



# Evaluating Encroachment Pressures on the Military Mission in the California Desert Region

THE MILITARY MISSION AND ENVIRONMENTAL HEALTH ARE INTERTWINED



Final Report

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For several years he has worked on a variety of projects that seek to preserve the economic vitality of the southwest while simultaneously safeguarding important resources and improving quality of life.

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**Legend**

-  International Boundary
-  Cal Desert Counties
-  Military SUA
-  Military Facility
-  Military Facility
-  Major Roads
-  National Monuments
-  City Limits 2010
-  Urban Areas
-  Impervious Built-up Land
-  Recreation Management Areas
-  Johnson OHV Shared Area
-  Open OHV Areas
-  Wildlife Linkage
-  Development Focus Area (All Technologies)
-  Geothermal
-  Solar and Geothermal
-  Variance Process Lands
-  DRECP Variance Process Lands
-  Area of Critical Environmental Concern
-  Wilderness Area
-  Critical Habitat
- California Lands - Association
  -  BLM
  -  USFS
  -  NPS
  -  US Fish and Wildlife Service
  -  Native American Reservation
  -  Bureau of Reclamation
  -  Other Federal
  -  State
  -  Private
  -  City
  -  County
- Number of Active Mining Claims
  -  1 - 2
  -  3 - 6
  -  7 - 17
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-  High Potential Mineral Locations
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**EXECUTIVE SUMMARY**

The U.S. Department of Defense (DOD) oversees 420 large military installations on 25 million acres of land (Department of Defense 2014d). Over the past two decades, the U.S. military has paid ever-increasing attention to the management and stewardship of its natural resources both on and off of these military bases. The reasons for this trend are twofold: (1) military bases must preserve the realism of battlefield conditions on the ground to maximize training effectiveness (Stein 2008) and; (2) military bases must protect the integrity of their military mission from pressures posed by encroachment.

In the past two decades, the DOD has spent close to \$200 million to protect sensitive wildlife on its bases while maintaining or enhancing battlefield realism (Department of Defense 2014d). Such measures are necessary to ensure that federal endangered species regulations do not unduly compromise the military mission. In recent years, the Readiness and Environmental Protection Integration Program (REPI) through the Department of Defense has awarded an additional \$60.41 million for FY 2014 and \$58.57 million for FY 2015 for a variety of actions that seek to preserve natural resources and preserve the mission of military facilities across the U.S. (DOD 2016).

Beyond concerns for wildlife on the bases themselves, incompatible land uses surrounding military bases can also detract from mission integrity. For this reason, the DOD takes a broad view on natural resource management to include diverse partnerships that extend off-base (Elwood 2008). The goal is to share the burden of conserving and restoring open spaces and wildlife habitat in order to minimize current and future impacts to the base and its mission.

This report explores the encroachment analysis structure that was recently published in the Sonoran Institute report Mutual Benefit: Preserving Arizona's \$9 Billion Military Mission and the Role of Publicly-Owned Lands (2015) for Arizona, and how this framework and analysis can apply to California's military industry. In general, we conclude that effective natural resource management in this region is critical to preserving the military mission at five significant military facilities in the desert region of California. This report takes a close look at the Naval Air Warfare Center Weapons Division (China Lake), Chocolate Mountain Aerial Gunnery Range, Edwards Air Force Base, Fort Irwin National Training Center, and Marine Corps Air Ground Combat Center (MCAGCC or 29 Palms) facilities.

A number of potential impacts are anticipated in the region that will require vigilant oversight, including renewable energy and urban development, transmission lines, recreational use, mining activity, and the management of wildlife. As over 79% of the military mission in this region occurs over federally owned lands, it is imperative that the military cooperate closely with the appropriate management agencies to ensure the sustainability of the military mission. This report provides an encroachment grade for these five impacts and suggests a range of actions that should be taken in order to ensure that both the natural resources and U.S. military operations endure.

**ACKNOWLEDGMENTS**

The advisory committee that was assembled for this project has provided significant experience in reviewing the report for accuracy and ensuring that it brings value to the conversation around military base sustainability. Stephanie J. Weigel, who led the Morongo Basin Conservation Priorities project for the Sonoran Institute also provided significant support and research to the effort. Additionally, John Shepard, Sonoran Institute's senior director of programs, provided valuable editing support and direction to the project. Angela Melendez provided the mapped products and GIS analysis.

## BACKGROUND

### *NATURAL RESOURCE MANAGEMENT AND THE MILITARY MISSION*

The U.S. Department of Defense (DoD) oversees 420 large military installations on 25 million acres of land (DoD 2014d). Over the past two decades, the U.S. military has paid ever-increasing attention to the management and stewardship of its natural resources, both on and off of these military installations. The reasons for this trend are twofold: (1) military installations must preserve the realism of battlefield conditions on the ground to maximize training effectiveness (Stein, 2008) and; (2) military installations must protect the integrity of their military mission from pressures posed by encroachment.

In the past two decades, the DoD has spent close to \$200 million to protect sensitive wildlife on its installations while maintaining or enhancing battlefield realism (DoD 2014d). Such measures are necessary to ensure that federal endangered species regulations do not unduly compromise the military mission. In recent years, the Readiness and Environmental Protection Integration Program (REPI) through the Department of Defense awarded an additional \$60.41 million for fiscal year (FY) 2014 and \$58.57 million for FY 2015 for a variety of actions that seek to preserve natural resources and preserve the mission of military facilities across the U.S. (DoD 2016).

Beyond concerns for wildlife on the installations themselves, incompatible land uses surrounding military installations can also detract from mission integrity. For this reason, the DoD takes a broad view on natural resource management to include diverse partnerships that extend off-installation (Elwood 2008). The intent is to share the burden of conserving and restoring open spaces and wildlife habitat in order to minimize current and future impacts to the installation and its mission.

Title 10 of the U.S. Code, Section 3062 (a) defines the military mission as:

- Preserving the peace and security, and providing for the defense of the United States, the Territories, Commonwealths, and possessions, and any areas occupied by the United States;
- Supporting national policies;
- Implementing the national objectives; and
- Overcoming any nations responsible for aggressive acts that imperil the peace and security of the United States. (Powledge 2008).

Testing and training in environments that approximate battlefield conditions produces service members who are confident in similar landscapes during wartime. Therefore, the desert ecosystem at ranges in the United States must be substantially intact when compatible with the DoD mission, to provide an environment that approximates conditions and ecosystems that military personnel may encounter abroad. For example, many Marines heading to battle in the Middle East train in the Mojave Desert at Marine Corps Air Ground Combat Center Twentynine Palms (MCAGCC 29 Palms) and the Chocolate Mountain Aerial Gunnery Range (CMAGR). The large R-2508 Range Complex over the Mojave

Desert that includes areas over and around Edwards Air Force Base (Edwards AFB), Fort Irwin National Training Center (Fort Irwin NTC), and Naval Air Weapons Station China Lake (NAWS China Lake) brings together soldiers from all military branches in combined training maneuvers that utilize both the broad airspace over the desert as well as land on and around the 3 million acres of military lands throughout the region. Additionally, various Special Use Airspace (SUA) and Military Training Routes (MTRs) occur that support the military mission and/or that connect these facilities to training areas and to each other—all of which need attention to preserve their long-term viability and functionality for military uses. Consequently, military installations must actively work to protect the integrity of their military mission from pressures posed by diverse forms of encroachment that may not occur in the immediate vicinity of their installation (Hagel 2014).

### *CALIFORNIA DESERT MILITARY OPERATIONS*

California's military installations have been in operation for decades; in fact, the majority of them date back to before World War II. Since the time of these early training operations, much has changed around these facilities and in the science of military readiness. Today the ambitions of local communities to grow around these existing military facilities must be balanced with the evolving requirements of national defense preparedness.

As communities grow, encroachment is becoming an issue for existing facilities. Activities, lying outside of the control of the military, may pose risks to a military facility through reduced mission effectiveness, increased scrutiny, complaints from the surrounding community, increased operational costs, or some other impairment.

In an effort to maintain the effectiveness of facilities and uphold the military's testing, training, and readiness objectives, the military may take proactive measures to limit encroachment. Opportunities exist to promote activities on these lands that are compatible with military objectives. Additionally, when practicable and prudent, military officials may work collaboratively with adjacent communities and landowners to foster compatible land uses on neighboring state or private lands.

In the California Desert Region, which for purposes of this project includes Imperial, Inyo, Kern, Los Angeles, Riverside, San Bernardino, and Tulare counties, as shown in Figure 1, military uses occur over the vast majority of the land base. In fact, of these counties which cover just over 56 million acres, the U.S. Military operates in or above about 40 million acres, or 70% of the land mass. Military uses include operating ranges and installations (covering a total of almost 3.1 million acres), Military Training Routes (MTRs) and Special Use Airspace (SUAs). Of the 40 million acres in which these testing, training, and readiness activities are prioritized, 79.4% is owned and managed by the federal government. In many instances, military facilities are surrounded by federal lands or otherwise depend on federal lands for continued viability. Therefore, the way in which these federal lands are managed will help determine the future cost and success of the region's military missions.

Table 1. Military Operations in the Cal Desert Region

Category	Acres	Percentage
California Desert Region	56,660,549	100%
Military Operations	39,795,850	70% of Region
Federal Lands	31,558,429	79.4% of Military Operations

In 2015, the Sonoran Institute released a report titled, Mutual Benefit, Protecting Arizona’s Military Mission and the Value of Publicly-Owned Lands. This report introduced a newly developed framework to evaluate possible encroachment pressures that could impair Arizona’s military facilities now or in the future. We now turn our attention to each of the five California Desert military installations to evaluate current or foreseeable encroachment pressures and assess what can be done to minimize these impacts. These facilities were selected due to their large landholdings and their significant position as features in the Mojave Desert landscape.

We will look at the role that natural resource management plays in protecting the integrity of the facilities’ operations and viability, and the stewardship implications for federal and other lands in order to preserve mission viability. This is important for

## ENCROACHMENT ON FEDERAL LAND

Several possible sources of encroachment exist in the California Desert that can contribute to the impairment of military facilities and/or missions. In the following sections, we summarize encroachment issues using the framework applied in the Sonoran Institute’s previously referenced Mutual Benefit report to show how land use, airspace, training regimes, military budgets, loss of habitat, and impacts to the electromagnetic spectrum can cause encroachment pressures. These impacts directly affect the DoD’s determination of the overall “military value” of a given installation.

The central issue that this report addresses is preserving the actual effectiveness of military installations in achieving their necessary training outcomes. While it is important to communities that military operations are not curtailed or removed through a Base Reallocation and Closure (BRAC) process, it is essential for the effectiveness of the military that these operations can continue uninhibited by pressures or hindrances. For this reason, the BRAC process should not be the driver of encroachment resilience efforts, as it is often politically driven and unpredictable. Instead, concerned stakeholders should be vigilant of possible impacts and proactive to protect the integrity of military training activities.

Across the West, installations are taking direct proactive measures to enhance their operational sustainability in response to encroachment concerns. The same is true for those in the California Desert Region. These measures can be summarized as:

- Permanent protection of publicly owned lands to prevent direct encroachment;

a number of reasons. First, with almost 3.1 million acres of the California Desert under management, the military is a major land manager. As a result, the military stewards significant natural resources and has made substantial investments in preserving wildlife and habitat, much of which extend beyond its own boundaries. Second, the continued success of these investments will benefit from compatible natural resource management efforts on adjacent lands, lest the military becomes the last refuge for imperiled species and shrinking habitat. Third, conservation of natural resources, through land protection or the exclusion of certain land uses, can serve as an effective tool to minimize encroachment by essentially creating “buffer zones” for existing military facilities.

Preserving military facilities in the California Desert is critical to maintaining our nation’s military readiness. The California Desert provides training environments that approximate battlefield conditions. To the extent that natural resource management strategies may complement military readiness, these deserve serious consideration. This report is intended to explore and facilitate discussion of such opportunities.

- Cross-jurisdiction management to mitigate indirect encroachment on military airspace as well as indirect encroachment from threatened and endangered wildlife species; and
- Permanent conservation of private lands to prevent both indirect and perceived encroachment.

The following sections cover direct, indirect, and perceived encroachment and cite specific examples that further clarify the impacts of incompatible uses and highlight the urgency of preventative actions.

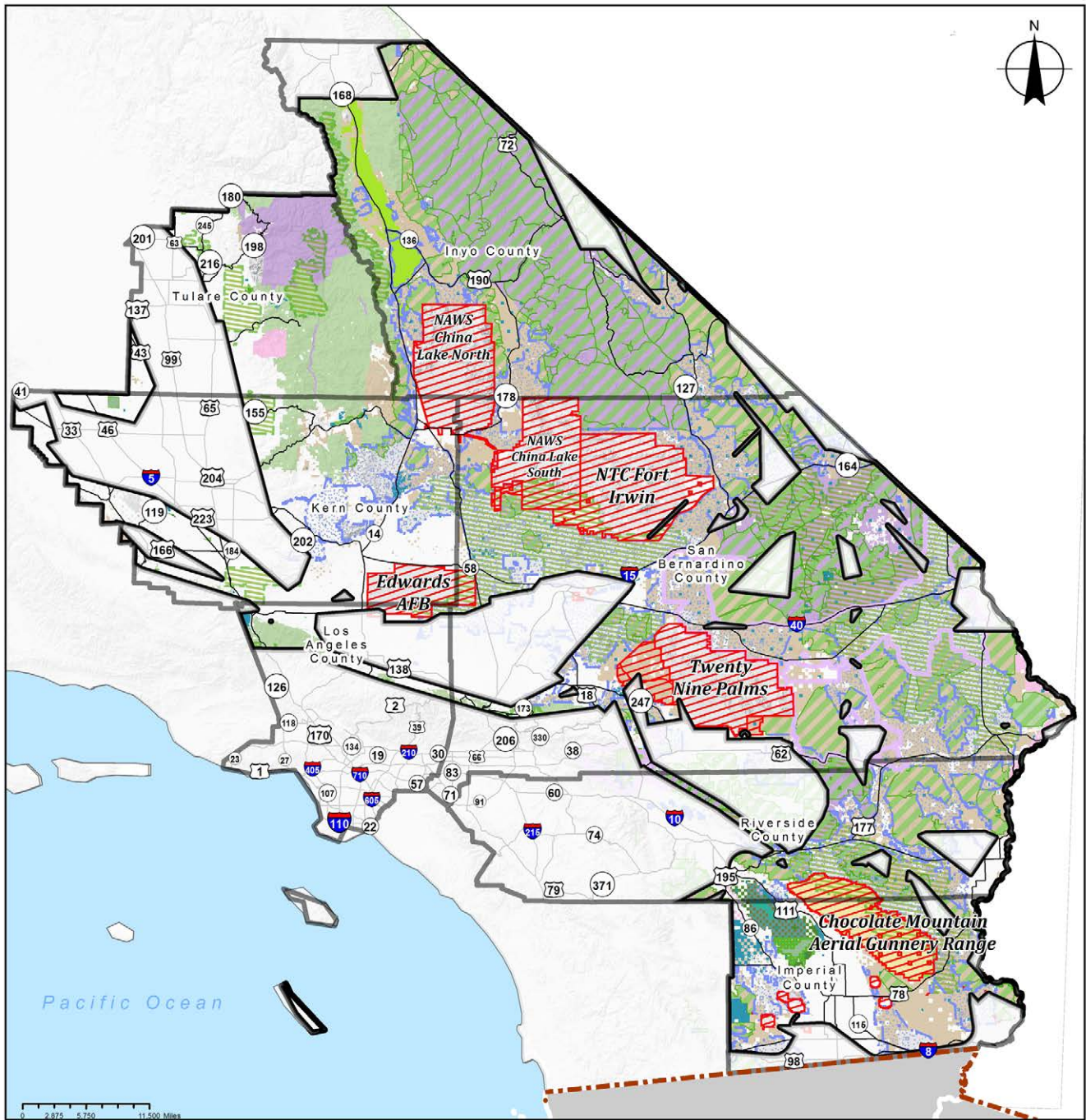


Figure 1. Military land and operations in the Cal Desert region

## TYPES OF ENCROACHMENT

The DoD defines encroachment as “the cumulative result of any and all outside influences that inhibit normal military training, testing and operations” (Ripley 2008, 1). The concept is so important to the military that in fiscal year 2013, alone, DoD spent over \$80 million on encroachment mitigation programs (Hagel 2014). In FY 2014 and 2015, REPI expenditures totaled approximately \$60 million each year in addressing encroachment associated with environmental factors (DoD 2016).

