the range. These alternatives would not displace any land uses or alter land use practices. Future land uses are being proposed with the knowledge of the existence of the range, so renewal of the range is not expected to alter these plans or proposals.

The restricted airspace overlying the BMGR was established to segregate activities, such as high-speed aerial maneuvers and air-to-ground ordnance delivery, which would be hazardous to non-participating aircraft. Consequently, when this airspace is active, it is not available for general and commercial aviation, but it is released for civil air traffic use when not required for military use. The location of the range on the U.S.-Mexican boundary is fortunate, however, as its overlying restricted airspace is generally out of the way of the predominant civil air traffic routes.



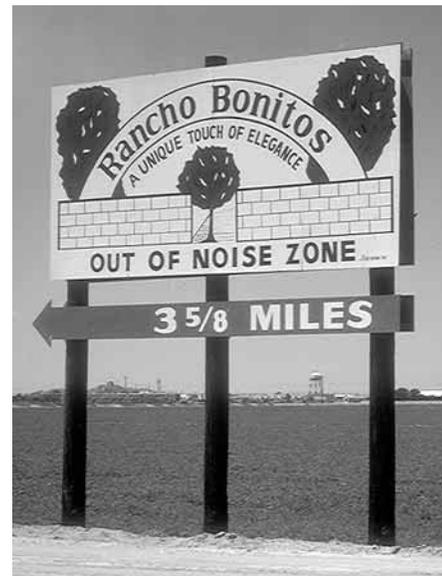
A wide variety of use occurs within lands adjacent to the BMGR.



The effects of public recreation in some locations, such as Tinajas Altas, have led the BLM to close some areas to vehicle use in order to promote recovery of natural vegetation.

Renewal of the BMGR would not likely change general aviation and commercial air carrier access to airspace relative to current conditions. In general, the current configuration of the airspace structure provides a workable balance among the needs of the Department of Defense, general aviation, and commercial air carrier users. Air transport and commerce needs are met as are defense training requirements.

Implementing the no-action alternative could substantially change land management and use within the existing BMGR boundaries. Although the withdrawal from mining, geothermal leasing, and livestock grazing would expire, segregation of these lands would continue until the BLM could complete a public planning process to determine the future use of the lands outside of the Cabeza Prieta NWR. Until that process could be completed, it cannot be determined if the lands might be available for multiple uses, designated for preservation such as a wilderness, or used in some other way. Even without the military withdrawal, the lands would remain under federal jurisdiction with the BLM as the



Aircraft noise can influence land use decisions in the near vicinity of the range.

land manager. No changes would be expected in land status or use of adjacent lands; therefore, minimal impacts are expected to perimeter land jurisdiction and use.

If the Department of Defense no longer had control of the land, military use of the overlying airspace would also likely change. Special use airspace designations could be cancelled or restructured, which may open the airspace to increased civil and commercial air traffic use in the BMGR area.



Military vehicle use is restricted to designated roads and support areas.

Some of the range renewal scenarios regarding land withdrawal area and the administration of natural and cultural resources are expected to affect non-military land and airspace use. Under Scenario B2, one or more parcels of land would not be included in the renewed land withdrawal area. Future use of non-renewed lands would be subject to BLM's public planning process. Depending on what types of future land uses are permitted, grazing lease boundaries and grazing practices adjacent to the lands proposed for non-renewal could potentially be altered. One parcel of land being considered for non-renewal is mostly within the Sentinel Plain Special Recreation Management Area. As a result of the BLM public planning process, this designation could remain or the land could be designated for some other purpose, but the land would continue to be restricted to public access because of public safety risks associated with the land's proximity to a live-fire range.

Under Scenario C2 the Department of Defense, rather than the BLM, would become the land manager for the eastern and western sections of the BMGR. As such, the military would produce a new resource management plan that considers not only military land and airspace uses, but also non-military land uses and natural and cultural resource management.

Under Scenario C3 a new collaborative resource management plan would be prepared under appropriate regulations. All specified cooperating agencies would be jointly responsible for plan development.

Noise

Noise is generated within the BMGR region by various military and non-military sources. Aircraft operations and explosive ordnance detonations generate the majority of noise from military activities. Noise from other military sources (such as target maintenance and vehicle use) and from civilian actions in the region (such as traffic on Interstate 8) is considered to be relatively constant and not significant within the context of average annual noise levels.



Aircraft are the predominant source of noise generated by military operations.

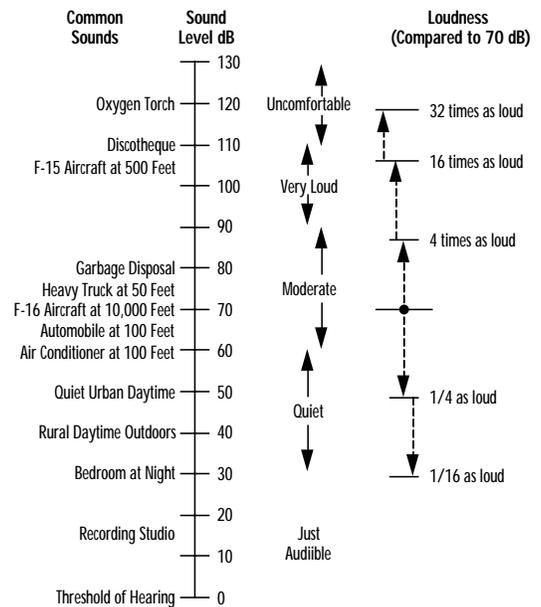


Helicopter transport of external loads requires low-level flight and the use of higher power settings.

An assessment of aircraft and blast noise requires a general understanding of sound measurement and the noise effects on people and animals. Figure 6 shows typical maximum sound measurements in decibels (dB) and the relationship of those measurements to common sounds. Noise levels are measured in decibels on a logarithmic scale, which means an increase in sound level of about 10 dB is usually perceived as a doubling of the sound's loudness. To assist in understanding noise levels, most conversations would measure between 50 and 60 dB depending on how close the people are standing to one another. The sound of an alarm clock placed about two feet from your pillow would measure about 80 dB.

The term "A-weighted" on Figure 6 refers to adjustments to approximate what the human ear hears. In addition, "C-weighted" noise is used for high-energy impulsive sounds, such as those produced by supersonic (faster than the speed of sound) aircraft flight and high explosive bomb bursts. The low-frequency noise component is frequently heard as a rumble.

**Figure 6
Typical Maximum A-weighted
Common Sounds**



Adapted from: Handbook of Noise Control, C.M. Harris, Editor, McGraw-Hill Book Co., 1979.

The noise effects associated with current aircraft operations and blast noise from explosive ordnance were estimated using computer-based noise models approved for such use. The computer models consider many factors that may affect noise levels and how people are affected by noise. The models predict a relative measure of change in noise levels due to military aircraft and weapons training operations, without actually monitoring the noise from these operations. The noise models for subsonic and supersonic aircraft operations each considered the type of aircraft, hours of flight operations, aircraft power settings, duration of activity, flight altitude, and number of flights. The blast noise model considered the type of ordnance, the amount of explosive charge, the location of detonation, and the number and time of events occurring per year. In all models, noise generated at night between 10 p.m. and 7 a.m. is regarded as of greater concern, and is weighted more heavily, because it may disrupt sleep.

Noise exposure guidelines developed by several agencies are relevant to the noise impact assessment. These guidelines relate the compatibility of various land uses to



Aircrews flying AV-8B "Harrier" aircraft practice take-offs and landings at Auxiliary Field 2 used to simulate the flight deck of a Landing Helicopter Assault Ship.

average sound levels measured in decibels. For example, average sound levels below 65 dB are generally considered to be compatible for most land uses, including residences, schools, churches, and hospitals. While noise levels of 65 to 70 dB may not be compatible with these land uses, these higher noise levels are generally acceptable for outdoor sports arenas, golf courses, and most manufacturing operations. The guidelines show that noise exceeding 80 dB may still be compatible with some land uses, such as agriculture and mining, as long as no residences are also in the area.



The size of the BMGR insulates off-range locations from excessive noise from the blasts of live munition.

Renewal of the BMGR under either the proposed or alternative actions would continue the existing noise conditions that result from military use. With only two exceptions, military operations on the BMGR do not result in noises that exceed an average of 65 dB off of the range. The two locations where aircraft noise can affect off-range land uses are at the Gila Bend AFAF and Auxiliary Field 2. Average noise exposure levels adjacent to the runways at the Gila Bend AFAF and Auxiliary Field 2 are above 80 dB. Aircraft operations at the Gila Bend AFAF result in average noise levels exceeding 65 dB at one residence off of the range. Average noise levels exceeding 65 dB on off-range lands from nighttime aircraft landing practice

at Auxiliary Field 2 affect a recreational vehicle park, a portion of a residential subdivision, and 13 separate single-family homes.

Within the BMGR, average noise levels from military operations not associated with the auxiliary airfields are highest within and near the three tactical ranges. These ranges are closed to public visitation for safety reasons. Average noise levels from aircraft training on tactical and manned ranges within the eastern section of the BMGR vary from 58 dB on Range 1 to 62 dB on North and South tactical ranges. Air-to-air operations in R-2301E (restricted airspace) result in average noise levels of less than 50 dB.

Noise generated from military aircraft activities within the western section of the BMGR is less than that generated within the eastern section of the range, primarily because there are about half as many operations within the western section. In contrast with noise levels in air-to-ground ranges in the eastern section of the range, the average noise level at the Moving Sands and Cactus West target complex is about 52 dB.

Noise generated as a result of explosive ordnance activities on North, East, and South tactical ranges was calculated to have average sound levels from 85 to 93 dB, although these noise levels rapidly diminish with distance from the targets.

Some supersonic aircraft operations occur over R-2301E, R-2301W, and the Sells MOA (see Figure 4). These supersonic operations are relatively infrequent and usually occur at higher altitudes, resulting in average noise exposure levels of less than 45 dB at the ground surface.

Low-level flight corridors (or Military Training Routes) extend from near some air bases to the BMGR. Other low-level corridors overlie the Cabeza Prieta NWR (see Figure 3A). Training flights on these corridors generally occur at 500 feet above

ground level but can occur at lower altitudes. Flight operations on about half of these corridors, including those over the Cabeza Prieta NWR, generate average noise levels of less than 45 dB and the remainder had average noise levels of between 45 and 55 dB. Noise exposure levels from flight operations in the Sells and Dome Military Operations Areas were also projected to be below 45 dB.



Army National Guard AH-64 "Apache" attack helicopter on a BMGR training mission.

Sudden onset of noise from a high-speed aircraft maneuver can be startling and annoying to a person who is overflowed. This may be particularly true within the Cabeza Prieta NWR, where the Marine Corps conducts one training exercise in which it is necessary to have high-speed, low-level flights. However, this exercise is conducted on only up to 10 to 14 days per year. People wanting a wilderness experience without the potential for these startling noises may schedule their trips to avoid the periods when the training exercise occurs.

Noise levels from military training would be reduced or eliminated if the range is not renewed. Blast noise would be eliminated because air-to-ground operations such as bombing and strafing would no longer be authorized. Aircraft operations associated with live-fire missions would also be eliminated. However, the overlying airspace may continue to be used for some aerial training operations so some aircraft noise may continue to occur even with the no-action alternative.

None of the scenarios dealing with military administration, withdrawal land area, or administration of natural and cultural resource management would cause additional or different noise impacts than those described for renewal of the land withdrawal.