The Sonoran Institute suggests three overarching forms of encroachment (See Figure 2).

1. Direct Encroachment: A condition whereby an action, proposed action, or an action’s direct impacts will impair a military facility or its mission by interfering with operations.
2. Indirect Encroachment: A condition whereby an action, proposed action, or the likely results from an action or proposed action will cause impairment or impose a greater burden on a military facility through increased oversight, regulation, and/or cost.
3. Perceived Encroachment: A condition whereby it is possible that an action or proposed action may trigger an increased level of scrutiny or the perception of impairment to a military facility even if there is no evidence of direct or indirect encroachment.

This decision matrix can be useful to those who are not familiar with issues of encroachment, as it allows decision makers to categorize encroachment in order to better determine the appropriate actions or proactive measures that would best address each concern. Direct and indirect forms of encroachment have been recognized by the military community, although little attention has been given to perceived encroachment.

In its various forms, encroachments can limit military activities or operations. Many factors related to land use and natural resource management around military installations can detract from the military mission. Some examples include direct impacts from urban development adjacent to or surrounding military installations; and indirect impacts due to airspace restrictions, land-use restrictions, scheduling changes, and financial constraints (Elwood 2008). In extreme cases, cumulative impacts can compromise the integrity of the military mission. The decision matrix in Figure 2 provides a framework for understanding potential impacts of a specific encroachment pressure on a military facility or mission. By using this model, it is possible to categorize potential impacts into three concise groupings that can be paired with possible compatibility tools (e.g., land exchanges and federal land designations) and mitigation measures discussed in this report.

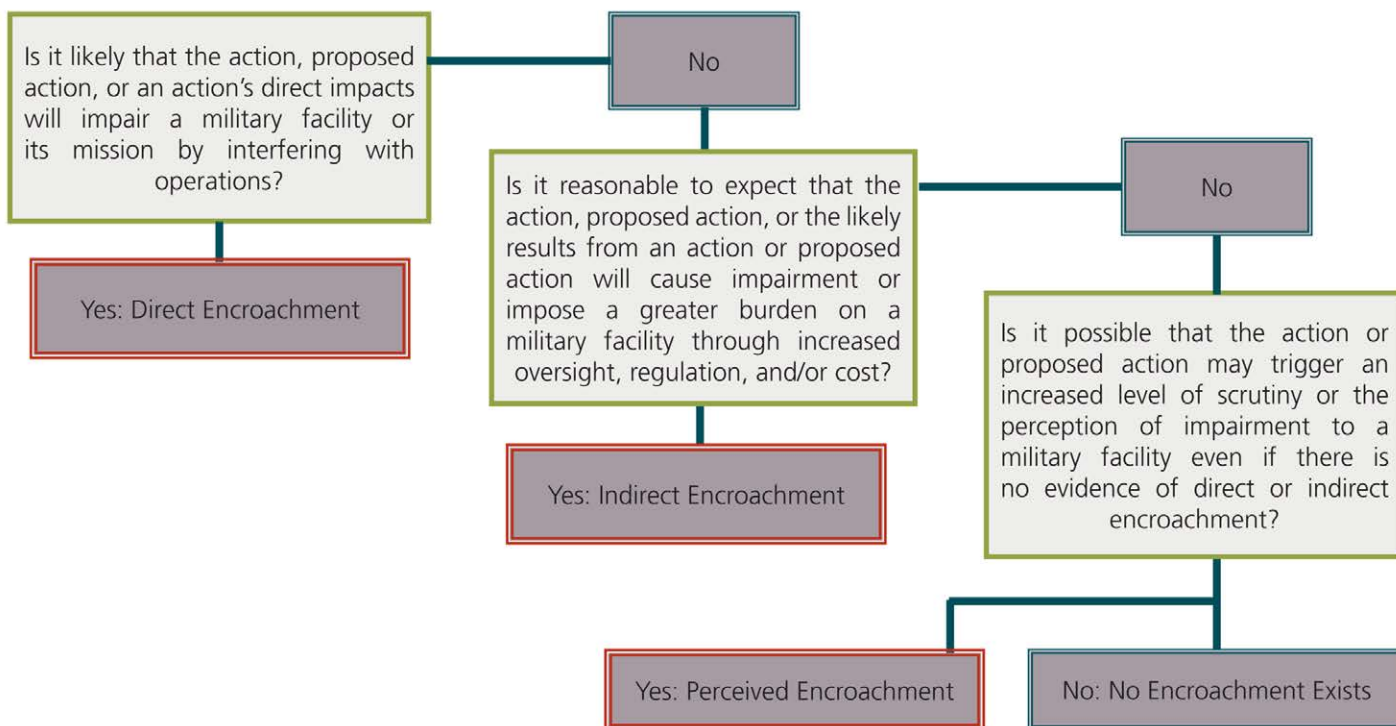


Figure 2. Decision matrix for encroachment



## California Desert Region

For illustrative purposes, Figure 3 demonstrates the issue of incompatible uses in flight corridors connecting Luke AFB in Arizona to the Barry M. Goldwater Range. Red and yellow circles within these MTRs are avoidance areas resulting from encroachments like small airfields and urban development. Similar conditions, including rural airports, wind energy structures, and towers occur in the California Desert Region that could impair facilities and their operations over the long term.

As demonstrated by the red and yellow circles in Figure 3, over time, competing land uses have contributed to conditions where

pilots can no longer fly a straight line between destinations, but must maneuver around increasingly constrained airspace to complete their training missions. Furthermore, development activities on surrounding lands are pushing wildlife onto military lands as a safe haven. Consequently, the continued establishment of land buffers and the management of natural resources on lands parallel to the military boundaries are indeed essential.

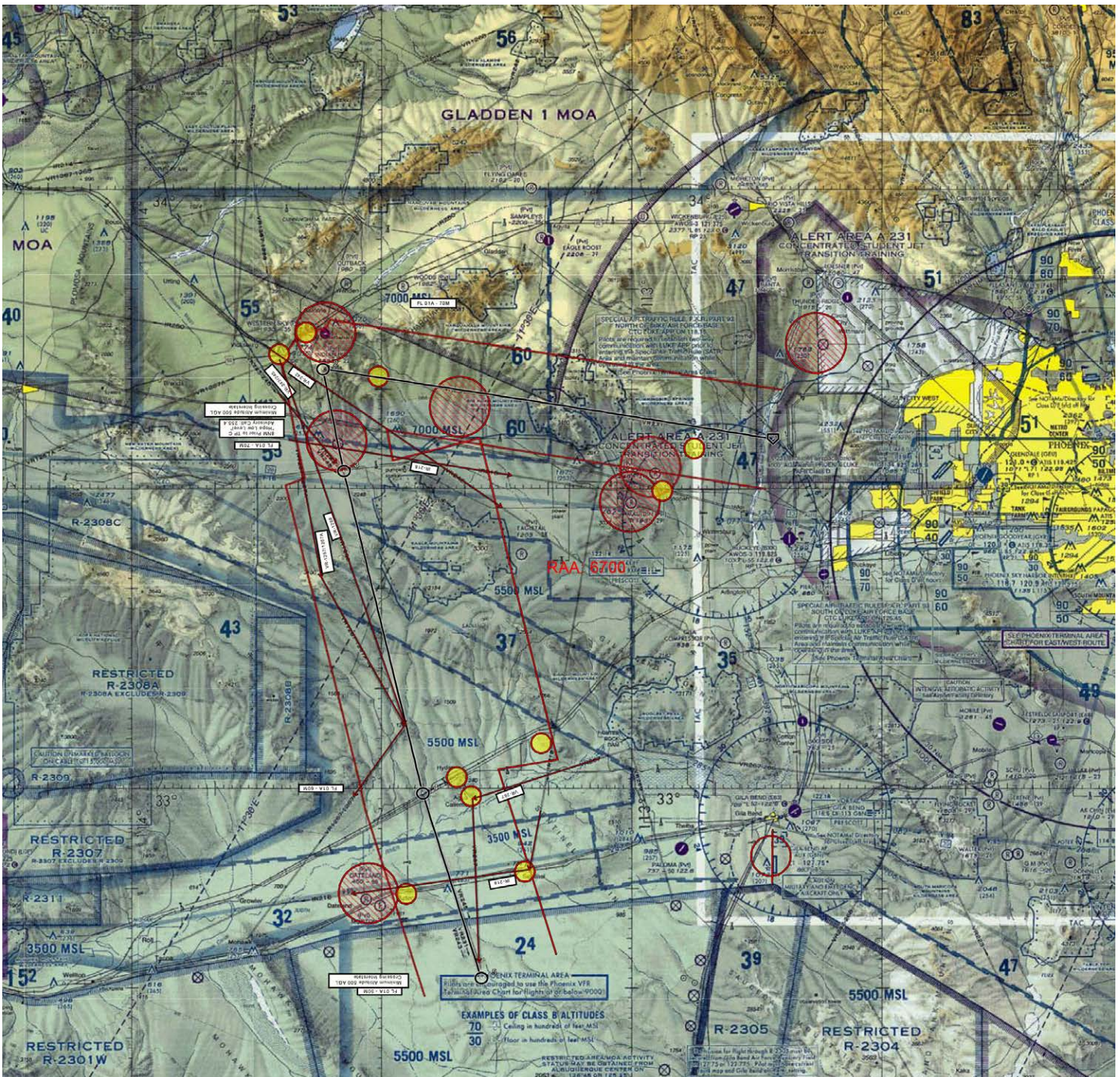


Figure 3. Direct encroachment into flight corridors connecting Arizona's Luke AFB to the Barry M. Goldwater Range. (Courtesy Luke AFB)

**DIRECT ENCROACHMENT**

The most visible and preventable forms of encroachment or impairment to a military mission result from development or other impacts that occur in the vicinity of military operations. As used in this report, direct encroachment is a condition whereby an action, proposed action, or an action’s direct impacts will impair a military installation or its mission by interfering with operations. For direct encroachment to occur, an action or its direct impacts must, in themselves, cause impairment to military operations. If the encroachment concern does not cause direct impairment, it likely would be considered indirect encroachment or perceived encroachment.

Direct encroachment can take many forms, but most often it results from urban development in areas incompatible for that land use. The most obvious result from this level of encroachment due to development is frequent civilian complaints regarding noise, dust, and other impacts from military-related operations.

**INDIRECT ENCROACHMENT**

While not as obvious or preventable as direct encroachment, indirect encroachment also puts pressure on military installations

and their effectiveness. In this report, indirect encroachment is a condition whereby an action, proposed action, or the likely results from an action or proposed action will cause impairment or create a greater burden on a military facility through increased oversight, regulation, and/or cost. It can be difficult to foresee the impacts of an action, especially when it occurs far from military facilities and operations. For this reason, it is important to understand the concept of indirect encroachment to reduce the occurrence of these impairments to California’s military community.

**PERCEIVED ENCROACHMENT**

The preservation of the military mission is partially dependent upon the good reputation and perception of an installation and its unfettered access to training areas. In some cases, the merest perception of encroachment can result in increased scrutiny. In fact, military installations are constantly tracking the optics of actions that are occurring nearby in order to be proactive in preserving their reputation as a good investment for DoD missions. In many cases, the actual direct or indirect impairment to a military facility has been resolved, yet the perception of encroachment can remain for years. It has been said that

Encroachment Type	Impact
Urban development, including residential, commercial, industrial, and public facilities	<ul style="list-style-type: none"> <li>• Loss of military/civilian life and/or property</li> <li>• Interference with military testing and training activities, due to the creation of avoidance areas</li> <li>• Complaints due to noise, dust, low flight altitude, etc.</li> <li>• Trespass of civilians into military bases and/or training facilities</li> </ul>
Large structures, including solar towers, wind turbines, and communications towers	<ul style="list-style-type: none"> <li>• Loss of military/civilian life and/or property</li> <li>• Interference with military testing and training activities, due to the creation of avoidance areas</li> <li>• Interference in military sensors from the Doppler effect</li> <li>• Vertical Obstruction</li> </ul>
Light pollution	<ul style="list-style-type: none"> <li>• Interference with military testing and training activities</li> </ul>
Transmission lines, cell towers, and other electronic equipment	<ul style="list-style-type: none"> <li>• Interference with military testing and training activities, due to the creation of avoidance areas</li> <li>• Interference with military testing involving electromagnetic spectrum</li> </ul>
Outdoor recreation	<ul style="list-style-type: none"> <li>• Interference with military testing and training activities, due to the creation of avoidance areas</li> <li>• Trespass of civilians into military bases and/or training facilities</li> <li>• Loss of military/civilian life and/or property</li> </ul>
National border security activities	<ul style="list-style-type: none"> <li>• Some border security actions occur on military facilities and interfere with training operations</li> <li>• Observation towers and communications facilities can create avoidance areas or impair testing involving electromagnetic spectrum</li> </ul>
Livestock grazing	<ul style="list-style-type: none"> <li>• Trespass of livestock can compete with native wildlife and can contribute to degradation or loss of habitat value and character on the military facility</li> </ul>

Table 2. Direct Encroachment

## California Desert Region

“perception is reality,” and in the case of military installation encroachment, this remains largely true. In this report, perceived encroachment refers to conditions whereby an action or proposed action may trigger an increased level of scrutiny or the perception

of impairment to a military facility even if there is no evidence of direct or indirect encroachment.