Public Health and Safety

The BMGR was created to provide land and airspace locations where inherently hazardous air warfare training activities can occur while (1) simultaneously protecting public health and safety, (2) minimizing safety risks to military personnel, and (3) preventing interference with military training and support activities. The BMGR accomplishes these missions by excluding land-based public access and civil air travel from land and airspace areas where hazardous activities occur. Public access is regularly restricted in 39 percent of the eastern section and 19 percent of the western section of the range because these areas contain potential surface dangers from live-fire military training. In all, public entry is regularly restricted to approximately 22 percent of the BMGR. In 43 percent of the eastern land section (18 percent of the BMGR) public access is limited (only authorized when coordinated with range operations personnel). The remainder of the range land surface exists as a safety buffer zone where visitation is controlled by specific entry procedures. These procedures include a safety briefing and permit system; continuous scheduling and range access control; and gated and locked entry roads, perimeter fencing, and warning signs. Land uses such as mining, livestock grazing, and agriculture are excluded to further reduce danger to public health and safety.



Mines on the BMGR have not been worked in 60 or more years and are in dangerous condition.

Because the BMGR functions as planned, it has an excellent record in protecting the health and safety of the public as well as military personnel. No member of the public has ever been injured or killed as a result of military training activities. Military personnel are protected from potential injury by the incorporation of risk management into all areas of BMGR use and responsibility.

The principal safety risks that may be encountered on the BMGR result from military activities. Military hazards are primarily associated with training or training support activities at the four manned ranges, three tactical ranges, air-to-air gunnery range, and the Moving Sands and Cactus West target complex. Public access is not authorized in these training areas.



This stop sign and call box mark a safety checkpoint on a road that enters a manned range. Before proceeding, personnel must communicate with the manned range control tower to receive permission to cross the manned range.

Air-to-ground delivery of munitions occurs at the manned ranges, tactical ranges, and Moving Sands and Cactus West target complex. Most of the air-to-ground bombs, rockets, and missiles delivered to these target complexes by aircraft are practice munitions that are inert (non-exploding) with the exception of small signal cartridges that detonate on impact to produce a puff of smoke to indicate the location of the hit. Some full-scale live (exploding) munitions are also used within the three tactical ranges, but only at five approved target locations. Signal cartridges and live munitions occasionally fail to fire on impact, but continue to be an explosive hazard to anyone that disturbs or collects the expended munitions.

Explosive ordnance disposal teams locate and collect inert munitions from the surface of target areas at least annually. Munitions with potentially undetonated signal cartridges are consolidated within target locations and then rendered safe by controlled detonation with small disposal charges. Because of the extreme danger involved in working with unexploded but armed full-scale live munitions, no attempt is made to move this ordnance; instead, it is detonated in place with disposal charges.

During past training activities dating from World War II, ordnance may have been inadvertently or purposefully dropped at locations throughout the BMGR, including areas that are now open to the public. The public is made aware of ordnance hazards when they apply for a permit to enter the range.

Lasers, now integral parts of aircraft aiming systems, are used in the delivery of some types of air-to-ground munitions within tactical ranges, and manned ranges, or at the Moving Sands and Cactus West target complex. The associated laser hazard areas are not open to

public access and are posted with warning signs. Military personnel that are training within the hazard areas are equipped with goggles that protect their eyes from the lasers.

Microwave, radio, and radar energy is used at temporary and permanent instrument sites located throughout the range to support aircraft training missions. These energy sources may be a health risk to persons standing close to the transmitting equipment. Therefore, the perimeters of the hazard areas are clearly posted with warning signs and access to them is controlled by fencing when warranted.



A live bomb that failed to explode lies on the surface of the East Tactical Range target where the use of live ordnance is authorized.

Live-fire aerial gunnery training in the air-to-air range results in a ground hazard within the potential target and weapons fall-out area. Public access to the lands underlying the air-to-air range is not authorized.

There are poor road conditions throughout the range that are sometimes unsafe for both military and civilian users of the range. Nearly all of the roads on the BMGR are unpaved. In dry weather conditions, the dirt roads become very dusty. Vehicles traveling on these roads, especially heavy military vehicles, can kick up enough dust to obscure the view of other drivers and potentially cause vehicle collisions. During wet weather conditions, roads can wash out and vehicles can easily become stuck in the mud. Vehicles can be overcome by swift moving waters within road-wash crossings.



Signs are used to alert the public and military personnel of hazards on the range.



Environmental hazards such as extreme temperatures and venomous wildlife are of concern to both military and civilian users of the range. In addition, some potentially hazardous unstable mines and wells (from mining and ranching activities prior to the establishment of the range) can be encountered throughout the BMGR.



Live .50-caliber machine gun ammunition ejected from a jammed helicopter door gun lies within a target range.

In regard to aviation safety, both the Air Force and the Marine Corps have detailed scheduling and operating procedures to help prevent aircraft mishaps. Flight training has inherent risks and some military personnel have been injured or killed in aviation training accidents; however, the overall safety record has been good. In the event of a crash, the Air Force and Marine Corps each have plans detailing crash response procedures. These plans include conducting search and rescue for the aircrew, establishing crash site security, assigning responsibility to responders, and cleaning up and restoring the crash site. At Auxiliary Field 2 and Gila Bend AFAF, clear zones and accident potential zones have been established at each runway end to define areas of increased aircraft mishap potential. In these zones, certain types of land development and activities are prohibited or restricted.

In general, renewing the BMGR through either the proposed action or alternative action would result in little or no increased public health and safety concerns as compared to existing conditions. There would continue to be limited public access to the range especially for recreational purposes. For the portions of the range where recreational access is authorized, visitors may encounter expended but unexploded ordnance or be exposed to environmental hazards such as extreme temperatures, flash floods, and venomous wildlife. Existing range entry procedures, including the safety briefing and entry permit system, would be continued. Increasing population and corresponding demands for increased use of recreation areas in southwestern Arizona may lead to more people accessing the range without a permit. These people could be at increased risk because they would not have the safety briefing about military and non-military hazards.

Under the no-action alternative, hazards from military training operations would be reduced or eliminated. However, further assessment would be required to determine if (1) the Air Force could continue air-to-air training in the BMGR airspace, (2) decontamination of the BMGR is practicably and economically feasible, and (3) it is possible to decontaminate the land to a state where it can be opened for more extensive public use.

The land parcels proposed for non-renewal with Scenario B2 are not overlain by restricted airspace and no direct military operations occur on the ground. Non-renewed lands would have to be evaluated for levels of contamination from explosive ordnance and toxic or hazardous materials before determining future use, including opening the area for more extensive public use. Other scenarios would have the same effect on public health and safety as described for the proposed and alternative actions.

Cultural Resources

Cultural resources are places important to a culture or community and can include archaeological sites, buildings, structures, districts and objects as well as traditional cultural places. *Archaeological sites* are places where people lived or worked and where traces of these past activities have been preserved as ruins or scatters of artifacts (lost or discarded tools and other small items). Archaeological sites on the BMGR represent past activities of people of European ancestry (Euroamericans) who entered the area known today as southwestern Arizona in the sixteenth century, as well as the original Native American occupants. *Buildings* include standing architectural features like ranch houses or military installations where people lived; in contrast, *structures* are things like roads, corrals, mines, and military airfields. An example of an *object* would be an abandoned truck or aircraft. Districts are groupings of related sites, building, structures, and objects. *Traditional cultural places* link traditional communities to their past and help to protect their cultural identities; they can be archaeological sites or other cultural resources, but also can include natural features such as hills or springs. Traditional communities with ties to the BMGR include a number of Native American groups.



Intaglios or geoglyphs are large ground designs.



Petroglyphs include images such as this possible mountain lion.

Studies to locate and evaluate the historic importance of cultural resources on the BMGR have included (1) surveys aimed primarily at locating archaeological sites, (2) inventories of standing buildings and structures, and (3) the collection of oral histories and other consultation with Native American communities to identify traditional cultural places. Because the BMGR is so vast, a complete survey has not been possible. Therefore, archaeologists have produced models that predict where archaeological sites are most likely to be located and how many can be expected in unsurveyed parts of the BMGR.

Archaeological sites are the most common type of cultural resources on the BMGR. Most of these consist of small scatters of broken pottery and stone tools where Native

American groups camped and gathered wild foods and other useful natural resources. Some larger sites may be base camps or villages where people stayed for longer periods of time and where they may have farmed when the climate was favorable. Other archaeological sites contain rock art including petroglyphs (designs pecked into a rock surface), pictographs (painted designs), and intaglios or ground drawings produced by moving rocks into alignments or by clearing surface rocks to produce large designs on the ground surface. Sites left by Euroamericans relate primarily to mining and ranching activities. Historic military resources on the BMGR reflect its use as a flight training facility during World War II. Triangular auxiliary airfields are the most common remains from the World War II training era.

Federal law protects cultural resources that satisfy the government's criteria for being listed on the National Register of Historic Places (National Register). Archaeologists, historians, Native Americans, and federal agencies like the Air Force work with the Arizona State Historic Preservation Officer in Phoenix to decide which resources are eligible for listing.

Impacts or effects on potentially eligible cultural resources that may result from the alternatives and scenarios addressed in the draft LEIS are the primary focus of this analysis. Adverse effects usually result when cultural resources, like archaeological sites or standing buildings and structures, are subject to physical disturbance. Sonic booms or the appearance of low-flying aircraft also may adversely affect resources like traditional cultural places because such impacts alter the natural setting, which may be an important component of these resources.

Archaeological surveys of about 5 percent of the 2.7 million-acre BMGR have been conducted, and close to 1,000 sites have been



Remnants of historic ranching activities are found throughout the BMGR.

recorded. It is estimated that the entire BMGR may contain as many as 20,000 archaeological sites. Most of these reflect use by Native American groups that occupied or visited the region over a span of at least 12,000 years; a smaller number are the remains of Euroamerican ranches or mines.

The majority of archaeological sites likely will be considered eligible for listing on the National Register because of the important information they contain about the past. A travel route called El Camino del Diablo or the Devil's Highway, which is already listed on the National Register, crosses the BMGR. This property probably was used by Native Americans, early Spanish conquistadors and missionaries, Forty-Niners heading for the California gold fields in 1849 and following years, and later explorers and surveyors.

Buildings and structures constructed for World War II flight training also are present within the BMGR. Seven triangular-shaped auxiliary airfields have been or are likely to be determined eligible for the National Register because of their association with World War II. Also, it is possible a small number of Cold War facilities on the BMGR may be regarded as of exceptional national significance despite their recent age; a study to assess these facilities is currently underway.



Historic graves including the one pictured above, which marks the final resting place of a prospector named O'Neill, are located along El Camino del Diablo.

Finally, the Air Force has partnered with other federal agencies responsible for cultural resource management on the BMGR to identify and address Native American concerns. The agencies have embarked upon a proactive effort to involve Native American tribal groups in the identification of traditional cultural places including sacred sites throughout the BMGR. Twenty-six groups were contacted initially, and it appears that as many as 12 groups may wish to participate in the study.



This small, concrete ruin probably marks the site of an historic homestead.

The locations of recorded and expected cultural resources throughout the BMGR were compared with the locations of military use areas as well as areas where recreational visitation is permitted in order to determine the probable effect of each of the alternatives and scenarios. In brief, it was found that more than 600 archaeological sites may be subject to ongoing disturbance in the military use areas. World War II airfields, which generally are not maintained, are suffering from natural deterioration and a few are used for troop deployments that also may be causing disturbance. Additionally, thousands of archaeological sites are present in areas open to recreational visitation.