Encroachment Type	Impact
Off-site habitat loss and fragmentation	<ul style="list-style-type: none"> <li>Increased wildlife management responsibilities and oversight</li> <li>Increased management costs and restrictions, especially if military facilities become the refuge of last resort for threatened and endangered species</li> </ul>
Restrictions, diversions, or limitations on water resources	<ul style="list-style-type: none"> <li>Increased costs or constraints on water uses for ongoing operations, including natural resource management programs</li> </ul>
Invasive species	<ul style="list-style-type: none"> <li>Activities can propagate the spread of invasive species onto military facilities</li> </ul>
Loss of natural character	<ul style="list-style-type: none"> <li>Significant loss of natural landscape can remove the realism of the terrain, thereby reducing its effectiveness as a training area</li> <li>Increased oversight and management responsibilities due to endangered species management</li> <li>Development impacts, including transmission lines, roads, and urban uses, can restrict the natural fire regime</li> </ul>
Attraction of incompatible wildlife	<ul style="list-style-type: none"> <li>Some development activities like installation of solar photovoltaic panels can create a “lake effect” and attract birds that interfere with flight areas</li> </ul>

Table 3. Indirect Encroachment

Encroachment Type	Impact
Past encroachment concerns	<ul style="list-style-type: none"> <li>Encroachment concerns that have largely been resolved can remain in the minds of the community and leaders at the Department of Defense</li> </ul>
Non-encroachment urban uses	<ul style="list-style-type: none"> <li>Urban uses near military installations may not in themselves be an encroachment concern, yet they can raise scrutiny and the perception of impairment</li> </ul>
Large-scale proximate non-urban development	<ul style="list-style-type: none"> <li>Large-scale solar development, transmission lines, and other projects may create the perception of impairment</li> </ul>
Proximate high-disturbance impacts	<ul style="list-style-type: none"> <li>Mining, forest management operations, off-highway vehicle use, border security activities, and other impacts of high disturbance to the landscape can create a perception of impairment</li> </ul>
Controversial public policy	<ul style="list-style-type: none"> <li>Occasionally, public policies of high controversy can impair nearby military facilities, especially when the public policy has high political backing and the military is at a comparably weaker position</li> </ul>
Natural resource constraints	<ul style="list-style-type: none"> <li>If a region suffers from water shortages or other resource constraints, military facilities can be burdened by the perception of impairment</li> </ul>

Table 4. Perceived Encroachment

## COMPATIBILITY TOOLS FOR PUBLIC LANDS

For the Cal Desert region, lands are primarily federally owned, and state trust lands provide fewer challenges for future development actions than their counterparts in other western states. Many tools, though useful for many private and state land concerns, are not as effective in resolving pressures on federal lands.

The tools outlined in Table 5 are available to assist in removing encroachment pressures that were discussed in prior sections. Some provide a solution for a broader array of encroachments.

Tool	Pressure	Use	Example
Large-landscape planning	Competing multiple uses (federal)	Can be used to designate compatible areas for natural resource development and conservation	U.S. Bureau of Land Management’s Western Solar Plan, Desert Renewable Energy Conservation Plan (CA), and Restoration Design Energy Project (AZ)
Integrated natural resource management plans (INRMPs) <sup>2</sup>	Recreation (federal) Cultural resource management (tribal) Natural resource Management (federal) Urban development (state) Solar development (state)	Can be used to direct recreation activities to areas of higher compatibility  Can be used to appropriately manage natural resources across multiple land ownerships  Can be used to minimize impacts of testing and training activities on natural resources within military facilities	The Barry M. Goldwater Air Force Range <sup>2</sup>
Joint Land Use Studies (JLUS) <sup>3</sup>	Urban development (state)	Can be used to focus solar development away from incompatible areas  Can be useful to guide regional planning processes to help steer state land development away from areas of incompatibility <sup>4</sup>	The Fort Huachuca Joint Land Use Study (JLUS) <sup>5</sup> explores land uses across multiple jurisdictions around the installation.
Land exchanges	Urban development (state) Solar development (state)	Transfer of mission-critical lands from private/state ownership to federal ownership	Proposition 119 in Arizona. Currently in the rule development stage. No exchanges have occurred to date.
Inter-agency coordination	All types	By improving coordination between land managers, incompatible uses can be prevented in many cases. There are occasions where encroachment pressures cannot be resolved due to lack of support or political will.	Joint Land Use Studies (JLUS) processes and the emerging Sentinel Landscapes designation such as around Fort Huachuca in Arizona.

Table 5. Additional Encroachment Pressure Removal Tools

California Desert Region

Tool	Pressure	Use	Example
<p>Permanent conservation actions, including:</p> <ul style="list-style-type: none"> <li>- Legislation</li> <li>- Agency administrative actions</li> <li>- Presidential proclamations</li> </ul> <p>(Wilderness, National Conservation Areas, National Monuments, National Parks, etc.)<sup>6</sup></p> <p>These actions require a multi-stakeholder process.</p>	<p>Urban development<sup>7</sup> (federal)</p> <p>Solar development (federal)</p> <p>Transmission lines (federal)</p> <p>Extractive industries (federal)</p> <p>Recreation<sup>8</sup> (federal)</p> <p>Border enforcement<sup>9</sup> (federal)</p> <p>Natural resource management (federal)</p>	<p>Generally, these actions immediately do the following:</p> <p>Remove military mission incompatible uses from development leasing</p> <p>Reduce the likelihood that transmission lines can be developed through the lands (Wilderness designations remove the possibility of all development)</p> <p>Remove the lands from mining exploration and private development (many existing operations are "grandfathered" in)</p> <p>Require a higher level of recreation management</p> <p>Reduce the risk of border enforcement impacts by establishing defined boundaries requiring enhanced operational awareness</p> <p>Establish areas of high natural-resource compatibility by ensuring that conservation areas are managed to reduce impacts</p>	<p>The Barry M. Goldwater Bombing Range enjoys many benefits from the adjacent Sonoran Desert National Monument and the Cabeza Prieta National Wildlife Refuge. These areas provide valuable habitat for species like the endangered Sonoran pronghorn, the Sonoran desert tortoise, and other wildlife. These areas are also unlikely to be developed with incompatible uses due to their level of protection. Some impacts resulting from border enforcement activities have occurred on lands, including Wilderness areas, near the U.S./Mexico border.</p>
<p>Education, public relations, and advocacy</p>	<p>All types</p>	<p>Ensure adequate communication to the public around a military installation to prevent inaccurate perceptions and avoidable miscommunications</p>	<p>Military support or "friends" groups like Fighter Country Partnership that advocate for the protection of Luke AFB have a public relations mission that works to proactively reduce negative perceptions of the base.</p>
<p>Collaboration</p>	<p>All types</p>	<p>Collaborative groups across public, private, and non-profit sectors can allow for early identification and resolution of encroachment pressures.</p>	<p>Western Regional Partnership (WRP) and Desert Managers Group (DMG)</p>
<p>Memorandums of Understanding (MOUs)</p>	<p>All types</p>	<p>A document that allows various organizations to support the military mission by agreeing to certain actions that implement portions of a JLUS and/or other planning strategies.</p>	<p>MOU between Kirtland AFB and the New Mexico State Land Department to implement portions of the JLUS</p>

Table 5 Continued. Additional Encroachment Pressure Removal Tools

## A REVIEW OF FIVE MILITARY BASES AND RANGES

### NAVAL AIR WEAPON STATIONS CHINA LAKE

The Naval Air Weapons Station (NAWS China Lake) is located in the Western Mojave Desert Region of California, approximately 150 miles north of Los Angeles (Navy 2016). Founded in 1943, NAWS China Lake provides and maintains land, facilities, and other assets that support the Navy's research, development, acquisition, testing, and evaluation (RDAT&E) of weapons systems for the warfighter.

NAWS China Lake is the Navy's largest single landholding, and it represents 85% of the Navy's land for training use and 38% of the Navy's land holdings worldwide. The infrastructure's value is roughly \$3 billion, and comprises 2,132 buildings and facilities. This facility covers more than 1.1 million acres, with its two areas known as the north and south ranges divided by a segment of land. The facility is known for its decades of testing associated with the development of military weaponry, including the Walleye bomb, Sidewinder and Hellfire missiles. Additionally, the site is involved with the testing of parachutes and ejection seats for all branches of the military.

In FY 2009, the Navy generated approximately \$799 million in total economic activity within the regional economy of southern California, including:

- \$456 million in industrial output - \$260.7 million from operations, \$184.6 million from payroll, and \$10.6 million from visitor spending by transient personnel;
- \$315 million in direct payroll expenditures - for military and civilian personnel;
- \$27 million in state and local tax revenues - \$11.1 million from operations, \$15.4 million from payroll, and \$900,000 from transient personnel spending;
- \$540,000 in Federal Impact Aid - to support local schools; and
- 8,760 jobs - including 4,793 military and civilian personnel directly employed and 3,962 additional jobs related to operations, payroll, and other spending.

The Navy is a major contributor to the regional economy of the Western Mojave Desert region of California, providing economic stimulus in the form of good-paying jobs, demand for housing and consumer products, expenditures for supplies and operational support services, and related economic activities that ripple through a wide range of economic sectors (Chung 2017).

### CHOCOLATE MOUNTAIN AERIAL GUNNERY RANGE

Founded in 1942, the Chocolate Mountain Aerial Gunnery Range (CMAGR) is located in southeast California, more specifically in the Colorado Desert and the Salton Sea geomorphic provinces of California, on the borders of the Salton Sea Basin. With 357 square miles of desert landscape, the CMAGR is used for training for aerial bombing, missile firing, tactical maneuvering and air support, and other defense-related purposes (MCICW 2013).

The province where the CMAGR is located is characterized by steep, discontinuous mountain ranges, separated by broad,

gently sloping to nearly flat, deep alluvial basins. The Chocolate Mountains is a range that rises abruptly from broad alluvium-filled desert basins. The center of the Salton Basin is the hottest area in the United States, and one of the hottest desert regions of the world. Surface water is extremely scarce at the CMAGR, and there are no naturally occurring perennial surface water features on the range. Surface water is derived from infrequent rainfall events. This combination of low precipitation and high evaporation prevents surface water from infiltrating deeply into the CMAGR soils; therefore, the desert washes are dry most of the year, making it an ideal environment for military operations (MCAS 2015).

The Chocolate Mountain Aerial Gunnery Range is one of the most heavily used aerial gunnery ranges in the West, so much so that proposals are proffered to utilize the CMAGR for ground training in addition to the aviation training that it was established to support (MCICW 2013).

### EDWARDS AFB

Edwards Air Force Base (AFB), located in the northwestern Mojave Desert, is an irreplaceable national asset with a rich history. As described on the Edwards AFB website, in December 1949, the Muroc Army Air Base was renamed Edwards AFB, and by that time, it had already become the leading center of American flight research. Since the 70's, new aircraft types have arrived, and the new millennium has also brought projects with worldwide impact. Today there is an estimated installation population of 11,200 federal civilian and contract personnel.

Edwards AFB is where the headquarters of the Air Force Test Center (AFTC) is located. The AFTC leads the test and evaluation (T&E) mission, conducting developmental T&E of air, space, and cyber systems to provide timely, objective, and accurate information to decision makers. The 412th Test Wing is located at Edwards AFB, and this is where all flight and ground testing of aircraft, weapons systems, software and components, as well as modeling and simulation for the U.S. Air Force is planned, conducted, analyzed, and reported.

With an area of about 481 square miles, the Edwards AFB is located in a land of extreme climate temperatures and occasional dust storms, characteristics that make it an ideal physical environment for flight-test activities. Edwards AFB has implemented an Environmental Management System (EMS) policy, adopting an approach that provides services in all areas of environmental support, including compliance programs; conservation services (environmental analysis for test programs and construction projects); and restoration programs, where hazardous waste sites are identified, investigated, and cleaned up.

Edwards AFB had an estimated economic impact to the local area of \$1.61 billion in FY 2015. This valuation includes a payroll of about \$667 million, expenditures of \$373 million, and support for 10,580 indirect jobs at a value of \$570 million (Edwards 2015).

### *FORT IRWIN NATIONAL TRAINING CENTER*

In the Mojave Desert in northern San Bernardino County, California, the Fort Irwin National Training Center (Fort Irwin NTC) is located in an extremely arid area, with average annual precipitation of 5.8 inches. Its primary function is to research, develop, and serve as the primary training site for the use of weapons. It is one of the preeminent institutions of its kind in the world. Its mission is to provide arms training, assist commanders in developing trained leaders and soldiers, and identify unit training deficiencies. Visiting units come from all over the U.S. to train at Fort Irwin NTC, while a permanent “opposing force” of 2,500 soldiers and up to 700 vehicles are stationed at the fort (USFWS 2005).

The National Training Center (NTC) at Fort Irwin, is said to be the only instrumented training area in the world suitable for live-fire training, and given its importance, efforts to expand the center to meet changing needs have been growing in the past years.

According to the report made by the RAND Corporation about the Army’s local economic effects, Fort Irwin, California, has a base population of 4,658 of permanent soldiers, and 9,985 civilians. This is one of the stations that is subject to reductions in income, as a part of the Supplemental Programmatic Environmental Assessment for Army 2020 Force Structure Realignment (Schnaubelt et al 2015).

### *MARINE CORPS AIR GROUND COMBAT CENTER TWENTYNINE PALMS MARINE BASE*

The Marine Corps Air Ground Combat Center Twentynine Palms (MCAGCC 29 Palms), is located in the Mojave Desert ecoregion of Southern California and more specifically in the Morongo

Basin. Since 1952, Marines from across the United States have come together at this arid desert facility to train and prepare for combat roles across the globe. The conditions present in this area of California are similar to the harsh environments in some of the most volatile locations of the world, and present an excellent opportunity for combat soldiers to prepare for combat situations. With over 1,000 square miles of desert landscape, MCAGCC 29 Palms is critical to the integrity of the U.S. Marine Corps’ training initiatives and the success of U.S. military missions (Marine Corps 2013).

Like all other facilities in the Cal Desert region, the MCAGCC 29 Palms is a key contributor to the local economy. According to the MCAGCC 29 Palms, it provides an economic impact estimated to be \$1 billion, which equates to 52% of all the employment and 62% of all economic activity in the Morongo Basin. Additionally it provides about 2,000 civilian jobs, houses 11,000 active duty military personnel, and hosts about 400 contractors—total annual salary and wages from the facility total about \$500 million per year. (Adams 2017). The Morongo Basin includes the communities of Twentynine Palms, Yucca Valley, Joshua Tree, Morongo Valley, Pioneertown, and Landers, with an estimated total population of approximately 60,000 residents (Californiaforvisitors.com 2017). With this level of economic support for the region, it is clear that San Bernardino County and the surrounding area rely on the sustainability of the MCAGCC 29 Palms and should be vigilant to any possible threat to its long-term viability.

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<sup>1</sup> Integrated Natural Resource Management Plans (INRMPs) are collaborative management plans that integrate the natural resource management objectives of Department of Defense and Department of Interior with consultation of the U.S. Fish and Wildlife Service and other agencies. Their purpose is to ensure that natural resource management activities are consistent across a landscape and management agency.

<sup>2</sup> (Goldwater Range 2012)

<sup>3</sup> A Joint Land Use Study (JLUS) integrates public input and the long-range planning activities from local jurisdictions near a military facility in order to ensure consistency and compatibility between military activities and nearby land uses.

<sup>4</sup> Joint Land Use Studies, and land use recommendations that result, have limited impact on removing the pressure of development on state lands. In Arizona, there is no mechanism to conserve state lands and remove all development rights. Also, these lands enjoy “super zoning” authority in which development can be approved without the consent of the governing municipality.

<sup>5</sup> <http://old.azcommerce.com/Military/Compat/Ft.+Huachuca+JLUS.htm>

<sup>6</sup> Permanent conservation actions are enacted by Congress, or in some instances by the President of the United States, under the Antiquities Act of 1906. They can only be applied to federal lands.

<sup>7</sup> Permanent conservation actions can remove the risk of urban development by ensuring that the lands are not exchanged and brought into private and state ownership.