The Air Force is working with the Arizona State Historic Preservation Officer, Advisory Council on Historic Preservation, and several other federal agencies with responsibility for cultural resource management on the BMGR to decide how best to lessen these impacts. An agreed-upon course of action will be outlined in an Integrated Cultural Resources Management Plan. This plan will be formally implemented with a Programmatic Agreement signed by all responsible parties. Other interested parties will be invited to concur in the agreement. Mitigation for important cultural resources in areas where future disturbance cannot be avoided or natural processes are impacting sites will include:

- additional inventory
- archaeological excavations aimed at recovering representative samples of important information from selected sites
- the development of educational materials to alert range users of the need to avoid disturbing archaeological sites
- periodic site patrols by BLM law enforcement officers and voluntary site stewards
- installation of signs to publicly interpret sites and discourage vandalism



Distinct pottery types can help date archaeological sites.



Accumulations of fire-cracked-rock often signal the presence of buried cooking pits.

With regard to cultural resources, there is little difference between the proposed action and alternative action. Long-term planning to integrate cultural resource management and military objectives might be somewhat more difficult to achieve under the 25-year term than it would be with an indefinite term.

If the no-action alternative were to be adopted, it is possible that intensive decontamination efforts in military use areas with associated ground disturbance and threats to cultural resources could ensue. Depending on the future use of non-renewed range lands, it is possible that public access may be unrestricted, which could increase inadvertent or intentional vandalism. However, BLM law enforcement efforts would continue and other actions to safeguard cultural resources would be undertaken. Before the former range lands could be made widely available for reuse, new land management planning by the BLM would be completed. The potential environmental effects of proposed land uses also would be evaluated before implementing the new management plan.

There would be little difference with regard to the management of cultural resources between Scenarios A1 and A2, which regard military administration of the range.

If parcels of land were not renewed, as proposed by Scenario B2, decontamination efforts and a potential increase in public access at these parcels might disturb cultural resources.

Scenario C1 (the current situation) is quite complicated because of the number of involved agencies. This situation leads both to redundancies and the potential for cultural resources to be overlooked in some cases. Voluntary interagency coordination efforts are being explored. Scenario C2, with a single administrative agency for a given land area, would help to ensure that administrative confusion does not impede proactive cultural resource management. Under Scenario C3, collaborative management would be mandated rather than voluntary. A benefit compared to Scenario C1 would be that interagency responsibilities would be clearly defined. An additional benefit compared to Scenario C2 would be that the expertise of multiple agency cultural resource specialists could be pooled.



Abandoned targets used for training during the Korean Conflict are Cold War "sites."



Military surface use, including authorized off-road vehicle use, could affect cultural resource sites.

Socioeconomics

The socioeconomic effects of the BMGR are measured in terms of its current contribution to the economic environment of the BMGR region. Although some employment, income, and revenues generated by the BMGR occur in the immediate vicinity of the range, most are realized in and around the military bases that rely on the BMGR for the completion of their training missions. In varying degrees, Luke Air Force Base, Davis-Monthan Air Force Base, Arizona Air National Guard Base, Marine Corps Air Station Yuma, Marine Corps Air Station Miramar, and the Western Army National Guard Aviation Training Site all rely on the BMGR to support a significant component of their training mission.

Therefore, these six military bases, together with the BMGR, and the affected states, counties, and communities were the focus of the analysis. Collectively, five counties, eight Native American reservations, and 24 communities in Arizona and southern California were included in the study area (Figure 7).



As the most active training deployment support installation in the Marine Corps and Navy, Marine Corps Air Station Yuma plays host to hundreds of aircraft and thousands of aircrew and support personnel that come annually to use the BMGR.

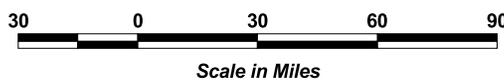
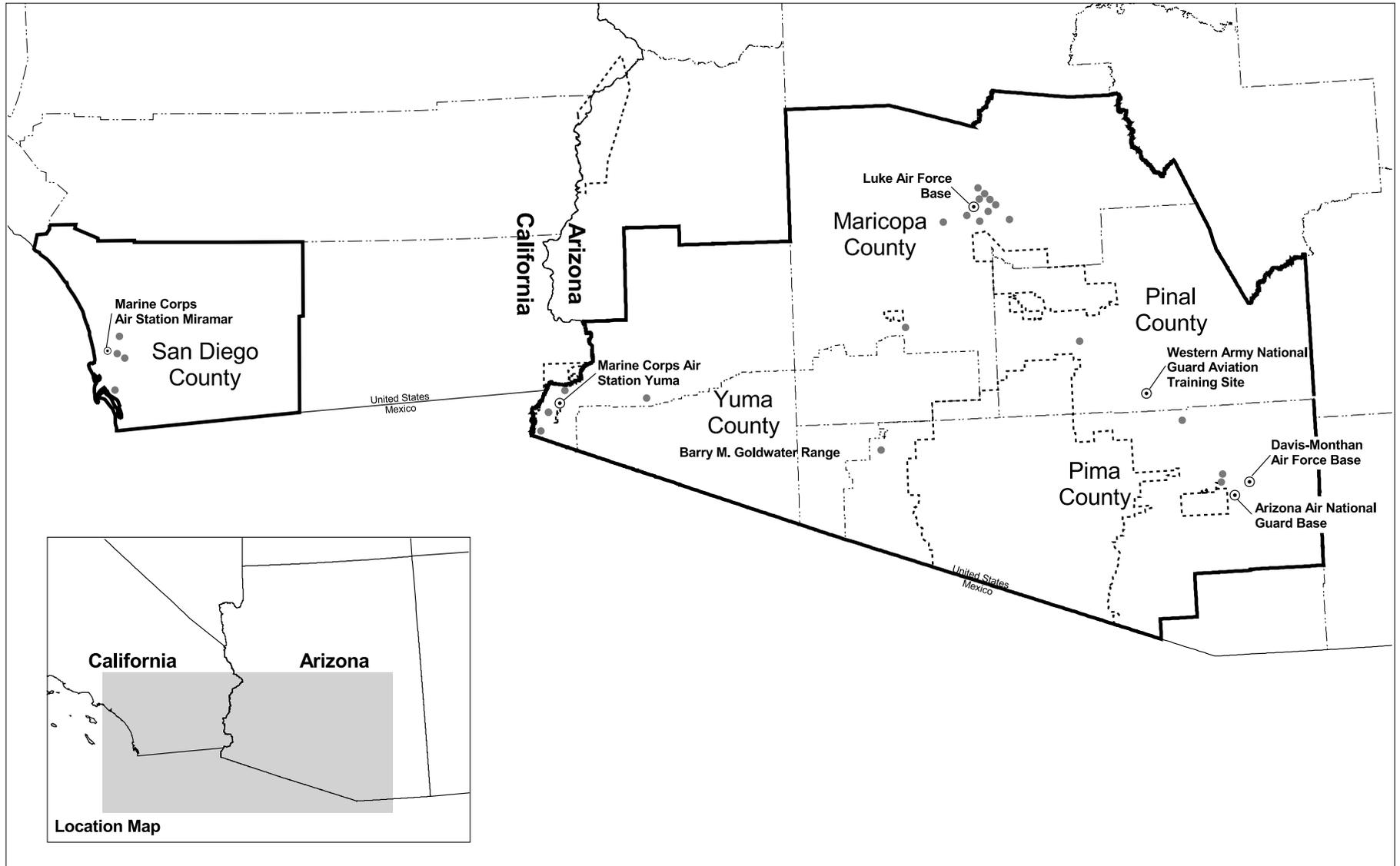


A military vehicle deploys to the BMGR.

Military contributions to the affected community are important; however, government, trade, service, agriculture, manufacturing, construction, mining, and tourism also support the regional economy. In 1990, the average household income for the affected communities was \$23,480. Only nine of the 24 communities in the study area had populations exceeding 20,000 and only four had populations exceeding 100,000. The racial composition of the study area is primarily White. Areas displaying the highest concentrations of minorities were the Native American reservations, where Native Americans represented as much as 98.8 percent of the population. Persons of Hispanic origin represented more than 50 percent of the population in three communities surrounding Luke Air Force Base, three communities adjacent to Marine Corps Air Station Yuma,

and one community adjacent to Davis-Monthan Air Force Base. African Americans and Asian or Pacific Islanders were not strongly represented in any community in the study area.

To understand how the BMGR contributes to the socioeconomic of the affected areas, two key factors had to be considered—the degree of effect the BMGR has on each military base and the effect that each base has on the surrounding area. These effects are interrelated and cannot be determined independently. Therefore, mathematical socioeconomic models were applied to data from the military installations and the U.S. Census Bureau to determine the current socioeconomic impact of the BMGR. The results of the socioeconomic model show that an estimated 17,000 direct jobs and 49,000



- Legend**
- Military Installation
 - Community
 - - - Native American Reservation Boundary
 - - - BMGR Land Boundary
 - - - County Boundary
 - ▬ Socioeconomic Study Area Boundary

**BMGR
Socioeconomic
Study Area**

indirect jobs in the affected area are related to the BMGR. This translates into about \$1.8 billion dollars in annual earnings and \$19.5 million in total tax revenues.

If the range is renewed, under either the proposed action or alternative action, current socioeconomic contributions to communities and counties surrounding the BMGR would continue. Since regional growth management plans anticipate and provide for the continued socioeconomic contribution of the military bases included in the study area, this consequence would be positive.

If under the no-action alternative the range is not renewed, the socioeconomic contribution of the BMGR would terminate. The missions of military bases reliant on the range could be substantially changed. Although the specific consequences regarding mission changes cannot be known until the various branches of the military begin the necessary planning that is performed in association with such decisions, the impact is expected to be adverse.

Non-renewal of the BMGR may also lead to the potential for gains in some economic sectors if future resource management plans permit activities such as mining or livestock grazing on former range lands. The socioeconomic consequences of new land uses would be evaluated in the environmental review of the new management plan.



A number of communities located near the BMGR provide support services to personnel that use the range.

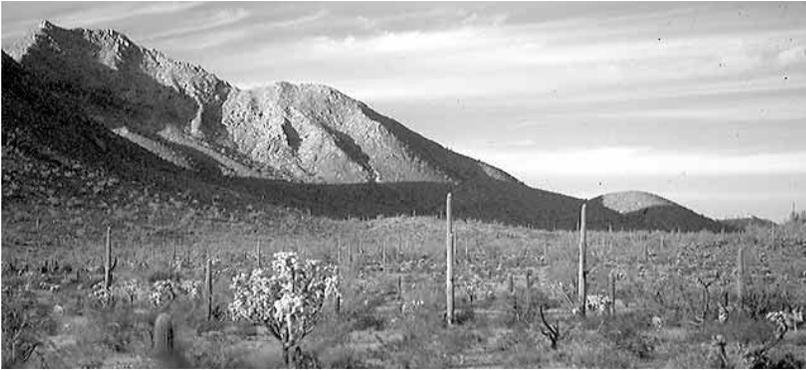
The only range renewal scenarios that have potential socioeconomic consequences that differ from the current conditions are Scenarios A2 and B2. Renewal of the range as a split military reservation (as proposed under Scenario A2) would support the Marine Corps' need for funding administrative responsibilities in future funding requests. As with the no-action alternative, non-renewal of portions of the BMGR (as proposed with Scenario B2) could lead to potential economic gains if land uses such as mining or livestock grazing are eventually permitted as a result of new resource management planning.



With approximately 200 home-based aircraft and 6,300 military personnel, Luke Air Force Base is the largest fighter aircrew training base in the world.

Visual Resources

The visual resources of the BMGR are characteristic of a Sonoran Desert landscape typified by a series of abruptly rising, sharp angular mountain ranges separated by broad, relatively flat basins. Interspersed vegetation and geological features add visual interest and variety to the landscape. The range landscape remains relatively unaltered by more than 57 years of military training.



Angular mountain ranges and mixed cactus upland vegetation form some of the most dramatic visual landscapes on the BMGR.

The BLM manages the visual resources of the BMGR outside of the Cabeza Prieta NWR. The USFWS manages visual resources within the refuge, where military features are limited to five remotely located communication sites, four of which are not readily within the viewing range of the public. The fifth site on Childs Mountain may be visible to visitors if the USFWS proposal to open that area to routine entry is implemented.

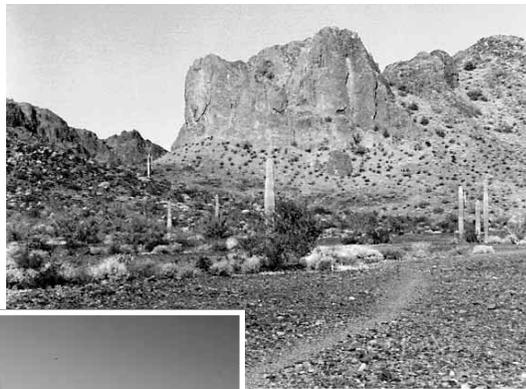
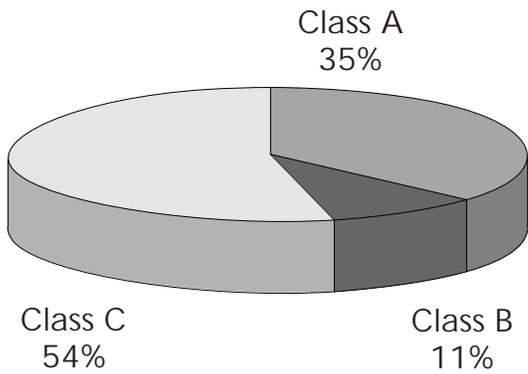
The BLM manages visual resources through the BLM Visual Resource Management system, which establishes objectives to protect scenic values on public lands. Each of the four Visual Resource Management system classes—Classes I, II, III, and IV—has its own management objectives. Each part of the landscape within the eastern and western land sections of the BMGR has been designated for interim management under one of these classes. The BLM assigned these interim classes through the 1990 Lower Gila South Resource Management Plan

Goldwater Amendment, pending BLM's completion of a comprehensive visual management plan for the range.

Most of the range is designated Class III, which allows visual contrasts caused by human modifications to the landscape to be evident, but does not allow for modifications that dominate or detract from the surrounding landscape. BMGR special resource management areas (such as Areas of Critical Environmental Concern), recreation travel corridors, and mountain ranges, are designated Class II. Under Class II management objectives, visual contrasts should not be evident in the characteristic landscape. A contrast may be seen but should not attract attention. Select areas of the BMGR where visual contrasts may attract attention and be dominant features in the landscape, such as in manned and tactical ranges, are designated Class IV. There are no Class I designations within the eastern and western sections of the BMGR. The BLM applies Class I designations to areas that have only very limited activity such as wilderness areas.

Three primary visual resource elements—scenic quality, visibility, and visual sensitivity—were analyzed for the eastern and western land sections to assess the visual resource effects of existing military use. Renewal of the range would generally continue these effects. Scenic quality refers to the aesthetic appeal or beauty of a landscape. To determine scenic quality of the eastern and western land sections of the BMGR, landscape features such as landform, vegeta-

Scenic Quality Classifications for the Eastern and Western BMGR Land Sections



Typical Class A Landscape



Typical Class B Landscape



Typical Class C Landscape

tion, color, and manmade change were evaluated using the BLM Visual Resource Management System. This system classifies scenic quality as either Class A, Class B, or Class C, depending on the diversity of the landscape. Class A represents the greatest amount of diversity while Class C represents the least diversity.

The evaluation of visibility and visual sensitivity focused on the principal travel routes and rest stops, special resource management areas, military use areas, and residences and communities. Travelers using State Route 85 and residents living near the BMGR boundary may be concerned about potential changes to the natural landscape. Views from these locations are rated accordingly as having high visual sensitivities. Within the BMGR, safety requirements limit visitor access to large portions of the range, thus restricting public viewing opportunities. In areas of the range that are open to the public, views rated as having high sensitivity are located within special resource management areas (such as Areas of Critical Environmental Concern) and along recreation travel corridors. From some viewpoints, military use of the range is evident and may be regarded as intrusive (out of context because of contrast with the visual setting). Visual intrusions may also be caused anywhere within the range by aircraft overflights. These signs of military use likely impact some viewers, but the type of impact is not easily defined. Because visitors to the BMGR are made aware of the military context of the range, they are likely to have a greater tolerance and even appreciation for the military character of the range.

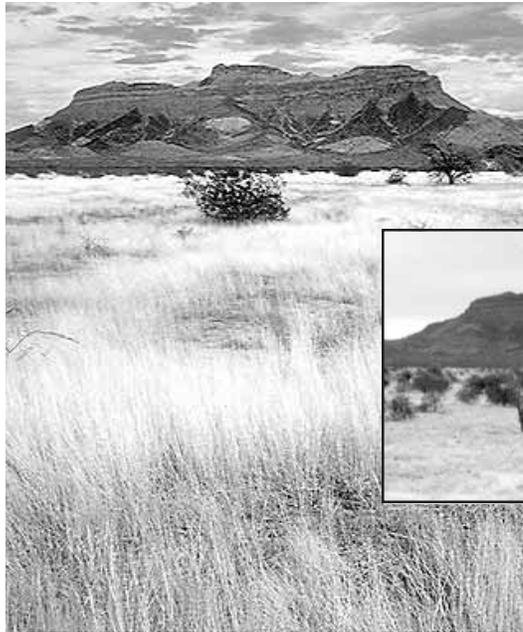
The results of the assessment of scenic quality, visibility, and visual sensitivity show that military use can be evident from some viewpoints; however, in most circumstances, these manmade changes are not dominant, do not

attract attention, and do not affect the overall scenic quality of the BMGR. Renewal of the BMGR, either under the proposed or alternative actions, would continue to impact visual resources at levels similar to those described for the existing condition.

If the range were not renewed as defined by the no-action alternative, visual impacts due to military use of the range would be reduced in some locations or eliminated. Removing target and support facilities and decontaminating the lands of hazardous materials may, in the short term, increase visual impacts. In the long term, revegetation and other signs of recovery should restore natural visual quality in most areas. In fact, the visual recovery of some former military use areas on the range has occurred. Some areas, however, would likely remain in distinct contrast to the landscape and require restoration actions.

If the results of new management planning find that the former range lands should be opened to mining, grazing, additional recreation, or other uses, visual impacts could potentially be greater than those resulting from the renewal of the range. These potential impacts would be evaluated during the BLM planning process for the future use of former range lands.

Some potential visual resource effects can be related to various range renewal scenarios. If portions of the range were not included in the BMGR renewal, as proposed in Scenario B2, the visual resource consequences for non-renewed portions of the BMGR would be similar to the consequences described for the no-action alternative. If the Department of Defense assumes responsibility for the administration of natural and cultural resources as proposed in Scenario C2, BLM would likely remain involved in the management of visual resources, but would serve in



Although they are eye-catching as a foreground element (below), live-fire targets recede visually within the greater landscape of a tactical range (left).



an advisory role to the military departments. If natural and cultural resources were managed through interagency collaboration as proposed in Scenario C3, the BLM would presumably continue to have an important role in visual resource management because of the agency's background and professional expertise in managing visual resources.



Troop deployments present a moderate, but temporary visual intrusion in the natural landscape.

Recreation

Dispersed, outdoor recreational opportunities are abundant in southwestern Arizona, where the BMGR is located. Organ Pipe Cactus National Monument, three national wildlife refuges, ten wilderness areas, the Colorado River, and other recreational sites on public lands offer varying opportunities for off-highway vehicle use, hiking, camping, hunting, rock collecting, fishing, and boating.



The BMGR is attractive to recreationists because it is in a remote location where you can be the only human for miles.

On the BMGR, recreational opportunities include four-wheel vehicle driving (on established roads), hunting, hiking, camping, picnicking, photography, and sightseeing. About 60 percent of the range is accessible to the public for recreation use. Another 18 percent of the range is available for recreation use, with special permission. The remaining 22 percent is closed to the public to protect public safety and prevent interference with military operations.

Recreational visitation rates at the BMGR have been relatively low considering the size of the range. Some reasons for the low level of use include the remote location, permit requirements for access, visitor concerns about military operations and safety, and access prohibitions for many places within the range. However, the scenery, geologic features, and diverse plant and animal life have been attracting more visitors in recent years, and trends indicate that recreational use will continue to increase.

The BLM, Air Force, Marine Corps, USFWS, and AGFD all have a role in administering recreation on the range. These agencies have established regulations for recreational use of the BMGR to protect and preserve the natural and cultural resources, protect public safety, and prevent interference with military training missions. One of the most important regulations is that no one is authorized to enter the BMGR without obtaining an entry permit and signing a military hold-harmless agreement. The permit kit informs visitors about vehicle use, resource protection requirements, and potential hazards emanating from military use of the range and from natural causes. The required agreement declares that if the visitor is injured by military activities or other causes while on the range they will hold the government harmless.

The BLM's 1990 Lower Gila South Resource Management Plan Goldwater Amendment identifies three primary goals for managing recreation resources. One goal is to enforce

all BMGR public access permit requirements developed by the BLM, Air Force, and Marine Corps. A second goal is to develop and post warning, directional, and interpretive signs. The third goal, to designate areas to be managed specifically for preservation and recreation, is accomplished by adopting the resource management plan. The Lower Gila South Resource Management Plan Goldwater Amendment designates two Special Recreation Management Areas—Sentinel Plain Lava Flow and Crater Range, and three Areas of Critical Environmental Concern—Mohawk Mountains and Sand Dunes, Tinajas Altas Mountains, and Gran Desierto Dunes. Finally, the Goldwater Amendment identifies El Camino del Diablo Backcountry Byway as an area for special resource management (see Figure 5).

Marine Corps management of recreation primarily involves issuing access permits for the western section of the BMGR. Although locations that support training activities requiring the use of targeting lasers, bombing, or gunnery are closed to the public, much of the western section of the range may be used for local day use and overnight recreation. Popular recreation sites include the Baker Peaks pavilion area, Fortuna Mine, Tinajas Altas, and El Camino del Diablo (see Figure 5).

The Air Force issues access permits for the eastern section of the range. Recreation can occur within the eastern side of the range

although some areas are closed to public use because the aerial bombing and gunnery training could be dangerous to recreationists (see Figure 5). The Air Force allows permitted access to Areas A and B and limited permitted access to Areas C and D and other large portions of the eastern section of the BMGR. Recreation access is prohibited in manned and tactical ranges.



The Baker Peaks Pavilion area is a popular recreation site used by residents from Wellton, Tacna, and other local communities.