<sup>8</sup> Conservation designations do not remove the risk of all recreation activities, but they generally require more cautious management actions. Some designations like Wilderness can remove the risk of off-highway vehicle recreation.

<sup>9</sup> Generally, border enforcement activities occur across the landscape regardless of the type of designation. Lands protected as Wilderness generally receive less impact, though recent efforts in Congress are attempting to reduce the amount of environmental compliance that is required of these activities.

## ENCROACHMENT ANALYSIS

The following sections evaluate the specific instances of encroachment observed in the California Desert Region. These issues are either currently challenging successful military operations or are likely to be at issue in the coming years—resulting in long-term impacts, either directly or indirectly, to the successful operation of military training and readiness activities. These sections will cover encroachment pressures caused by: 1) Urban development, 2) Renewable energy, 3) Electrical transmission lines, 4) Extractive industries like mining, 5) Recreation, and 6) Natural resource management.

### 1. URBAN DEVELOPMENT PRESSURES

Generally, urban development encroachment occurs on private lands near military installations, operating areas, and underneath airspace. Publicly owned lands can also be subject to these pressures, especially state trust lands, which can be difficult to conserve in many states and are similar to private lands due to their development potential. On federal lands, development of typical urban uses do not occur, but parcels of significant value are occasionally exchanged or sold to be converted to development uses. Throughout the California Desert region, urban development occurs in a variety of patterns—urban development in cities and towns, suburban development surrounding these communities, and rural development in

scattered and unstructured patterns that are associated with agricultural activities, mining, or other social or economic factors (see Figure 5).

#### *Potential Encroachment Pressure: Significant*

Urban development can cause significant encroachment pressure on a military facility and is almost always a negative factor if military activity causes nuisances like noise, smoke, dust, or light in the vicinity of human habitation. Table 6 identifies these potential encroachment concerns.

#### *Possible Benefit: Conditional*

Creative development planning and design can bring beneficial use to parcels within close proximity to a military installation, operating area, or under airspace.

Direct	Indirect	Perceived
<p>Homes and commercial uses can cause significant challenges for military facilities and uses.</p> <p>Complaints from the public are catalogued and used as a metric to measure the viability of an installation.</p> <p>Lands with development potential, including private and state-owned parcels, are considered an encroachment pressure even if no plans are in place to develop them.</p> <p>Military operations that use optics or sensitive night-vision instruments can experience direct encroachment from light pollution. This can severely impair the facility's viability.</p> <p>Proximate urban uses can cause:</p> <ul style="list-style-type: none"> <li>-Dust</li> <li>-Light pollution</li> <li>-Trespass issues</li> <li>-Smoke</li> <li>-Noise</li> </ul> <p>Each of these can impact the facility nearby.</p>	<p>On occasion, the development and infrastructure that serves it can damage and fragment habitat to such a degree that wildlife must rely on nearby natural lands, like military installations, to survive.</p> <p>Urban demands on natural resources cause impairment to military facilities.</p> <p>Even if a facility has control of underground water resources, in the event of continued water scarcity due to a variety of factors, the facility could quickly become unpopular with other interests who desire reserved water resources for other purposes.</p> <p>Urban development brings communication infrastructure that can interfere with military electronics and communication testing, training, and experimentation activities.</p>	<p>Occasionally, urban development encroachments are resolved after a period of public scrutiny. In some situations, the concerns, though largely removed, remain in the minds of the community and parties at the DoD. It can be difficult to remove these perceptions of encroachment.</p> <p>Urban uses near military installations can raise concern from the community and/or military leaders, even if they comply with encroachment protection requirements.</p>

Table 6. Possible Urban Development Encroachments



## PRIOR ACTIONS TO PROTECT THE MCAGCC: THE MORONGO BASIN CONSERVATION PRIORITIES PROJECT

Around 2006 a group of visionary leaders in the Morongo Basin, which included the Sonoran Institute, came together in recognition of the importance of working collaboratively to develop conservation strategies to help local communities decide where and how to grow. Out of these meetings, the Morongo Basin Open Space Group was formed, bringing together a planning partnership of 22 local, state, and federal entities from the government, business, and community sectors. In order to best provide support for forward-looking decisions about basin-wide conservation and growth issues, the group initiated the Morongo Basin Conservation Priority Setting Project. One product of that work – the Morongo Basin Conservation Priorities Report: A strategy for preserving conservation values –identified specific parcels in the 1,400-square-mile area that, when conserved, will support one or more of five community-identified conservation values. On its release in 2012, the Conservation Priorities Report identified 1,406 composite high-priority parcels—properties that earned a high-priority ranking on at least two of the five conservation values. Conservation of these and other identified priority parcels will provide large areas of contiguous habitat and roaming area, with connections to other protected areas, and will also contribute to the maintenance of community

identities, protect the missions of the Marine Base and national park, and preserve community views and treasures. In 2012 approximately 18% of composite high-priority parcels were under existing protection; since then, many of the identified parcels have been conserved.

The impact of the Morongo Basin Conservation Priority Setting Project is ongoing, and includes land acquisition and protection efforts undertaken by a number of Open Space Group principals. These include the Mojave Desert Land Trust’s tireless efforts in land acquisitions and transfers effecting protection of local wildlife corridors, the Marine Corps Air Ground Combat Center’s active participation in the Department of Defense’s REPI (Readiness and Environmental Protection Integration) Program, local government’s incorporation of conservation strategies and wildlife corridor mapping in long-range planning documents, and online access to parcel-level Conservation Priorities Setting results funded by the Morongo Basin Conservation Association. Now in its second printing, the Conservation Priorities Report remains an essential reference in the continuing implementation of land protection activities underway across the complex landscape of public-private lands and diverse land uses in the Morongo Basin.

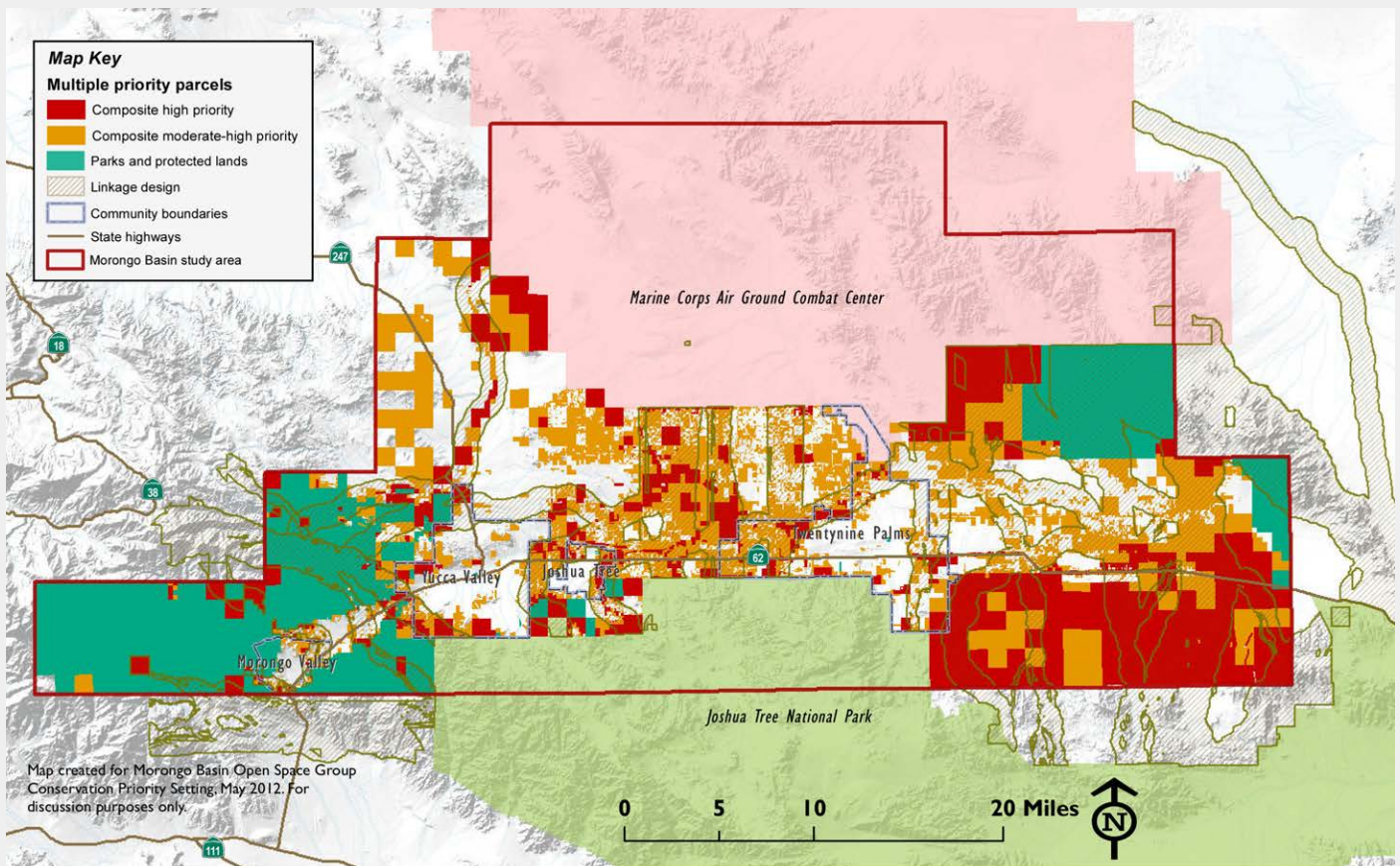


Figure 4. The Morongo Basin Conservation Priority Setting Project identified significant parcels of public and privately held land that are of import to retaining the connectivity of the MCAGCC with the broader ecological network.

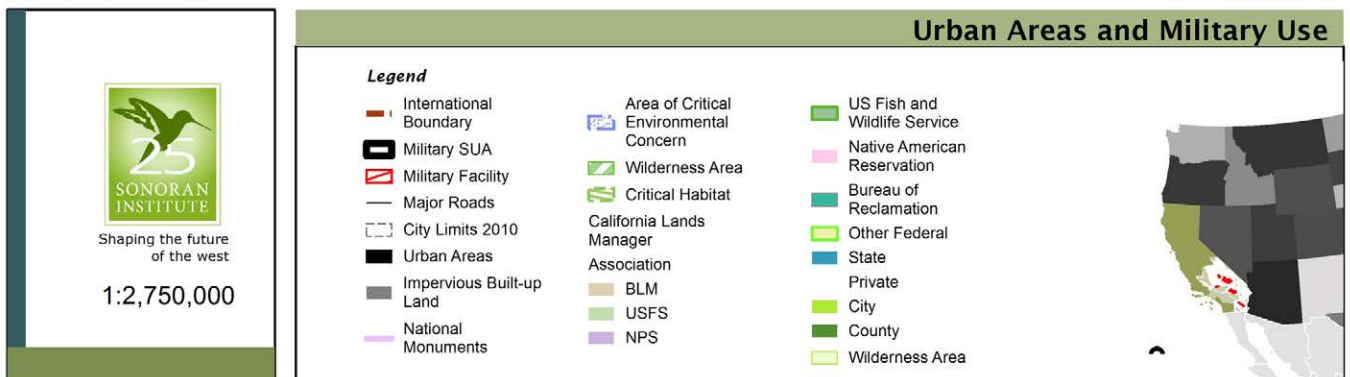
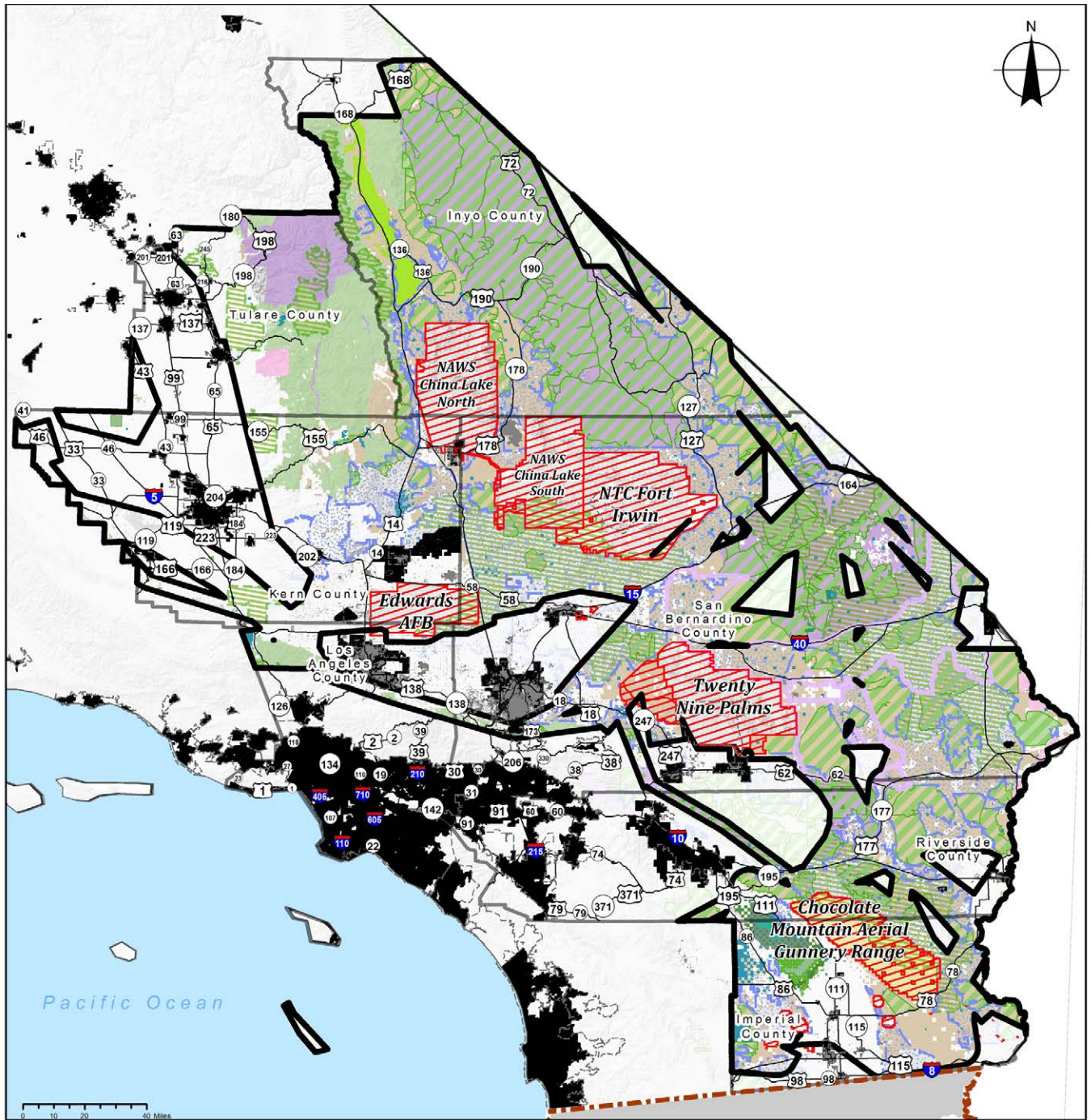


Figure 5. Urban areas and impervious built-up land in the California Desert region.