The USFWS issues permits for recreational use of the Cabeza Prieta NWR and wilderness. Recreational activities that are popular here include traveling the historic road called El Camino del Diablo, hiking, backpacking, and camping. Hunting opportunities are limited to only a few bighorn sheep permits issued each year by the AGFD. Vehicles are restricted to approved roads within the refuge.

The AGFD manages wildlife, administers hunting permits, and enforces hunting and trapping regulations for lands within the BMGR. Four Game Management Units have been established within the BMGR. Two units are within the Cabeza Prieta NWR and are limited to bighorn sheep hunting. The other two units cover the rest of the BMGR and some land adjacent to the range. Deer, javelina, and small game may be hunted with the proper permits, in authorized areas, during the designated hunting seasons.



The proposed and alternative actions to renew the BMGR would not be expected to change the recreational access to the range, or affect the types of recreational activities permitted. Areas used for bombing or gunnery training and other hazardous areas would continue to be off limits to the public. Permits to enter public access areas would still be necessary. Continued withdrawal of the range would not change opportunities for recreation or the quality of the recreational experience on lands adjacent to the BMGR.



Nearly all visitors to the BMGR use vehicles.

Non-renewal of the range under the no-action alternative would have few immediate effects on recreation, because recreation management of range lands would initially remain relatively unchanged. Although some levels of overhead flight training may continue, most military operations would be eliminated or reduced. The changes would enhance the recreational experience for some and may eventually lead to public access of range locations currently closed to visitation.

In the long term, non-renewal could change recreational use or participation levels within the BMGR boundaries. Currently, many land uses within the BMGR are prohibited as a safety requirement. While the reuse of

former range lands would be subject to a public planning process, existing land use restrictions may be removed and the range could potentially be opened for multiple uses under BLM management guidelines. The character of the recreational experience could change in the face of new land uses. Existing recreational activities would likely continue to take place, and some activities that are currently prohibited or that have low participation rates may occur in increasing numbers. Some recreational areas within the BMGR would likely face increased use pressures as well as associated changes in the experience and potential deterioration of the resource base.

Scenario B2, which could exclude the Sand Tank Mountains and Sentinel Plain areas from the range renewal, is the only renewal scenario likely to affect recreational resources. If these areas were not part of the range, they could be subject to increased demand for recreational use. With public involvement, the BLM would develop a long-term resource management plan for these areas, which would address future recreational use opportunities for these lands.



In areas of the range open to the public, camping with a vehicle is allowed within 50 feet of a major road. No camping is allowed within one-quarter mile of any open or available surface water, within Tinajas Altas Area of Critical Environmental Concern, or within sand dune habitats.

Hazardous Materials and Waste

Military operations on the BMGR have required the use of materials that, under certain circumstances, can be hazardous to human health or the environment. To protect against these hazards, numerous state and federal laws regulate the use of hazardous materials and the storage, transportation, handling, and disposal of hazardous materials and wastes. In addition, Air Force and Marine Corps policies and practices aim to prevent pollution, meet or exceed all regulatory requirements, minimize or eliminate hazardous materials use, and prevent the release of hazardous materials into the environment.



High-density plastic sheeting is placed under parked vehicles and supply drums to contain any spills of hazardous materials.



Hazardous constituents in unexploded ordnance could leach out into the environment.

On the BMGR, the Arizona Department of Environmental Quality provides the primary oversight and enforcement of hazardous materials and waste regulations, with assistance from federal regulating agencies such as the U.S. Environmental Protection Agency. Hazardous material and waste management for the eastern land section is the responsibility of the Environmental Flight at the 56th Fighter Wing, Luke Air Force Base. The Marine Corps Air Station Yuma Environmental Department is responsible for hazardous material and waste management within the western land section.

Hazardous materials, such as automotive and generator fuels, oils, lubricants, paints, cleaning solvents, pesticides, and herbicides, are used at developed range administration and support facilities such as the Gila Bend AFAF. In dispersed locations throughout the BMGR, vehicles and portable generators use fuels, oils, and lubricants. Other potentially hazardous materials include latex paints used in the construction and repair of simulated

targets. Temporary containment aprons are placed beneath parked vehicles and generators to contain inadvertent spills of fluids.

Hazardous wastes are products or by-products of hazardous materials. Wastes can be classified as hazardous either by being included on a list compiled by the U.S. Environmental Protection Agency or because they are ignitable, corrosive, chemically reactive, or toxic. Low concentrations of these wastes may be processed in the wastewater treatment lagoons and septic systems at developed BMGR support facilities. These sites are monitored in accordance with applicable regulations to prevent the release of hazardous wastes into the environment. In addition, there is one facility on the western section of the range where unused obsolete or outdated munitions are burned or detonated. A similar facility located on the eastern section of the range is no longer used for disposing of military munitions and is currently undergoing closure.

Hazardous constituents contained in munitions delivered to the BMGR air-to-ground ranges are usually consumed in a series of chemical reactions that occur upon detonation. Occasionally the munitions do not fully detonate or do not detonate at all. If explosive ordnance disposal teams do not recover these undetonated munitions and the munitions case is damaged or eventually corrodes, the hazardous constituents could potentially contaminate the environment.

All non-hazardous training or target debris is recycled or disposed of in approved off-range landfills.

An investigation to identify and evaluate the past hazardous material handling procedures and disposal practices on the BMGR was initiated by Luke Air Force Base in 1992. The results of the investigation show that initially 218 sites were identified as areas of possible concern, but further investigation found that, with one exception, the handling and disposal practices were adequately protective of human health and the environment. Only one oil/water separator site was determined to require clean up or remediation. This site is at the former Ajo Radar Station located on Childs Mountain within the Cabeza Prieta NWR. Luke Air Force Base is currently preparing to begin clean-up activities at the oil/water separator site.



Equipment used during Marine Corps training exercises requires the use of heavy vehicles, equipment, and generators. Contaminated spill aprons are placed in steel drums for transport to off-range facilities.

If Congress selects either the proposed action or alternative action to renew the BMGR, range administration and support facilities would continue to require the use of hazardous materials and the generation of hazardous wastes approximately at current levels. It is possible that the use of hazardous materials may decrease because there has been a decrease in the use of hazardous materials on the range over the past years. Current Air Force and Marine Corps range management programs, designed to prevent human health and environmental hazards and assure compliance with federal and state regulations, would be continued. These regulations would sufficiently guide hazardous materials and waste management on the BMGR into the foreseeable future.



A number of formerly used military structures and sites on the BMGR have been deactivated and dismantled. The potential presence of hazardous materials at sites scheduled for deactivation or removal – such as the Ajo Radar Station shown here – has been evaluated. Hazardous material clean-up programs are implemented wherever the need is indicated.



A temporary vehicle refueling station is erected in a Marine Corps ground support area. Large containers and aprons are used to contain inadvertent spills.

Under the no-action alternative, hazardous materials and wastes would no longer be used to support military operations within the BMGR. During range deactivation, however, hazardous materials such as fuel, oil, and lubricants would be necessary to supply and maintain vehicles and other equipment that would be needed for the removal of range structures, explosive ordnance disposal, and any required restoration work.

Before the BMGR could be opened to new land uses or expanded public visitation, it would be necessary to determine if additional decontamination of explosive, toxic, or other hazardous materials on the BMGR is needed, practicable, and economically feasible. A plan would be prepared to specify proposed decontamination methods for all potential hazardous waste sites and would consider the human health and environmental consequences of these methods.

With Scenario B2, the hazardous material and decontamination consequences for the non-renewed portions of the range would be the same as those described for the no-action alternative. No other scenarios are expected to affect the use of hazardous materials and the storage, transportation, handling, and disposal of hazardous materials and wastes on the BMGR.



Developed facilities at Air Force manned ranges have septic systems and fuel stored in aboveground storage tanks. Latex paint is used on the manned range control tower and on the tires that are used in the target layout.

Earth Resources

The BMGR is located in the Basin and Range Physiographic Province of Arizona, which is distinguished by broad valleys separated by steep, discontinuous, northwest to southeast trending mountain ranges. The range landscape is geologically indistinguishable from other areas within the province; however, it is an exceptional resource because its vast area has been relatively unaffected by human activities.



The several sand dune systems within the BMGR are composed of sediments transported by wind from the northern portions of the Gulf of California. Dunes form the base for some unique ecological systems.

To assess the effects of the BMGR renewal on the earth resources of the range, the general geology, seismicity (the degree to which the region is subject to earthquakes), known and potential mineral and energy resources, and soils and soil erosion potential were reviewed.

The modern landscape of the BMGR is primarily the result of past mountain building activity and erosion from natural forces. Human activities have caused some accelerated erosion but such effects are, so far, locally isolated. There is a diverse representation of geological processes and geomorphology on the range. The mountain ranges are formed of the three main rock types—igneous, metamorphic, and sedimentary. The BMGR's highest mountains, found in the northeastern corner of the BMGR, rise to nearly 4,100 feet above mean sea level. The basins or valleys of the BMGR are filled with silt, clay, sand, and gravel deposits. These deposits can be more than 10,000 feet deep. Along many of the mountain bases, sloping masses of valley fill material widen out like fans as they

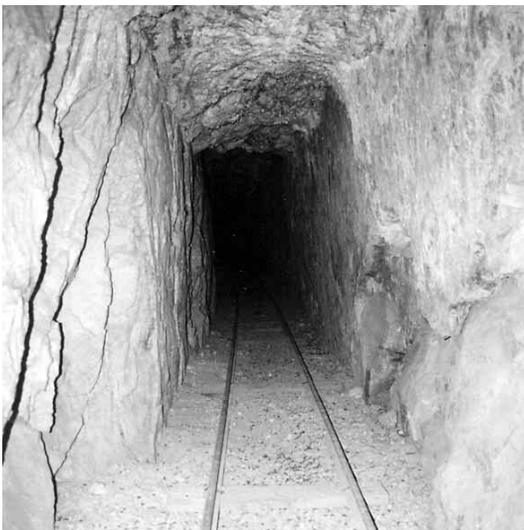
join the valley floor. In the western portion of the range, the valley elevation is as low as about 200 feet above mean sea level. Sand dunes have formed in some areas as a result of wind-blown fine sand and silt particles. Extensive sheet-like lava flows, including portions of the largest lava flow in southern Arizona, occur in some parts of the range.

The BMGR region is in a tectonically stable area with very few earthquakes and very few active faults. Earthquake activity felt in the area is typically from earthquakes originating in southern California.

There is a potential for mineral resources at locations dispersed throughout the BMGR. In fact, active mining of some of these resources occurred in several range locations in the mid- to late-1800s and continued at a few places until the lands were withdrawn for military use in 1941. Gold, silver, tin, copper, uranium, tungsten, iron, barite, celestite molybdenum, and rare earth elements (a special class of 14 metallic minerals) are present in some mountain ranges within the

BMGR. The extent and value of these resources is unknown. Minerals that are known as strategic and critical because they could decrease and preclude the dependence of the United States on foreign sources of supply in times of national emergency are also known to occur on the BMGR. These minerals include mica, silver, quartz crystals, tantalum group minerals, and tungsten ore.

There are several areas identified on the BMGR where, because of the earth's physical properties, there could be a source of geothermal energy. Oil and gas exploration has not occurred within the range so it is not known if these energy sources exist on the range. However, oil and gas exploration has occurred without success near Yuma, located just west of the range. Currently, there is no active mining and there are no active mining claims or other valid existing mineral rights within the BMGR. A Mineral Potential Report has been completed for the BMGR under the direction of the BLM. This report presents an assessment of mineral potential by geographic areas on the BMGR.