## California Desert Region

### NAVAL AIR WEAPONS STATION CHINA LAKE

NAWS China Lake is a facility that is generally fairly secluded from urban development pressures. Though the gateway community of Ridgecrest occurs just to the south and along the border of the north range, generally there is no urban development anywhere near its boundaries. Figure 6 demonstrates that some development of a rural variety, however, does occur to the southwest around the community of Inyokern and could be a source for concern about noise, dust, or other nuisances.

Urban development does not appear to be a source of significant fragmentation of the ecological network around this facility. Figure 7 identifies a range of connectivity corridors that have been mapped around this facility. The only area of conflict appears to be directly on the southwest border of the north range of NAWS China Lake where a corridor is interrupted by scattered development activities.

#### Urban Encroachment Grade for NAWS China Lake

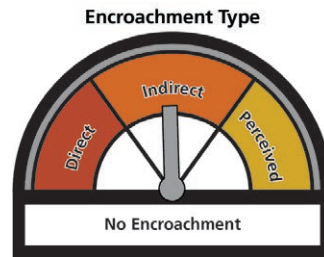
Urban development does not appear to be a significant concern for the long-term viability of NAWS China Lake both in terms of interference of military uses or fragmentation of habitat. One emerging issue, however, is new development and its impact on water supplies that are shared by all users in this basin. The Indian Wells Valley (IWW) relies entirely on groundwater, as it is the only source of potable water. All users, and especially NAWS China Lake, must remain aware of growing water demand and the sustainability of water resources. In fact, the Indian Wells Valley is identified as a "Critically

Overdrafted Groundwater Basin" by the California Department of Water Resources and as such is mandated to develop a groundwater sustainability plan by 2020 (Association 2017). For this reason alone, any extensive groundwater pumping, such as is required by urban uses, should be considered a source of current and future indirect encroachment if not adequately addressed and managed in a manner that will ensure a long-term and sustainable aquifer, both in regard to maintaining water quality and availability.

#### Urban Encroachment Recommendations

Within the California Desert Region, excessive groundwater pumping can contribute to indirect encroachment concerns. In particular, due to the serious overdraft conditions of the Indian Wells Valley, NAWS China Lake, like other installations in the arid West, should proactively engage in water resource planning with the surrounding communities and stakeholders. This planning should anticipate the uncertainty of the future, explore conservation opportunities, and promote proactive policy around land use planning and managing water uses. To best facilitate this, the State of California has enacted the Sustainable Groundwater

Management Act of 2014, and requires the development of a Groundwater Sustainability Plan for each basin in the state, particularly those determined to be in critical overdraft, such as the Indian Wells Valley. To help protect the mission of the DoD at NAWS China Lake, it is recommended that the DoD continue to participate in the development of the IWW Groundwater Sustainability Plan.



### CHOCOLATE MOUNTAIN AERIAL GUNNERY RANGE

In the case of the Chocolate Mountain Aerial Gunnery Range, (CMAGR) development has not occurred in any significant way near the facility, nor is it likely to occur in the near future. Figure 8 identifies areas where urban development has occurred in association with military uses, along the limits of incorporated areas—an indicator of where development is likely to occur. Generally, the rural and agrarian communities of El Centro and Brawley are the only urban areas that are remotely close to the CMAGR. There is little threat of any urban development that could encroach within military airspace.

#### Sun Corridor Program

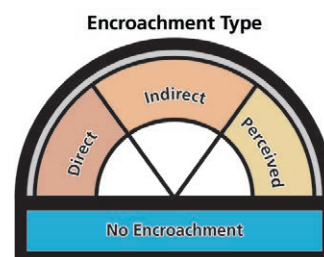
With respect to ecological connectivity, no urban development is expected to contribute to the fragmentation of habitat around the CMAGR facility. See Figure 9 for more information.

#### Urban Encroachment Grade for the CMAGR

Though some rural agrarian communities occur in the vicinity of the CMAGR, they are not expected to grow or contribute additional encroachment pressure to the facility.

#### Urban Encroachment Recommendations

None.



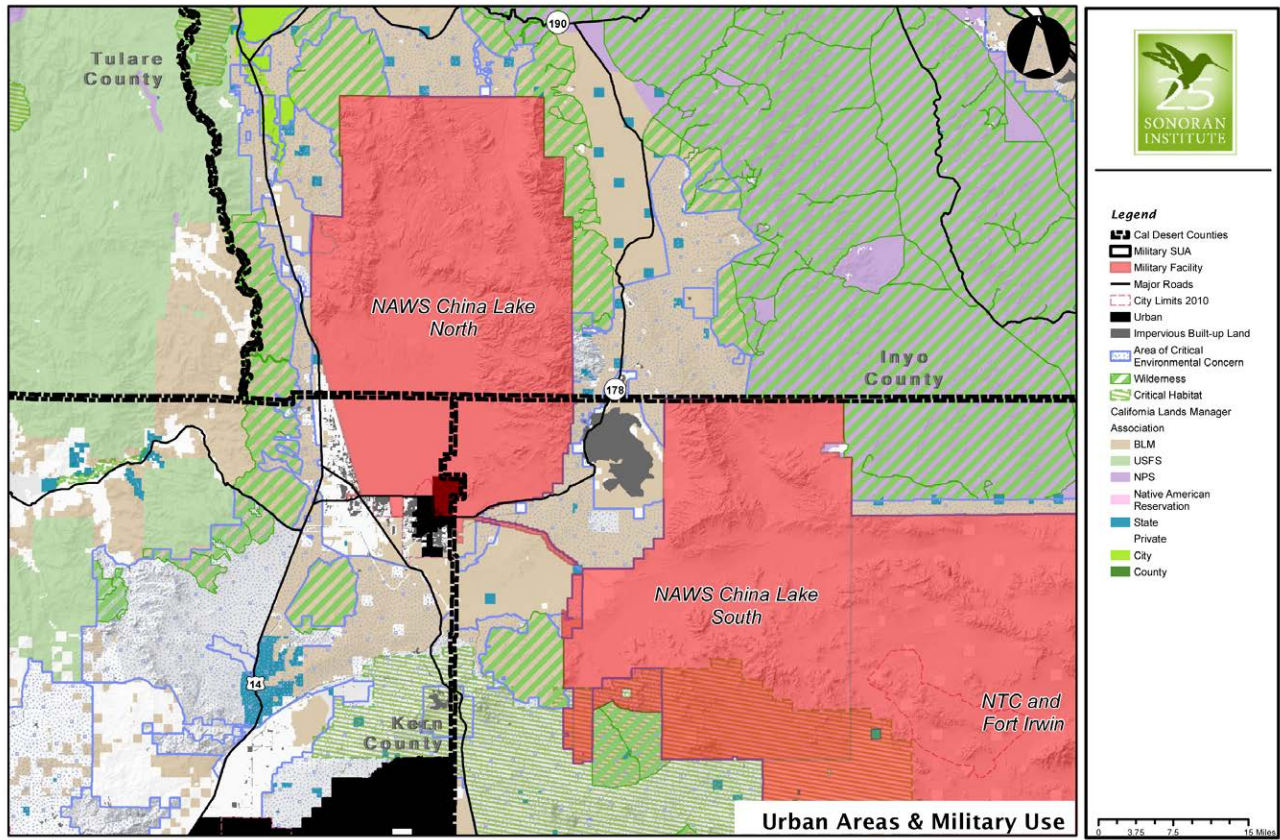


Figure 6. NAWS China Lake enjoys little encroachment from urbanization.

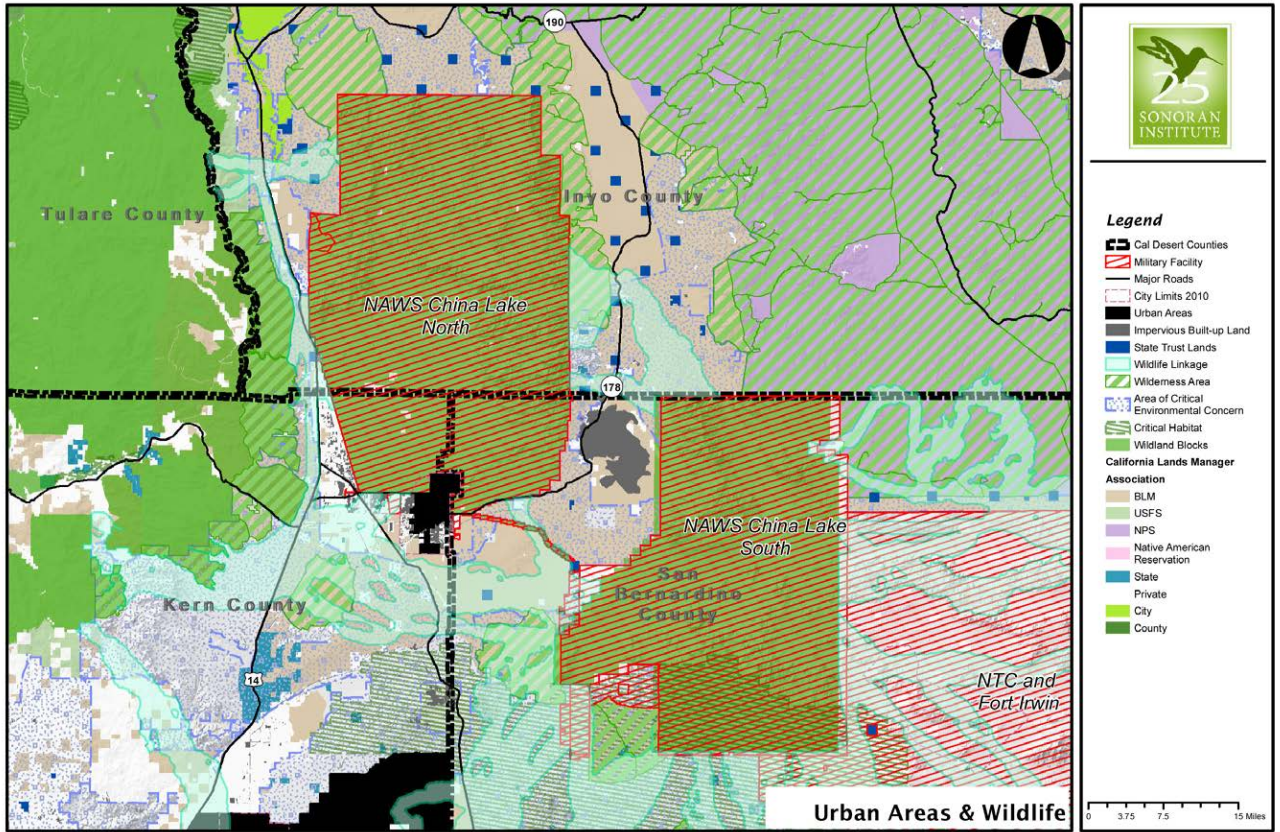


Figure 7. NAWS China Lake is relatively free of ecological connectivity conflicts, except on its southwest border, where a corridor is interrupted by scattered development activities.

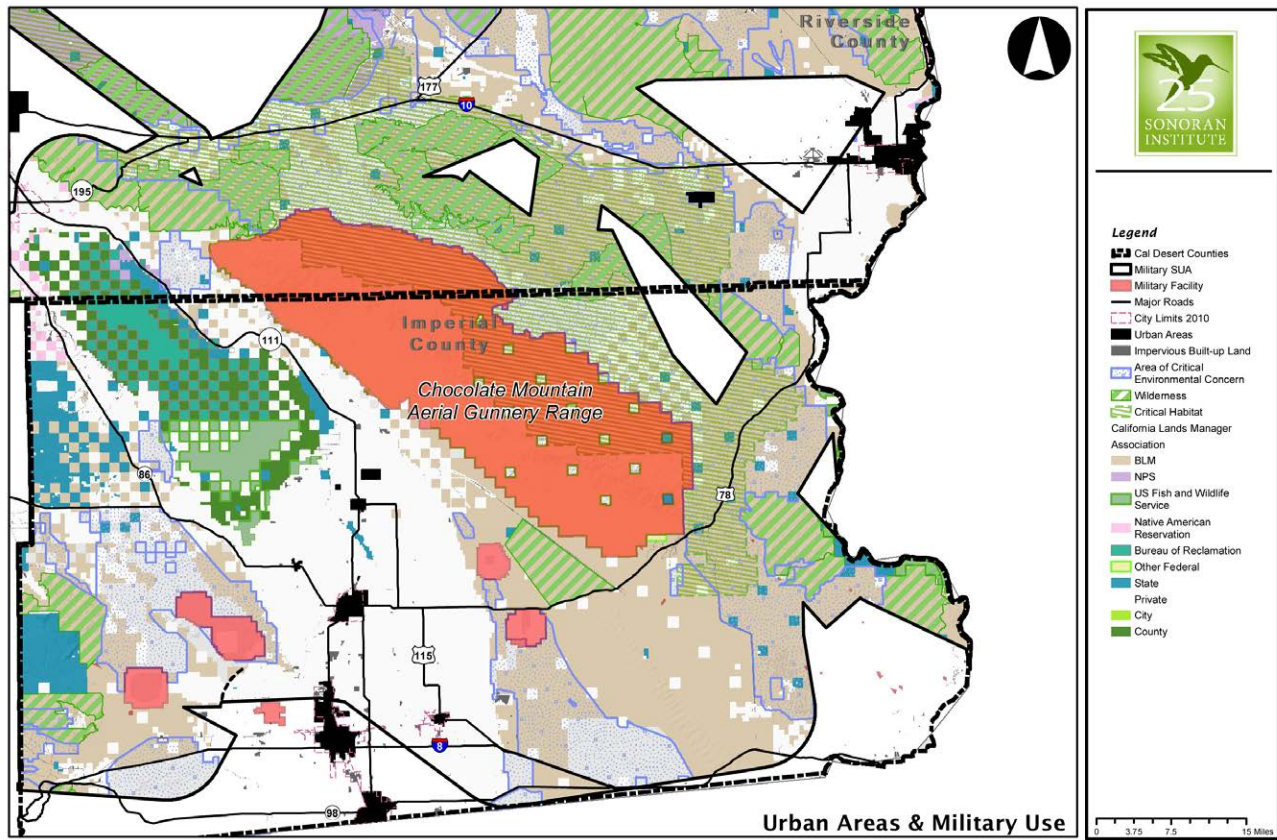


Figure 8. The CMAGR enjoys little encroachment from urbanization.

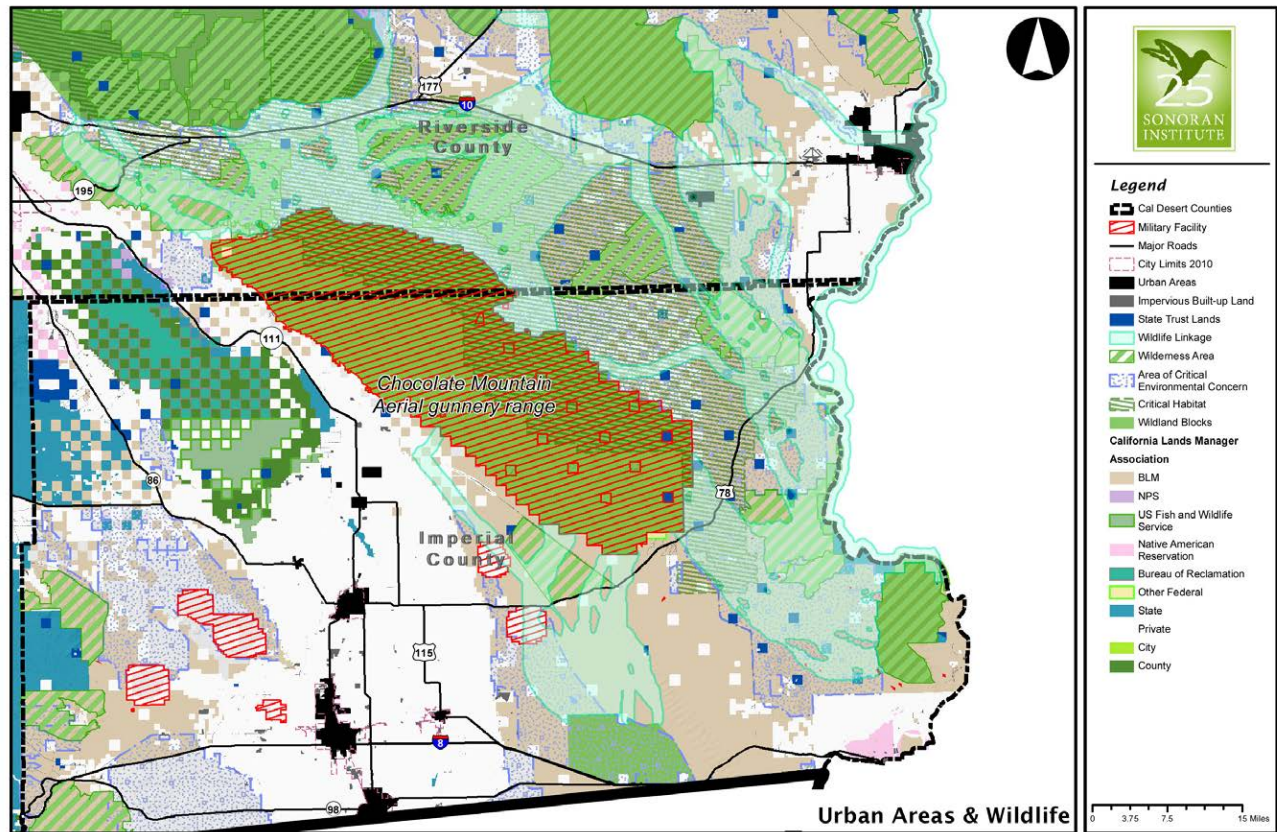


Figure 9. Biological connectivity at the CMAGR is expected to be unchanged in the near future as a result of urban development.

**EDWARDS AIR FORCE BASE**

In the case of Edwards AFB, development has occurred, and will likely continue on three sides of the installation with California City to the north, Willow Springs and Mojave to the west, and Lancaster and Victorville to the south. Figure 10 identifies areas where urban development has occurred in association with military uses, along with the limits of incorporated areas—an indicator of where development is likely to occur. In general, there is no clear threat of direct encroachment in the current development patterns, as Edwards AFB is sheltered within a large and controlled installation. Military SUAs and MTRs occur in the vicinity of California City and in portions of Victorville and Lancaster where additional vigilance needs to occur to preserve the viability of the military activities that rely upon these corridors.

Figure 11 identifies urban development as it relates to biological connectivity and environmental resources. This image is a reminder that Edwards AFB, like other installations in the California Desert, must remain vigilant about losing viable biological connectivity to the broader natural landscape. Edwards AFB is rapidly becoming isolated from the broader Mojave Desert ecoregion on three sides and must respond by preserving connectivity through the landscape to the northeast. The promotion of enhanced protection measures to preserve this connectivity—in addition to promoting connectivity to the northwest through western California City and to the south between Lancaster and Victorville, where modeled corridors are mapped—is recommended.

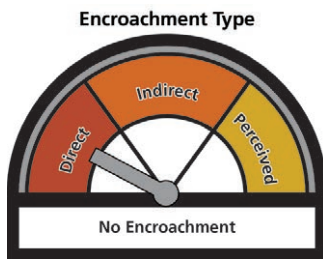
*Urban Encroachment Grade for Edwards AFB*

Some direct encroachment within military SUAs and MTRs has occurred around California City, Lancaster, and Victorville. Directly to the west of

the facility is some rural development that can lead to complaints from residents and challenges related to community support. Indirect encroachment is occurring through the fragmentation of the Mojave Desert landscape on the north, east, and south of the facility, which heightens the need for conservation actions to protect mapped corridors on the north and east sides of Edwards AFB. In particular, wildlife corridors that are mapped through urbanizing areas should be preserved through wildlife-sensitive design, conservation easements, and/or other protection measures.

*Urban Encroachment Recommendations*

1. Edwards AFB may consider working closely with nearby communities to update and implement the existing JLUS in order to promote compatible development within urbanizing areas like California City, Victorville, and Lancaster. In particular, the JLUS should focus on promoting actions that can reduce incompatible development pressure within MTRs in the area.
2. Attention should be paid to the preservation of habitat connectivity between Edwards AFB and the surrounding Mojave Desert ecoregion. In particular, mapped connectivity through protected lands to the east and north should be permanently protected, while linkages that are being lost to urbanization to the northwest and south should be mitigated.
3. Edwards AFB, like other installations in the arid West, should be engaged in the regional dialogue about the long-term sustainability of water resources in the area, exploring conservation opportunities and promoting proactive policy around urban planning and water use.



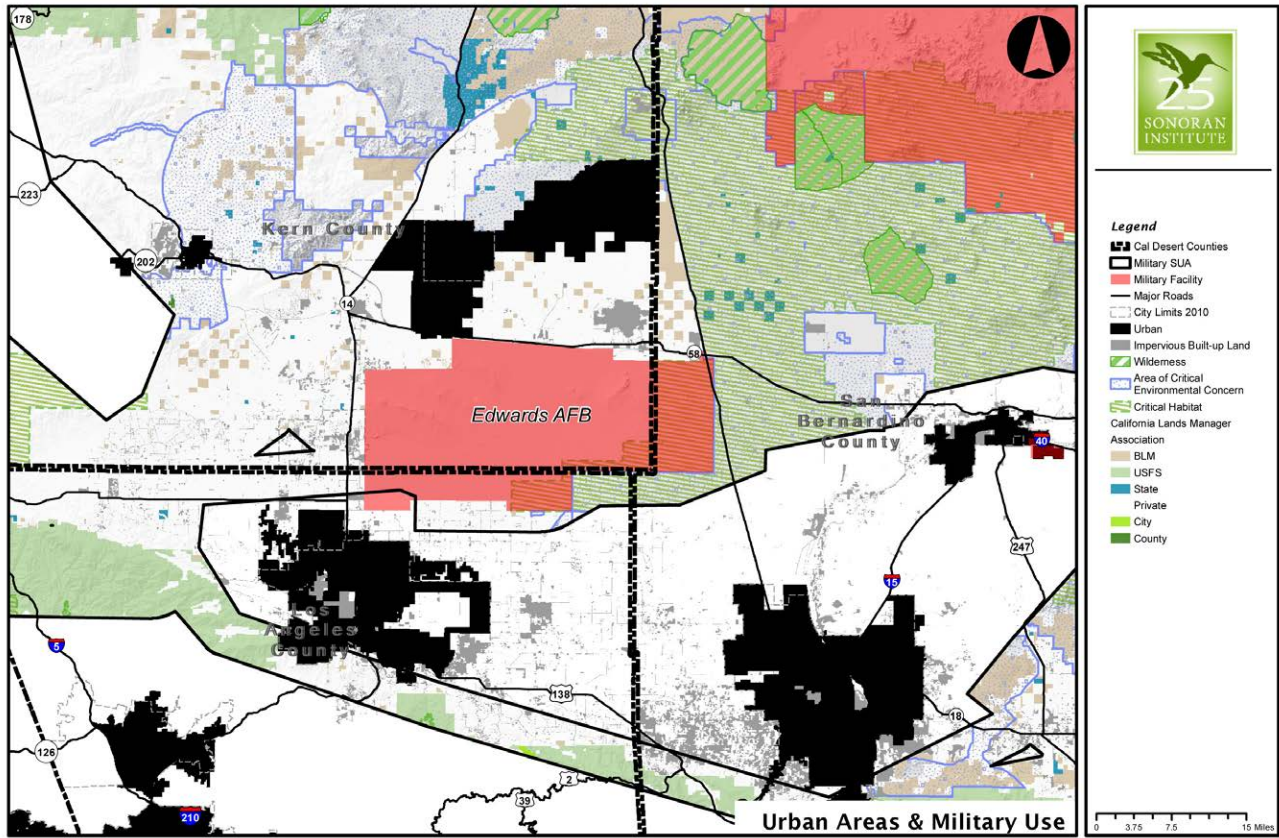


Figure 10. Edwards AFB enjoys little physical encroachment from urban development at its boundaries.

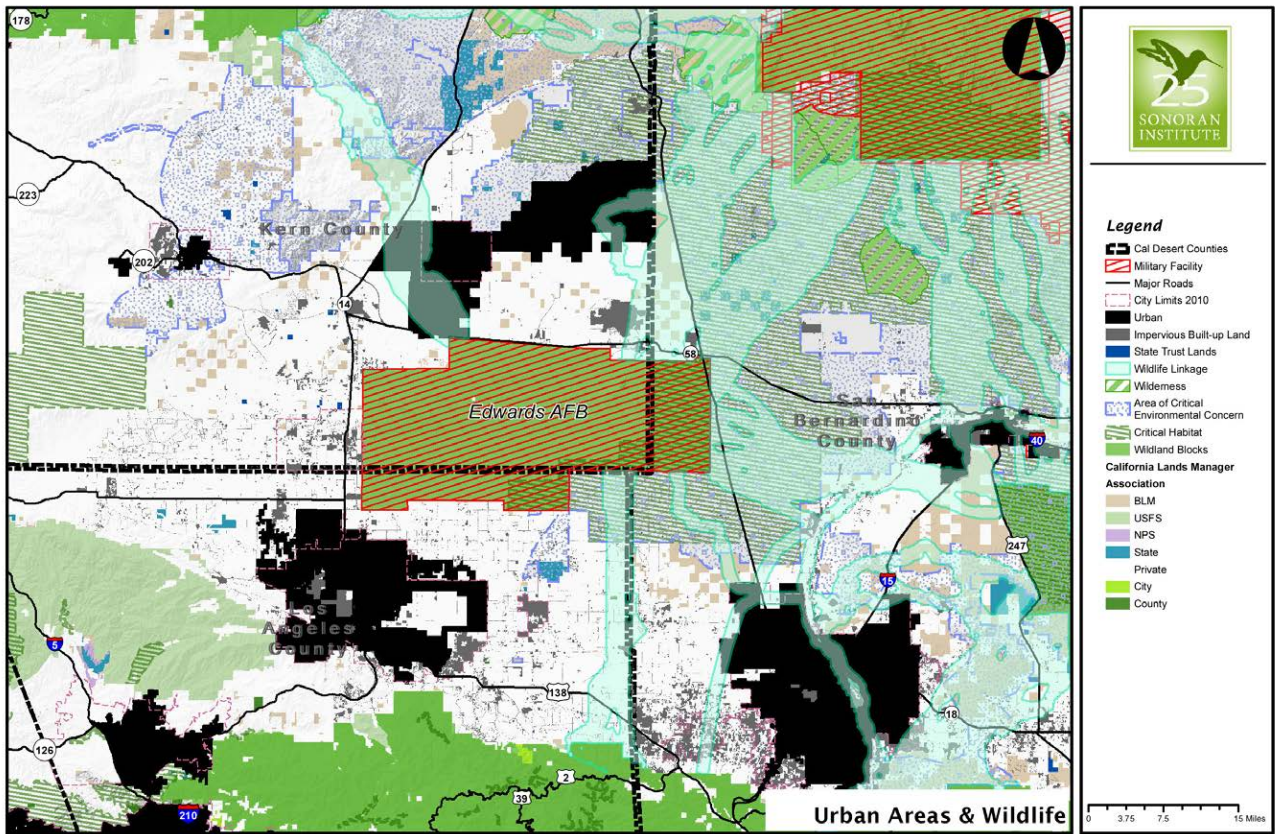


Figure 11. Planned and current development activities have all but isolated Edwards AFB on three sides from the broader Mojave Desert ecosystem.

### FORT IRWIN NATIONAL TRAINING CENTER

Fort Irwin NTC lies in an area that is surrounded by federal lands and is thereby free of urban encroachment pressure as shown in Figure 12. With respect to wildlife connectivity, Figure 13 depicts the community of Barstow that lies within and around a number of significant corridors to the south.

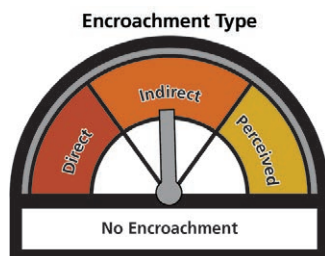
#### Urban Encroachment Grade for Fort Irwin NTC

Incremental and persistent urban development presents a concern for direct encroachment across the operating areas around and leading to Fort Irwin NTC. Incompatible development that occurs in the surrounding communities increases competition for water and other resources in the region and could potentially impact the sustainability of the installation. While these impacts are currently limited, indirect encroachment is foreseeable due to impacts to water uses and natural resources.

#### Urban Encroachment Recommendations

Like other areas within the California Desert Region, urban areas even hundreds of miles from the facility can contribute to indirect encroachment concerns. Led by the appropriate

land use agency, Fort Irwin NTC may want to consider engaging in a regional dialogue about the long-term sustainability of water resources in the area. In particular, agencies should promote the conservation of water across the basin and actively address policies that contribute to new water-intensive agricultural operations and intensive development activities.



### MARINE CORPS AIR GROUND COMBAT CENTER TWENTYNINE PALMS

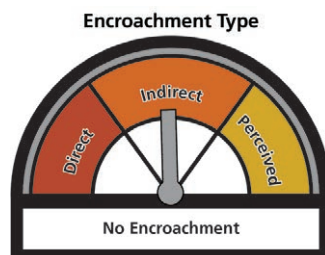
In the Morongo Basin, significant urban encroachment issues persist in spite of enduring efforts to acquire priority parcels and preserve the wildlife corridors that connect MCAGCC 29 Palms to Joshua Tree National Park and other areas. Figure 14 demonstrates how uses of these private lands can contribute to the continued habitat fragmentation and the development of incompatible urban uses in the region. Additionally, significant urban areas have developed over the past few decades, expanding the need for awareness of how urban uses and their resulting encroachment pressures can impair the military installation. Of particular interest is the development in areas like Hesperia and Apple Valley that lie within and near to helicopter flight paths to the southwest. These routes are not designated as MTRs but remain vital to the mission of MCAGCC 29 Palms. Figure 15 identifies areas of urban development across the region, some of which occur in military flight corridors.

#### Urban Encroachment Grade for MCAGCC 29 Palms

Despite development risks in the Morongo Basin in private lands south and west of MCAGCC 29 Palms, in general, there are few risks for development that would directly impair the continuation of military uses in the region. There are, however, concerns about the continued risk that development may have on the connectivity of wildlife that move across private lands and around the communities of Twentynine Palms, Joshua Tree, and Yucca Valley. Using the REPI program, some progress has been made by land trusts to purchase developable lands in key areas of high conservation priority, but more needs to be done to ensure that the ecological connectivity of MCAGCC 29 Palms remains viable into the future.