Mineral resources on the BMGR prompted some mining development prior to the creation of the range in 1941.



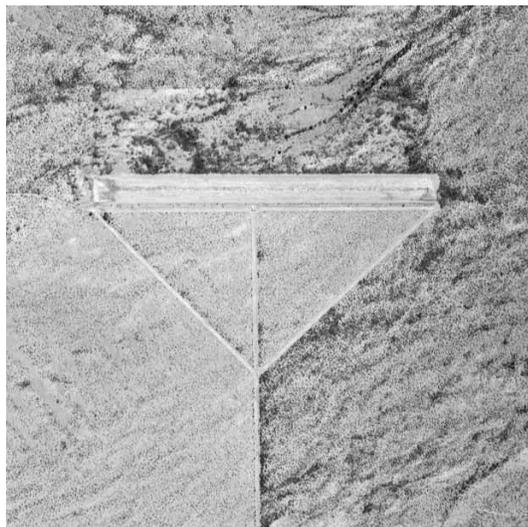
Mismanagement of roads or other surface use can accelerate erosion; however, gully erosion on the range also occurs as the result of natural processes.

The soils throughout the BMGR are quite variable ranging from fine-grained sands and silts on the valley floors to very gravelly soils in the mountainous regions. 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. In some of the valleys, surface water runoff from rain has cut small channels into the soil in a process called rill erosion. Gullies have formed where these channels have enlarged and cut more deeply into the soil.

Soil erosion may impact surface water quality, cause loss of topsoil, and degrade air quality. On the BMGR, areas that are cleared of natural vegetation or disturbed by vehicles, heavy equipment, or the delivery of training munitions may be more susceptible to erosion. In areas where the ground is completely disturbed, marked increases in erosion are likely to occur. Recent detailed analysis of military surface use found that less than two percent of the BMGR has high to

complete levels of ground disturbance in dispersed target ranges and former test site locations. Almost 4.5 percent of the total range surface is impacted by low to moderate levels of ground disturbance in dispersed target areas. These low to moderate levels of ground disturbance may also result in increased erosion. The amount of non-military use that has caused ground disturbance on the range has not been quantified, but is limited to low-level dispersed recreation use. The overall impact to the BMGR soils as a result of all human activity is considered to be minimal. The BMGR—in contrast with surrounding areas undergoing urban, agricultural, or other development—is a location where natural geologic processes predominate.

Renewal of the BMGR under either the proposed action or alternative action would continue the land withdrawal restrictions on development of potential mineral and energy resources within the range. However, these resources would remain available for possible development following a future expiration of the range. It is assumed that the current level of soil disturbance and erosion would continue in the existing military target and ground support areas.



Off-road vehicle use is required for some training or range maintenance activities.

Under the no-action alternative and Scenario B2, it is possible that there would be increased use and development of the non-renewed land parcels, possibly causing greater and broader surface disturbance than currently exists. Future land use management planning for non-renewed lands would need to assess the potential for such disruption and consider methods to prevent or limit soil erosion. Depending on the economic value of various minerals on the BMGR, there could be interest in mineral or energy resources exploration and development. The availability of these resources for development would also depend on the outcome of future land use planning. During range deactivation, areas identified as having potentially hazardous materials or contaminated soils would be contained or remediated to eliminate potential threats to human health and the environment.

As shown in this aerial photograph, surface developments can disrupt natural drainage and vegetation patterns.

Water Resources

In the BMGR region, water is a scarce resource and an important commodity. Rainfall in the BMGR region ranges from less than 5 inches per year in the Yuma area, to more than 10 inches in a few isolated mountainous areas. Most of the annual rainfall occurs in mid-winter and in the late summer, often as intense rainfall. Surface runoff carries water into streams and rivers or into closed basins or playas. Evaporation exceeds precipitation. Annual evaporation rates range from greater than 86 inches along the Colorado River to about 72 inches along the eastern part of the BMGR.



With the exception of two small springs, surface waters are present on the BMGR only after rains fill washes, playas, or natural or human-made catchments.



Many natural catchments have been augmented and artificial water catchments constructed to benefit selected species of wildlife. The practice has recently been the focus of considerable debate among management professionals and interested parties.

Surface water resources within the BMGR are very limited. The presence of surface water is typically dependent on recent rainfall. Water from rainfall drains outward from the mountain ranges and ultimately northward for most of the BMGR by numerous washes that come together to form a number of main drainages that flow to the Gila River, which in turn empties into the Colorado River. Some of the surface water in the southern portion of the BMGR flows south into Mexico. These drainages flow for short times in response to the brief but intense summer monsoonal rainstorms or the longer duration rains typical of the winter and spring. Some of the storms cause flash flooding in the smaller drainages or flooding in the larger washes. Surface water also drains to closed basins or playas. Most, if not all, of these surface drainageways are considered jurisdictional waters of the United States; therefore, activities on the BMGR that may affect these waters are subject to the Clean Water Act. No surface water on the BMGR is used for military purposes.

Surface water catchments present on the BMGR include natural rock depressions (referred to as “tinajas”), sand tanks (saturated sand depressions), charcos (pools within adobe flats and washes), playas (closed basin drainages), and/or springs and seeps. Several of these natural catchments have been artificially enlarged or fortified by wildlife management agencies to improve water-bearing capacity and to ensure a more dependable water supply. There are approximately 70 artificial or enhanced catchments present throughout the BMGR to retain runoff for the benefit of wildlife.

Playas within the BMGR, which may hold surface waters intermittently and support vegetation, are important to migratory birds and other wildlife. Natural springs and seeps, typically found in some of the mountains within the BMGR, are usually dry most of the year. However, these springs and seeps have water from infiltration into the rock or ground surface following rainfall. There are two small perennial springs within the BMGR.

Groundwater occurs at depth in the sands, silts, and gravels of the floodplains and deep basins of the BMGR. Portions of three major groundwater basins—Yuma, Lower Gila, and Western Mexican Drainage—are included in the BMGR. Water from rainfall and rainfall runoff that does not evaporate seeps through the soil and recharges the groundwater. Recharge can also occur when groundwater flows into the BMGR from portions of the groundwater basins outside of the range.

Wells in the basins are used to withdraw groundwater for supply and use. Depth to groundwater on the BMGR, based on very limited well data, varies from about 50 feet along major wash tributaries near the Gila River to nearly 600 feet in the basin east of the Tinajas Altas Mountains. Shallow water occasionally occurs where groundwater is perched between materials such as clays that slow seepage deeper into the ground.

Although the groundwater on the BMGR is generally of poor quality and has high concentrations of total dissolved solids and fluoride, there are a total of 74 registered wells identified on the range. Thirteen are registered to military agencies. Military agencies



One of a few natural catchments on the range that holds water on a near year round basis, the Baker Tanks serve wildlife and are a popular recreation site.

use groundwater for construction, dust control, and drinkable water supplies at selected developed facilities.

The use and management of range water resources would be subject to the Clean Water Act under all alternatives and scenarios. The Arizona Department of Water Resources would continue to administer water rights and registration of water wells.

With the proposed action and alternative action, water use by the military is expected to remain at current levels. Surface water drainages that have been impacted by the establishment of roads, targets, and ground support areas would be expected to continue to be impacted at current levels. The overall impact would be minimal since most of these are dispersed throughout the range. The water resources on the range would continue to be relatively undisturbed and protected from development.



Sonoran pronghorn and other wildlife are known to frequent a rain water filled bomb crater within the South Tactical Range. The circumstances that created this unintended catchment are apparently rare as no other crater that retains water for any length of time has been found.

Under the no-action alternative and Scenario B2, it is possible that mining, livestock grazing, or intensive recreation land uses could be permitted as a result of new land use management planning. Such land uses could result in increased ground disturbance, and thus increased soil erosion and surface water quality degradation. However, future surface management policies would have to adhere to federal and state rules and regulations protecting water quality and ownership of surface water rights and groundwater permits. During range deactivation, potentially hazardous materials and contaminants in the soils that could enter the surface and groundwater would need to be evaluated and properly remediated so as not to pose a threat to human health and the environment.

Air Quality

Several factors combine to determine the air quality of a region, including the local meteorological conditions, types and amounts of pollutants emitted, and locations of air pollution sources. These factors interact to determine the concentrations of various pollutants present in the atmosphere. As the concentration of pollutants increases, the quality of the air decreases.



Dust may be raised as a temporary consequence of some military training activities such as helicopter operations.



Aircraft gunnery and other ordnance delivery operations emit byproducts from explosive detonations.

Some of the air pollution sources within the BMGR region include:

- stationary or point sources, such as fuel combustion from power generators and industrial processes
- mobile sources, such as fuel combustion from automobiles, trucks, aircraft, and portable generators
- natural sources, such as wildfires, windblown dust, and pollens
- non-point sources such as dust generated by vehicle traffic on unpaved roads; farm equipment plowing, disking, or cultivating fields; agricultural field burning; and munitions impacts and blasts

Existing air quality in the BMGR region is considered good to excellent. The range is in a remote location where the relatively few sources of air pollutants are generally dispersed. Most of the region is sparsely populated and the BMGR is unpopulated. In the vicinity of Yuma and Ajo, particulate matter

(such as dust) has been reported as exceeding the National Ambient Air Quality Standards (NAAQS), which are pollutant concentration limits established by the U.S. Environmental Protection Agency to protect human health and the environment. Some of the air quality problems in these areas may result from the dust associated with agricultural operations in Yuma and with a formerly operated mine in the Ajo area. The level of particulate matter in these locations has decreased by nearly 50 percent during the last 10 years, which indicates that the regional air quality is improving.

The evaluation of how the BMGR affects air quality considered military operations occurring both in the air and on the ground. Aircraft operations associated with the BMGR were evaluated by assuming that all of the aircraft emissions for one year were captured within an imaginary box that approximates the size of the range airspace. This approach for evaluating the effects of aircraft operations is conservative because wind and other

weather conditions will disperse aircraft emissions and prevent them from concentrating within a given volume of air over a one year period. The evaluation of ground operations considered several sources of emissions including vehicular traffic on paved and unpaved ground, ordnance detonations, ordnance burning, field generator use, and boiler use at the Gila Bend AFAF. The concentrations generated by both military aircraft operations and ground operations were projected to be well within the federal and state standards. Even if worst case meteorological conditions occur and the air remains stagnant for five consecutive days, ambient concentrations of air pollutants attributable to military operations would vary from less than 1 percent to 6 percent of the federal and state standards for the pollutants that may affect public health and the environment.

Either the proposed or alternative action would result in continued military aircraft and ground operations in the study area. While the intensity of training fluctuates somewhat from year to year, no dramatic changes in the levels of operations are foreseen. Consequently, the air quality effects of military operations would be relatively unchanged from the current condition and no net increase in the amount of pollutants associated with range operations would be anticipated.



Airborne dust results from vehicle use and some range maintenance activities.



Missiles, rockets, and aircraft engines produce various exhaust emissions.

If the BMGR is not renewed, military ground operations would be discontinued and military aircraft operations would likely be reduced or possibly eliminated. Because current aircraft and ground operations have a minimal impact on air quality, it is anticipated that little change in ambient air quality conditions would occur. However, because the future use of BMGR lands under the no-action alternative cannot be determined at this time, air quality effects would need to be examined during the planning process for future management and use of the land.

None of the administration, land area, or management scenarios being considered with range renewal is expected to affect air quality.

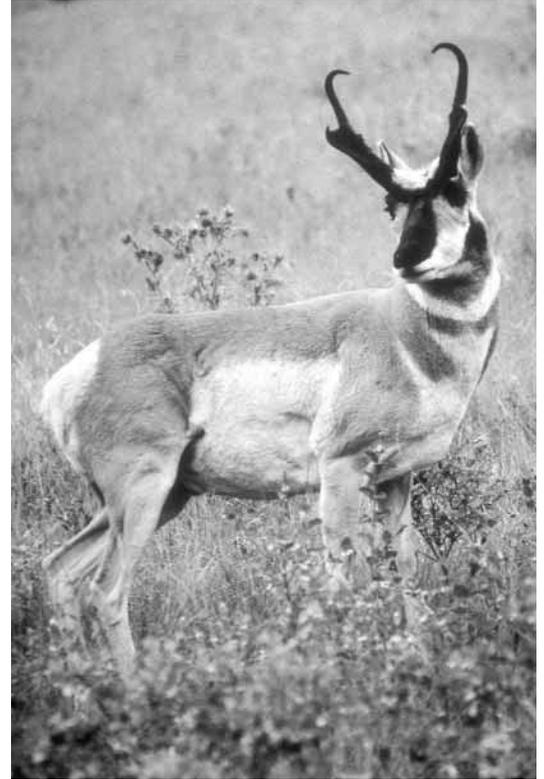
Biological Resources

The Sonoran Desert was once considered by many as a barren wasteland, but is now recognized as the most diverse of the great North American deserts. Located within the core of this desert, the BMGR is one of the largest and best preserved remaining tracts of the Sonoran Desert. Although military activities have occurred on the range over the last 57 years, less than two percent of the BMGR has experienced moderate to high levels of disturbance to soil surfaces or vegetation communities resulting from these activities. This has occurred because the military aviation training conducted on the BMGR requires a large land area to protect public safety, but only a small portion of the area must be disturbed to support that training. Safety concerns, however, require that economic activities such as mining, livestock grazing, or agricultural development be excluded. Other public land uses such as recreation can occur to some degree, but must be restricted from high hazard areas. Military withdrawal of the BMGR has allowed the natural processes of the Sonoran Desert, not the activities of humans, to dominate the ecological landscape of the range.



The diversity of vegetation on the BMGR includes many species of native cacti such as this hedgehog cactus in bloom.

The plant life of the BMGR is characteristic of Sonoran desert scrub. The distribution of plant communities within the range is influenced by a diverse landscape that consists of a series of widely spaced, rugged mountain ranges separated by broad valley plains, sand dune systems, and playas. The Sand Tank Mountains near the eastern border of the BMGR rise almost 4,100 feet above sea level and receive sufficient rainfall to support isolated communities of chaparral and woodland vegetation. In contrast, the western end of the range within the Gran Desierto dune field is less than 200 feet above sea level and is one of the driest locations in North America.



Habitat within the BMGR is important to the recovery of the Sonoran pronghorn, a federally listed endangered species.

The broad, flat intermountain basins of the range are dominated by creosote bush, which often grows in nearly pure stands over many thousands of acres. This type of vegetation covers about three-fourths of the non-mountainous terrain of the BMGR. In upland areas, on foothills and mountain slopes, palo verde, ocotillo, saguaro cactus, and a wide variety of other cacti and shrubs are the dominant plant life.

Washes are lined by vegetation communities consisting of taller trees and shrubs including blue palo verde, ironwood, and smoke tree. Wash vegetation stands in strong contrast to the creosote bush flats of valley floors and is present because of the subsurface water that accumulates in the plant root zones as a result of storm water runoff from summer monsoons and winter rains. This taller, more dense vegetation provides valuable habitat for many species of wildlife.

Wildlife habitat on the BMGR is diverse, as are the wildlife species it supports. At least 56 species of mammals, more than 150 species of birds, 44 species of reptiles, and 6 species of amphibians have been reported from the range. Mammals include Sonoran pronghorn, desert bighorn sheep, javelina, mountain lion, kit fox, coyote, bobcat, jackrabbit, and many species of bats and rodents. The diversity and density of vegetation in upland areas and along washes provide habitat for a wide variety of birds including the Harris' hawk, American kestrel, elf owl, Gila woodpecker, cactus wren, curve-billed thrasher, Gambel's quail, white-winged dove, and greater road-runner. Birds typically present in lowland areas include LeConte's thrasher, black-throated sparrow, and lesser nighthawk. Reptile species characteristic of the sand dune systems of the range include leopard lizard, flat-tailed horned lizard, and banded sand snake.

In general, the biological health of the range is considered to be very good. A strong indicator of this is that all of the wildlife species believed to be present in 1941 when military use began are still found on the range today, almost certainly in the same relative numbers as in 1941. The continued success of these species is probably attributable to the fact that more than 98 percent of the natural habitats present in 1941 have survived to the present with little or no modification.



Javelina, feeding here on prickly pear cactus, occupy upland, mixed-cactus habitats on the range.



Three species of horned lizard, including the desert horned lizard to the left, are residents of the BMGR.

Federally listed endangered or threatened species that are present or have the potential to be present on the BMGR include the Sonoran pronghorn, lesser long-nosed bat, peregrine falcon, and cactus ferruginous pygmy-owl. Of these, only the Sonoran pronghorn appears to be dependent upon habitats within the range for its continued survival.

Other wildlife of special concern in Arizona that are present include the California leaf-nosed bat, flat-tailed horned lizard,



Coyotes are the most common large predator on the range and may be a factor influencing the recovery of the Sonoran pronghorn.

Cowles fringe-toed lizard, and Sonoran desert tortoise. Many plants on the range are protected by the Arizona Native Plant Law including acuña cactus, sand-food, blue sand lily, and Kearney sumac. None of the above species is listed as threatened or endangered or is otherwise sensitive as a result of military operations on the BMGR. Rather, their status is a result of habitat loss, hunting and poaching pressures, development, or other threats outside of the BMGR, or is a consequence of natural processes.

If Congress renews the BMGR under the proposed action or alternative action, the potential biological effects associated with ongoing military training operations would continue. The principal effect is the exclusion of habitat disturbing land uses from most of the range area. Potential impacts on biological resources include limited habitat disturbance, noise and visual disturbance of wildlife, and possible impacts to wildlife contacting pooled storm waters that may have been contaminated by chemicals from expended ordnance.



Vehicle use, including vehicles used to maintain military roads or targets, causes some disruption of wildlife habitat.

Military activities that result in habitat disturbance include grading existing service roads and target areas, use of vehicles off road to clean up ordnance and debris from targets, impact craters from ordnance delivery, and the use of designated support areas by ground troops. These operations may injure, disturb, or kill individual ani-

mals as well as damage or destroy vegetation and wildlife habitat. However, these operations are limited to areas of current use and prior disturbance and are therefore unlikely to have significant additional impact on biological resources.

Animals that see or hear aircraft may be disturbed, particularly if the aircraft are flying at low altitudes. Only a few species have been studied to evaluate how aircraft overflights affect them. For those species studied, results generally show that the disturbance may flush some animals from shelter; disrupt activities; and result in physiological response, such as an increased heart rate. While the disturbance may be unpleasant, it does not appear that there are any long-term effects.



This side-blotched lizard is among the 19 species of lizards that can be found on the range.

This is, in part, illustrated by the successful coexistence of wildlife and military operations on the BMGR for more than 57 years.

Some birds or bats may be killed by collisions with aircraft, but this problem does not appear to be significant. These deaths are relatively rare and are unlikely to jeopardize the continued health of any population of any species on the range.

Ordnance delivered on the range contains spotting charges or high explosives that are potential contaminants in surface waters that may collect temporarily after rainfall. Such water collected in bomb craters or other target area low points may be consumed by wildlife. Although the locations where this problem may occur are few, research is currently ongoing to determine the potential threat to species from consuming contaminants from water collected in bomb craters or local plants.



The diversity of wildlife species on the BMGR includes the small as well as the large. Male tarantulas wander in search of a mate and are more commonly seen than the female.

While ground disturbance, noise, and ordnance delivery may adversely affect biological resources on the range, the prohibition on mining, geothermal development, livestock grazing, agriculture, and other uses that disrupt habitat has helped to preserve these resources. Access restrictions help to limit poaching and other illegal activities. These conditions benefit biological resources.

The Marine Corps and Air Force have each prepared biological assessments for the federally listed species that would be potentially affected by the proposed action and the USFWS has issued biological opinions regarding the impacts. The USFWS determined that the proposed action may affect but is not likely to adversely affect the lesser long-nosed bat, peregrine falcon, and cactus-ferruginous pygmy owl. This opinion requires the Air Force to continue surveys for the pygmy owl on the BMGR. To date, this species has not been documented to occur on the BMGR, although there is abundant potential habitat for the species. Another biological opinion concluded that the proposed range renewal is not likely to jeopardize the continued existence of the Sonoran pronghorn. This conclusion was based on the condition that the Air Force continues to (1) minimize impacts of their activities on this species; (2) minimize loss, degradation,



Wildlife surveys are important biological resource management tools.

and fragmentation of habitat; (3) monitor and study reactions of pronghorn to military activities; and (4) determine the level of harm to Sonoran pronghorn resulting from the proposed action.

Mitigation measures to reduce potential biological resource impacts include restricting vehicles to existing designated roads, unless they are essential for military or environmental operations; limiting surface disturbance and erosion during construction work; and preventing pollution of soil and drainages. The conditions specified in the biological opinions for the pygmy-owl and Sonoran pronghorn could further reduce potential impacts. For example, the Air Force visually monitors the high explosive target areas prior to high explosive bomb drops to ensure no Sonoran pronghorn are in the vicinity. The bomb drops are cancelled if pronghorn are sighted near the target.

With the no-action alternative, military ground operations would be discontinued and a decontamination plan to remove military debris and ordnance would be prepared and implemented. Depending on the extent of the decontamination effort and associated ground disturbance, biological resources could potentially be adversely affected. New land uses that could potentially be authorized, such as mining, grazing, and agriculture, may cause more widespread habitat disruption and direct animal mortality than military operations. The future use of the land would be subject to a public planning process and the effects on biological resources would be evaluated at that time.

Similarly, if Scenario B2 were implemented, the biological resources in non-renewed parcels may be affected by any decontamination efforts deemed necessary or by the new land uses established for those lands. This may be of particular concern in the Sand Tank Mountains area where the desert vegetation includes a high density of saguaros, and provides functional habitat for lesser long-nosed bats and Sonoran desert tortoise.



Ironwood trees are important members of the riparian woodland communities that line washes and larger drainages on the BMGR.



A white-lined sphinx moth fulfills its role in the cycle of life on the BMGR by cross-pollinating seasonal wildflowers while foraging for nectar.

The other renewal scenarios would affect the assignment of resource management responsibilities to federal agencies, but would not directly affect biological resources. Scenario A1 would leave these assignments unchanged from present conditions. Scenario A2 would assign the Marine Corps with independent responsibility for administering military use of the western land and airspace sections of the BMGR. This assignment would not, however, change the roles of other agencies for managing biological resources within the range. Scenario A2 would be compatible with the recently established BMGR Interagency Management Committee, which was designed to enhance management of range resources by infusing cross-jurisdictional collaboration among the principal federal and state agencies involved.