#### Urban Encroachment Recommendations

1. MCAGCC 29 Palms should engage proactively in local land use planning and economic development efforts to identify uses, activities, and businesses that are compatible with installation operations.
2. The efforts of the Mojave Desert Land Trust and other land conservation entities in the region should continue to receive support from MCAGCC 29 Palms in pursuing funding from REPI, Sentinel Landscapes designations, and other federal assistance used to enhance ecological connectivity.
3. MCAGCC 29 Palms enjoys control of the underground water resources below the facility. However, in the event of continued water scarcity as is expected due to climate change, MCAGCC 29 Palms, like other installations in the arid West, should be engaged in the regional dialogue about the long-term sustainability of water resources in the area, exploring conservation opportunities and promoting proactive policy around urban planning and water use.





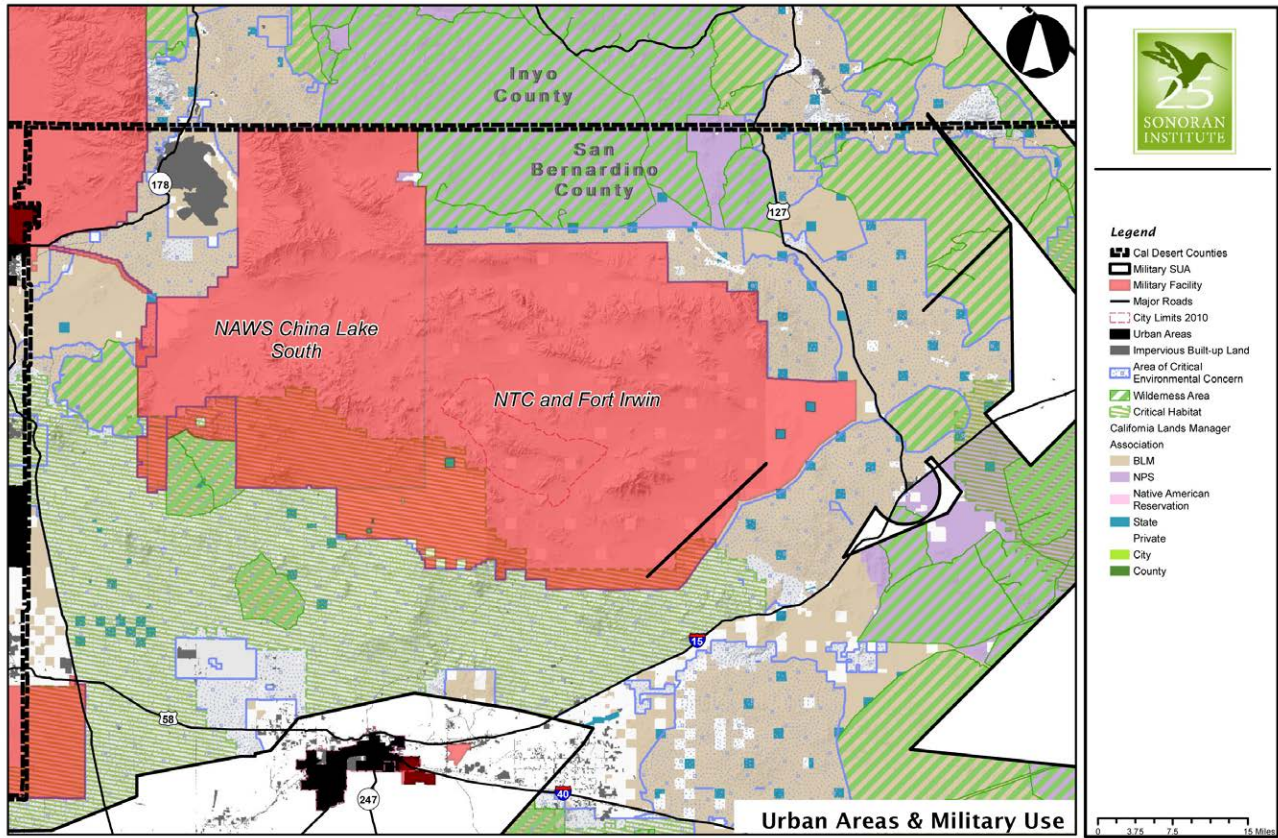


Figure 12. Fort Irwin NTC enjoys little encroachment from urbanization.

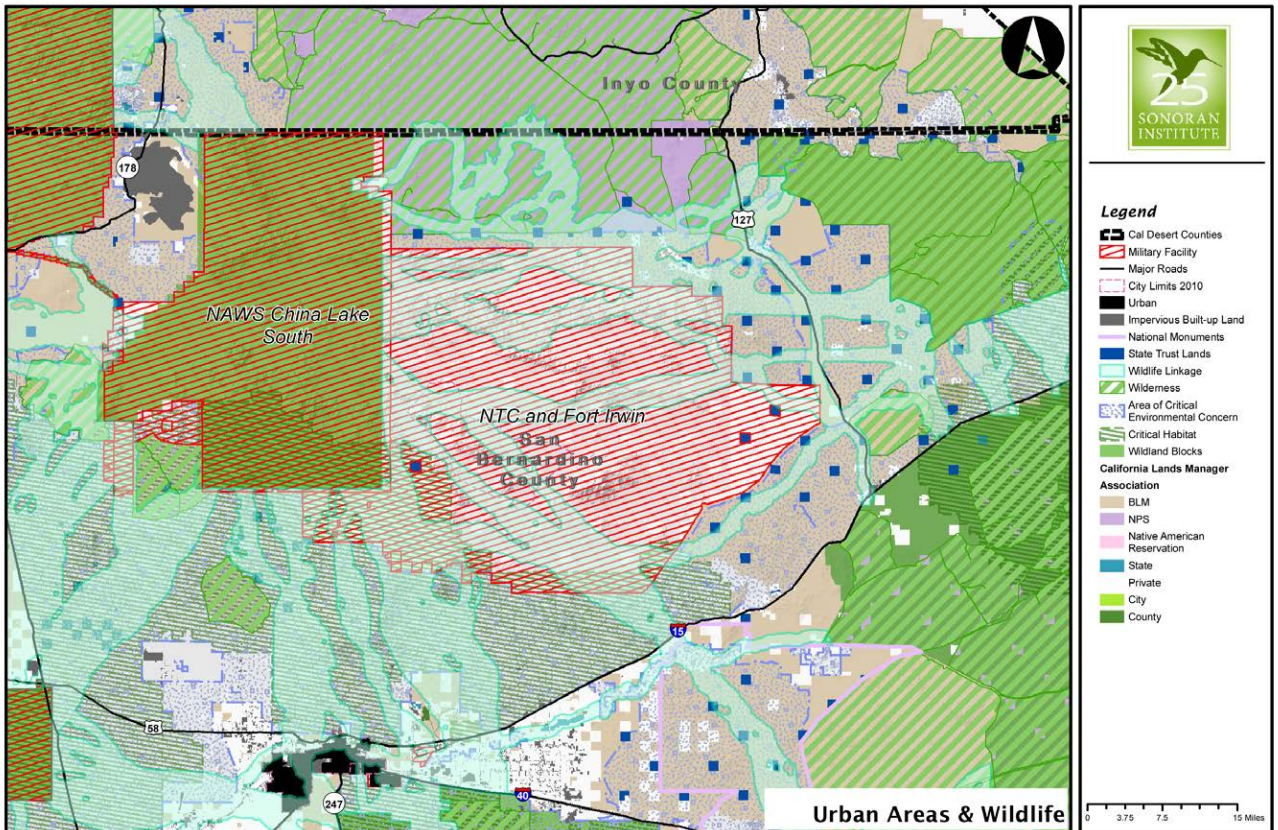


Figure 13. Ecological connectivity has little interruption from urban development around Fort Irwin NTC.

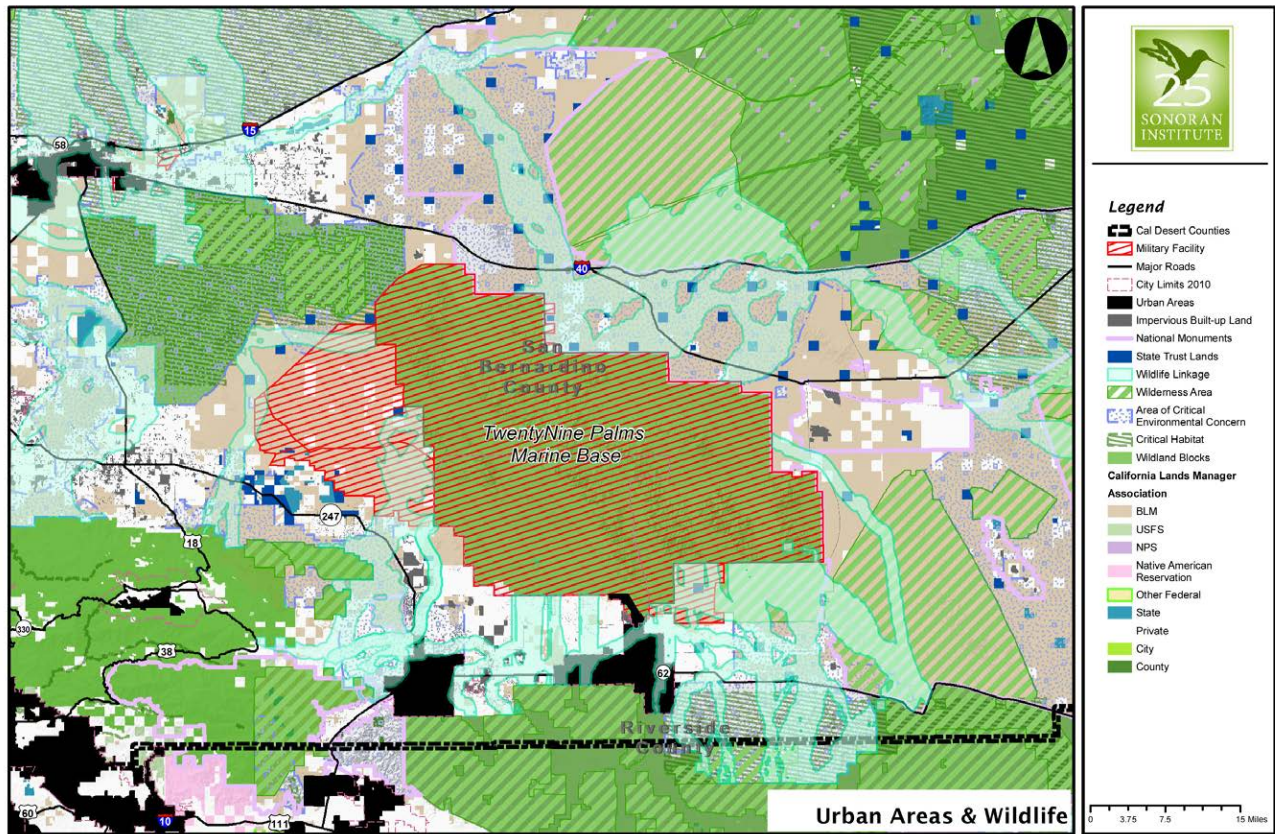


Figure 14. Planned land uses throughout the Morongo Basin could threaten the viability of wildlife connectivity between the MCAGCC 29 and Joshua Tree National Park.

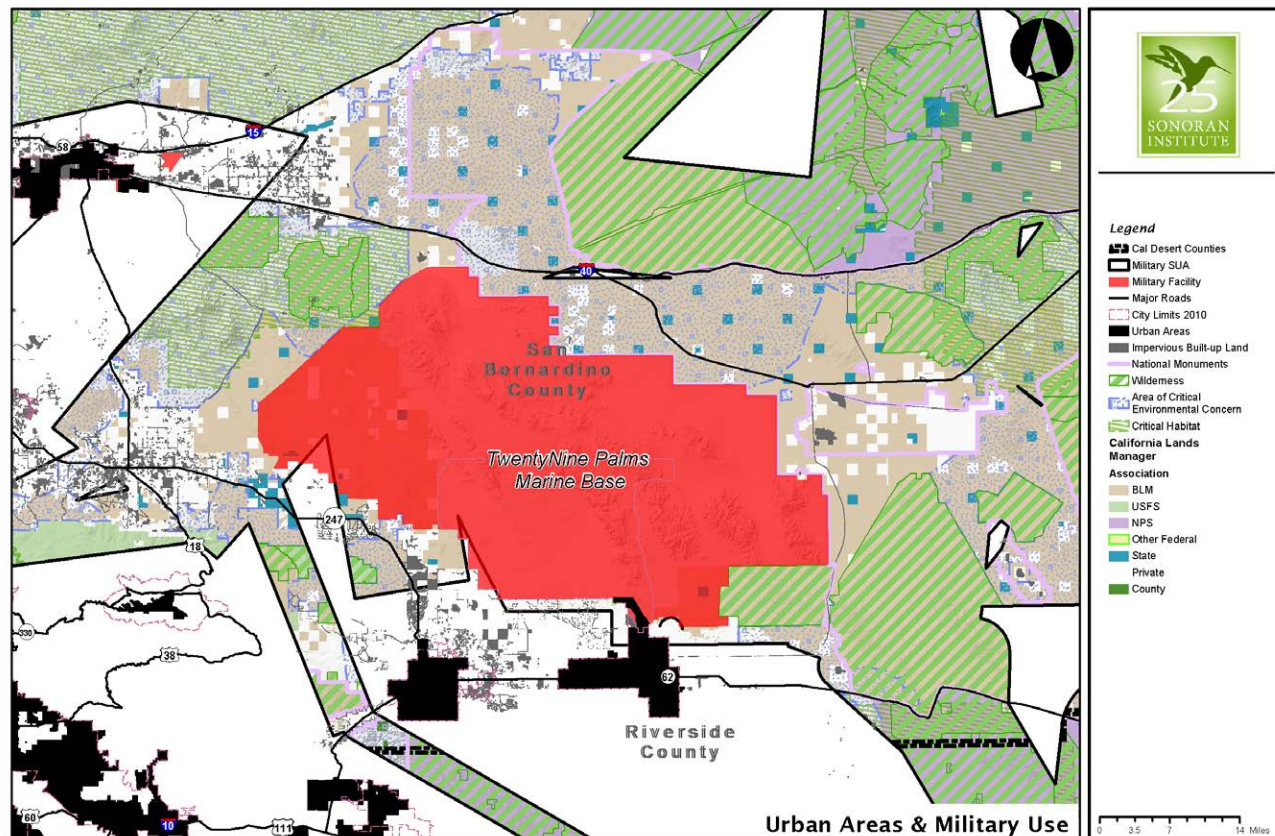


Figure 15. Urban areas around the MCAGCC 29 generally occur outside of SUAs and MTRs, with a few exceptions.

## 2. RENEWABLE ENERGY DEVELOPMENT

Over the past decade, renewable energy projects have become a large component of federal land management. In response to hundreds of thousands of acres proposed for large-scale solar projects, the Bureau of Land Management (BLM) developed a Western Solar Program in 2012 covering six southwestern states including California. Recently, the BLM and a wide range of other stakeholders have been working to create a structure that will both promote renewable energy development in the California Desert Region and reduce conflicts with other stakeholders and environmental resources. The California Desert Renewable Energy Conservation Plan (DRECP) is the result of this process. A record of decision (ROD) was signed in September 2016. Through this process, there is now greater certainty about where renewable energy projects are likely to occur on public lands in this region. The military community in the California Desert Region was highly engaged in the DRECP process, yet it is possible that new projects in these areas could present cumulative impairments to the military mission if there is not proper oversight and project-specific input provided to future developers.