Scenario C1 (the current condition) would leave the current multiple agency assignments for biological resource management unchanged. Agencies would presumably continue to collaborate through the Interagency Management Committee. Some management actions would likely be duplicated because of overlap in agency management requirements. Conversely, some management needs may not be effectively addressed because of gaps between various agency responsibilities.

Scenario C2 would assign the primary responsibility for resource management of the BMGR lands outside of the Cabeza Prieta NWR to the Department of Defense. This change would place the Air Force and Marine Corps in the lead roles for developing and implementing federal management programs for biological resources. Military agencies would be in the best positions to integrate military operations as elements in habitat and other management plans.

With Scenario C3, biological resources would be managed through a collaborative interagency framework. This scenario differs from the current conditions in that the interagency resource management collaboration would occur by Congressional mandate rather than by administrative agreement. Scenario C3 differs from Scenario C2 in that both the historical management experience and the relative strengths of all current agencies would continue to be involved in biological resource management.



The BMGR harbors some of the most extensive and robust communities of saguaro cactus in the Sonoran Desert.

Environmental Justice

Environmental justice refers to the right to a safe and healthy environment for all and the conditions in which such a right can be freely exercised regardless of race, ethnicity, and socioeconomic status. Federal agencies are to make the achievement of environmental justice part of their mission. Agencies are to review their programs, policies, and activities, and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority populations, low-income populations, and Native American tribes.



Native American tribes would not be adversely affected by renewal of the BMGR according to federal standards for overflight noise, but quality of life issues remain. The Department of Defense would continue to work with Native Americans to address their concerns.

Environmental justice applies to all environmental resources. With regard to the renewal of the BMGR, noise from military aircraft operations is the only environmental effect that extends beyond the range boundary and affects residences. Therefore, with the proposed action and alternative action, noise is the only resource that has the potential to have an environmental justice effect.

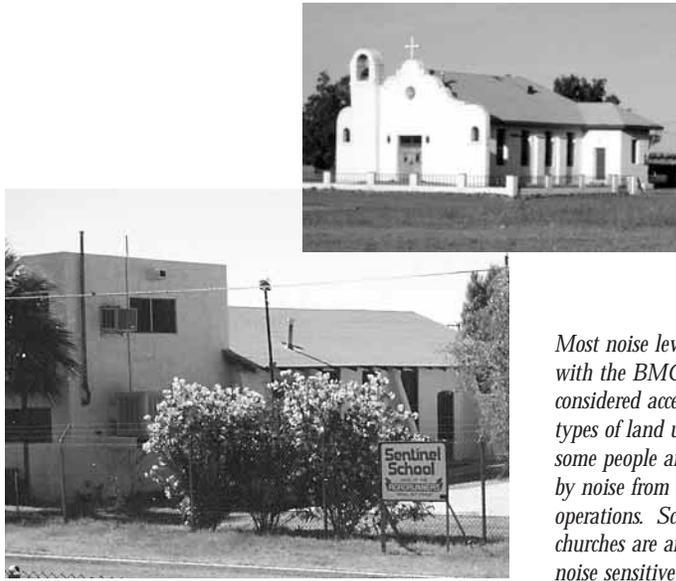
ible noise levels from Auxiliary Field 2 affect a recreational vehicle park, part of a subdivision, and 13 dispersed homes. Incompatible noise levels from operations at the Gila Bend AFAF affect one residence.

The race, ethnicity, and income data for the census tracts that represent the affected residences show that these areas have more minority and low-income persons than the surrounding area. Therefore, there is a disproportionate noise effect to minority and low-income populations related to the renewal of the range. The hours of operation and flight procedures at the auxiliary fields would continue to be evaluated, with consideration of flight safety and mission requirements, to review the noise impacts to sensitive land uses such as residences. If the range is not renewed and the auxiliary fields are no longer used, the noise—and thus the environmental justice effect—would be eliminated.



A few low-income, minority residents are adversely affected by aircraft noise in the vicinities of Auxiliary Field 2 and Gila Bend AFAF.

In two locations, residences are affected by noise levels that are loud enough to be considered incompatible with residential land use. These noise levels result from aircraft operations at Auxiliary Field 2, operated by Marine Corps Air Station Yuma, and at the Gila Bend AFAF. The incompat-



Most noise levels associated with the BMGR are considered acceptable for all types of land use. However, some people are still annoyed by noise from BMGR operations. Schools and churches are among the most noise sensitive land uses.

With the no-action alternative, the only resource area where there is a potential environmental justice effect is socioeconomic. Non-renewal of the range may result in mission changes at military installations that use the BMGR to support a significant part of their mission requirements. This, in turn, could cause potential losses in employment, earnings, and total revenues to the communities supporting the military installations. According to the socioeconomic model, communities made up of minority and low-income populations as well as Native American tribes could be potentially negatively impacted at a significant level by such losses.

However, there are no foreseeable disproportionate impacts to these communities and tribes because there is uncertainty regarding the location and extent of mission changes. If necessary, documents separate from the LEIS would specify and evaluate the socioeconomic and environmental justice consequences.

None of the renewal scenarios are expected to have environmental justice implications.



Non-renewal of the BMGR could result in losses in employment, earnings, and total revenues to communities made up of minority and low-income populations as well as Native American tribes.

Cumulative Effects

Cumulative effects are those additive or interactive effects that would result from the proposed BMGR renewal when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts are studied because a single project may have a minor effect on a resource, but the combination of several projects may have some potentially adverse effects.



Development is changing the visual landscape in some locations in the range vicinity. Growth near the range perimeter could increase the demand for recreational access to the range.



Livestock grazing on lands adjacent to the range may damage habitat and lead to accelerated soil erosion.

Aside from military training, primary land uses within the BMGR or its vicinity include recreation; agriculture; livestock grazing; mining; international border surveillance; residential, commercial, and industrial development; and resource protection and conservation. The cumulative effects of these former, current, and proposed activities together with the BMGR renewal may be important for some, but not all, environmental resources. The following discussion focuses on those resources for which notable cumulative effects are possible.

Land Use – The proposed Yuma Area Service Highway near the western boundary of the BMGR would connect Interstate 8 with a new commercial port-of-entry at San Luis. The highway and port-of-entry, together with the residential development and urban growth that would likely accompany them, could potentially result in substantial changes to land use patterns in the western vicinity of the BMGR. These would likely be long-term effects because once an area has been developed for one purpose, other land uses are generally precluded for the life of the development.

Noise – Highway traffic, military and civilian air traffic, mining operations, and the construction activities and population growth associated with development all cause noise in the BMGR region. However, unless many of the noises are heard at the same time, they are not loud enough to be annoying. Because most off-range sources of noise are spread over such a large area, there are no significant effects associated with the combination of these activities with BMGR operations.

Cultural Resources – Past, present, and proposed future military use of the BMGR could potentially affect at least several hundred of the estimated 20,000 cultural properties possibly existing on the BMGR. Past, present, and future activities of agencies (including the Border Patrol and Drug Enforcement Administration) within and adjacent to the BMGR, as well as residential development adjacent to the BMGR may also affect cultural resources. Proposed projects that could also affect cultural resources include: (1) constructing a transmission line from Gila Bend to Ajo, (2) widening a portion of State Route 85 through the Crater

Range (north of Ajo), (3) constructing the Yuma Area Service Highway, and (4) constructing an air route surveillance radar facility at Childs Mountain. However, these proposed actions would be done in accordance with laws designed to protect cultural resources.

Visual Resources – Military, agriculture, live-stock grazing, recreation, mining, residential and commercial development, and international border surveillance activities within and adjacent to the BMGR have all contributed to a deterioration of the natural landscape and scenic quality of the BMGR region. Visual resources in developed lands surrounding the BMGR are markedly degraded in comparison with the BMGR. Proposed developments in the region that may further change the natural landscape and degrade scenic quality include the proposed Yuma Area Service Highway and the development anticipated along this transportation route, the Gila Bend to Ajo 230-kilovolt transmission line, and the radar facility at Childs Mountain. The proposed transmission line, which would parallel State Route 85, would deter from the views from the highway, which already include a railroad, electrical distribution line, fencing, signs, and, in some areas, distant views of the towers in one of the BMGR manned ranges.



Farming operations in the region may have destroyed archaeological sites. Agriculture also destroys natural habitats, making wildlife more dependent on habitat within the range.



Planned highways may spur development and growth along the range perimeter placing additional demands on range resources and lead to new conflicts with military operations.

Earth Resources — Incremental impacts on earth resources occur as a result of the military surface uses of the BMGR in combination with the non-military surface uses of the range. Most of the military use roads are shared with non-military users for recreation, international border surveillance, and natural and cultural resource management. There are also hundreds of additional miles of established roads on the BMGR that are not used for military purposes, but are used on a regular basis for non-military purposes. Authorized off-road vehicle use primarily occurs in the Marine Corps ground support areas, Air Force manned and tactical ranges, and from Border Patrol surveillance activities. Some unauthorized recreational off-road vehicle use also occurs on the BMGR. Disturbance caused by this cumulative use has accelerated naturally occurring wind and water erosion patterns. However, the resulting effect is minimal in context of the lack of disturbance to most BMGR lands.

Air Quality – Actions that might increase traffic, such as the Yuma Area Service Highway and the port-of-entry at San Luis, would increase automobile emissions in the area. If a proposal to re-open the Phelps Dodge Ajo Incorporated Mine were developed, mining activities would generate air pollutants. While the air pollutants associated with these projects have not been quantified to determine the extent of the cumulative effects, these actions would need to comply with federal, state, and local laws that would limit the amount of air pollutants emitted.



Management of non-military as well as military activities is necessary to keep the cumulative environmental effects of all BMGR uses to a minimum.

Biological Resources – Agriculture, grazing, recreation, mining, residential and commercial development, and Border Patrol surveillance activities have all contributed to the damage or loss of vegetation and wildlife habitat in the region. Military operations on the BMGR have also contributed to this loss, but less than two percent of the range has had a high to complete level of ground disturbance. The exclusion of certain land uses from the range for safety reasons has preserved most of the natural habitat and features of the range. Proposed construction of a highway, transmission line, and radar facility may contribute to wildlife disturbance, although most wildlife would be expected to return to these areas following construction activities. Ongoing military operations and recreation on the BMGR may also cause temporary disturbance, injury, or death of individual plants or animals. However, the species indigenous to the range have co-existed with these activities for many years without notable change to the general health or size of their wildlife populations.

ACRONYMS USED IN THIS REPORT

ACEC	Area of Critical Environmental Concern
AFAF	Air Force Auxiliary Field
AGFD	Arizona Game and Fish Department
ATCAA	Air Traffic Control Assigned Airspace
AUX	Auxiliary Field
BLM	Bureau of Land Management
BMGR	Barry M. Goldwater Air Force Range
DART	Deployable Aerial Rigged Target
dB	Decibel
GRMDS	Goldwater Range Measurement and Debriefing System
HE	High Explosive
HMA	Habitat Management Area
LEIS	Legislative Environmental Impact Statement
MCAS	Marine Corps Air Station
MOA	Military Operations Area
MSL	Mean Sea Level
NAAQS	National Ambient Air Quality Standards
NAF	Naval Air Facility
NAS	Naval Air Station
NWR	National Wildlife Refuge
SRMA	Special Recreation Management Area
TAC	Tactical
TACTS	Tactical Aircrew Combat Training System
USAF	United States Air Force
USFWS	United States Fish and Wildlife Service

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