### Potential Encroachment Pressure: Variable

Encroachment potential from renewable energy development depends highly on the specific circumstances of the project site and the technology used. In many cases, renewable energy projects will use project-specific design approaches in areas of military use to be compatible with military missions.

### Potential Benefit: Appropriate Buffer

Renewable energy development can be an encroachment pressure if it is poorly sited. On the other hand, it can be hugely beneficial when used as buffer for a military installation. Solar projects that are low-lying and well sited can fill lands that would otherwise be left vacant, thereby bringing value to the community and the landowner. Solar projects should be in the toolbox as opportunities for beneficial use of buffer lands.

Direct	Indirect	Perceived
<p>Vertical wind and solar towers located in flight corridors or military airspace can pose a vertical obstruction.</p> <p>Small testing towers to determine wind energy potential can be difficult to see and occur with little to no advance notice.</p> <p>Some projects may cause interference with electromagnetic equipment and testing operations.</p> <p>Wind energy development can create a significant interference with military sensor hardware because of the Doppler effect.</p>	<p>Large developments of renewable energy can disturb habitat, thereby encouraging the wildlife to live on military lands.</p> <p>Solar arrays can cause a “lake effect” and attract large birds to military operating areas, increasing the risk for bird strikes.</p> <p>Water-intensive solar projects could impact military installations in areas where water is constrained or subject to management scrutiny.</p>	<p>On occasion, the development of solar projects may pose no real encroachment pressure but may increase scrutiny of the viability of military installations and operations.</p>

Table 7. Possible Renewable Energy Development Encroachments

### NAVAL AIR WEAPONS STATION CHINA LAKE

As shown in Figure 17, there is not much new renewable energy predicted on federal lands by the DRECP. Some of this development could come in a Development Focus Area (DFA) in the dry Searles Lake between the north and south ranges of the NAWS China Lake facility while projects could also occur to the northwest. In general, though this development occurs within areas of military activity, it is unlikely to contribute significant encroachment concern.

However, biological connectivity has been a long-standing concern in the California Desert Region, especially with respect to renewable energy development as shown in Figure 18.

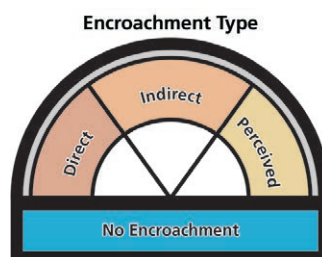
#### Renewable Energy Development Encroachment Grade for NAWS China Lake

Though some renewable energy projects will likely occur in the vicinity of NAWS China Lake, it is unlikely that there will be encroachment concerns provided that there is sufficient scrutiny of individual projects as they are proposed. It appears

that ecological connectivity is largely preserved by the approved DRECP, and little additional indirect encroachment is expected from wildlife management. The overall region of the R-2508 Complex is vital to the long-term viability of this and other facilities in the Cal Desert. For this reason, all development actions in the area should be heavily scrutinized.

#### Renewable Energy Recommendations

The development of renewable energy in the California Desert provides significant opportunity for the state to meet its robust renewable energy portfolio standard of 50% by 2030. Additionally, the DRECP has provided needed guidance to the region on how to implement energy generation in a thoughtful way. Even so, care needs to be taken to ensure that each project is evaluated to prevent encroachment pressures from occurring. For example, low-lying photovoltaic systems could be compatible with overhead MTRs where other technology in the same location could cause a hazard.



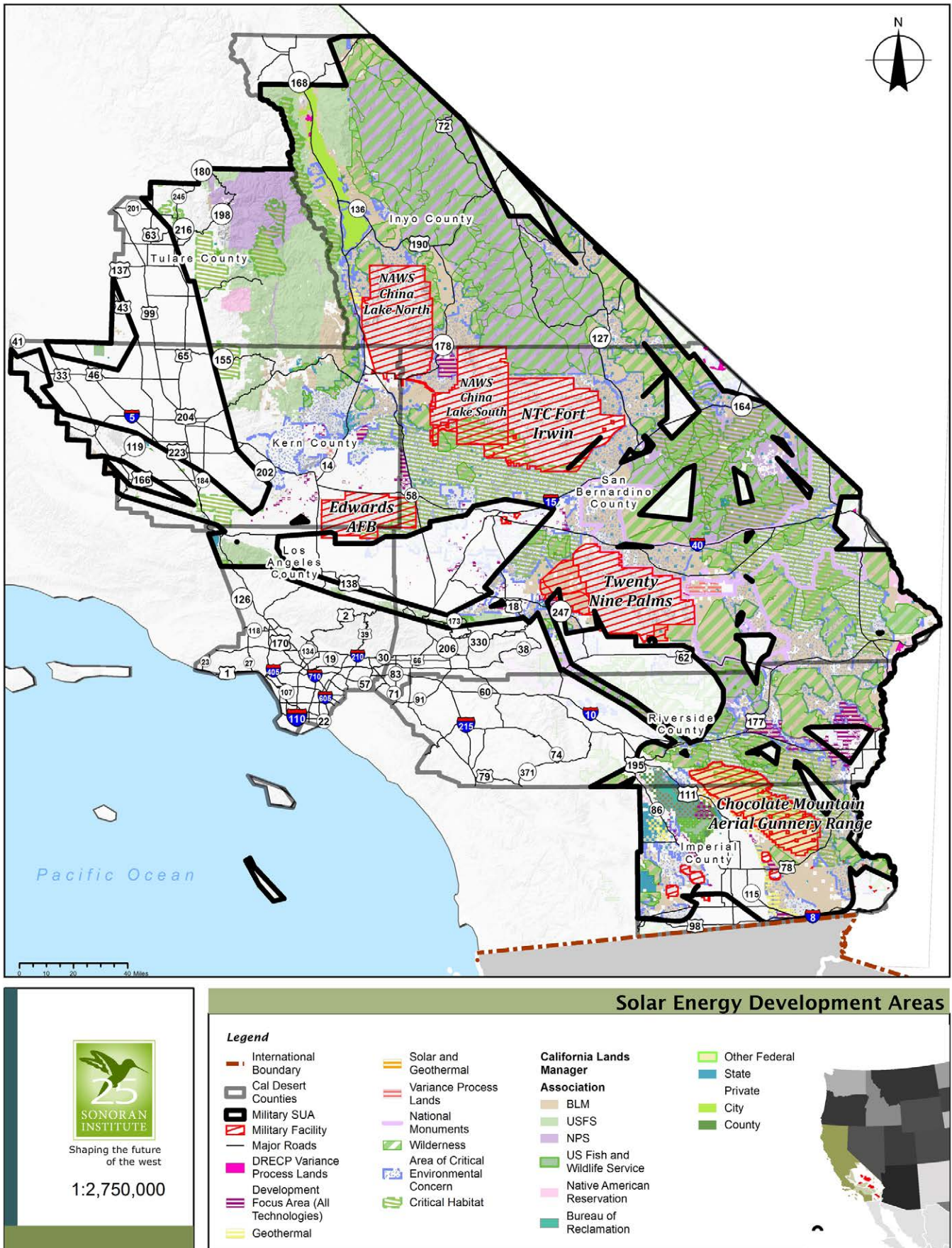


Figure 16. Areas where renewable energy development is likely to occur in the Cal Desert region

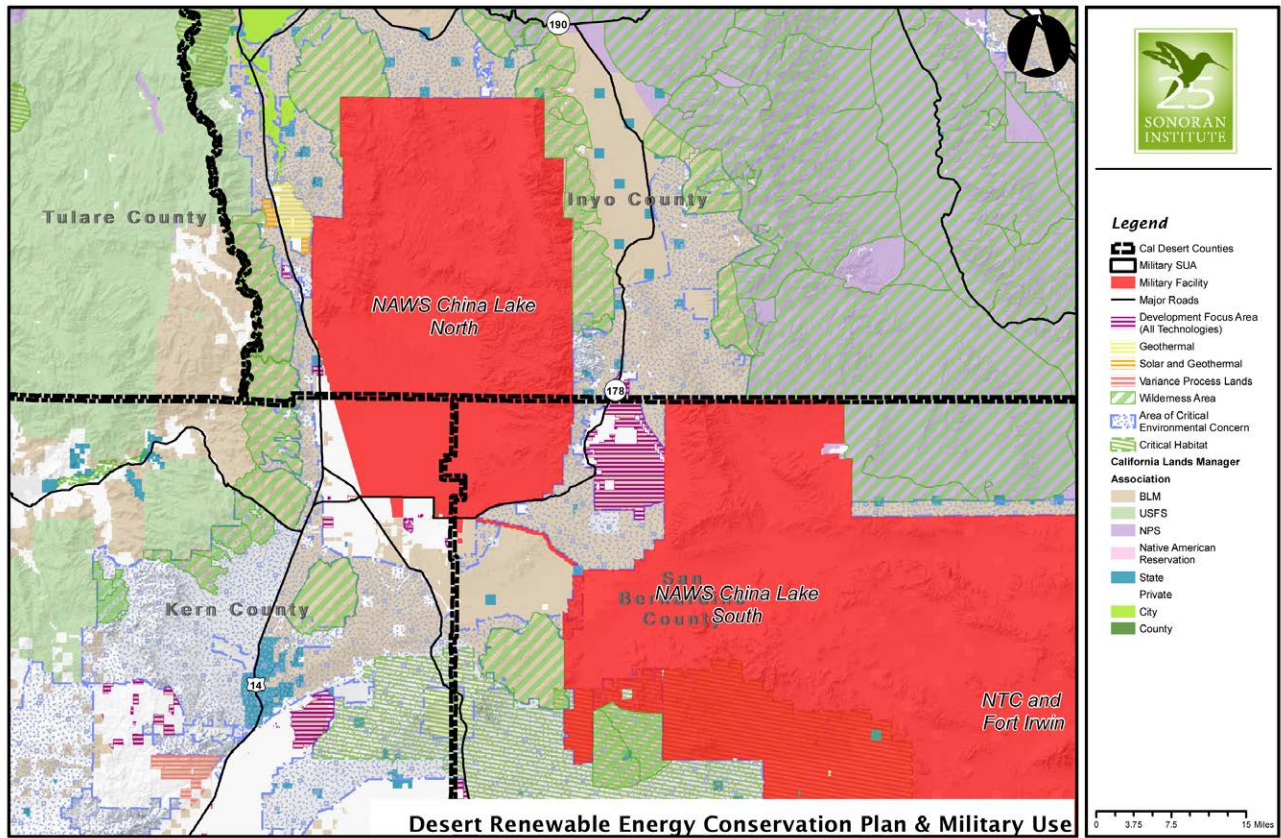


Figure 17. Renewable energy development areas around NAWS China Lake. In general, there is not significant development planned that would create an obvious encroachment concern.

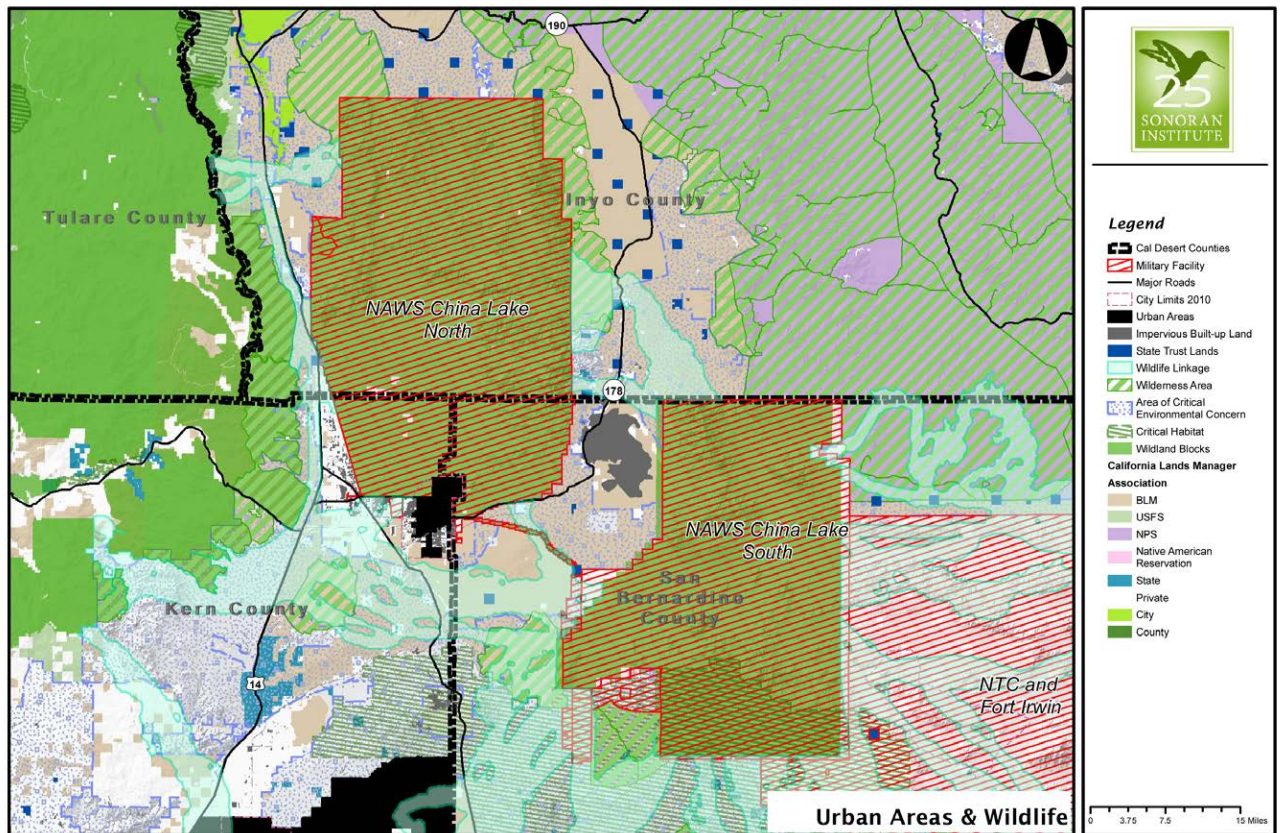


Figure 18. Development Focus Areas avoid wildlife corridors near NAWS China Lake.

**CHOCOLATE MOUNTAIN AERIAL GUNNERY RANGE**

Recently, the BLM and a wide range of other stakeholders have been working to create a structure that will both promote renewable energy development in the California Desert Region and reduce conflicts with other stakeholders and environmental resources. The California DRECP is the result of this process. A ROD was signed in September 2016. Through this process, there is now greater certainty on where renewable energy projects are likely to occur on public lands in this region.

Renewable energy, whether through geothermal, solar, or wind generation, can be a significant cause of encroachment into military operations. Figure 19 identifies the renewable energy development areas as identified in the DRECP, and their location relative to military SUAs and MTRs. These areas are the most likely locations for future projects to occur and could result in encroachment concerns. In the area of the CMAGR, there is some potential for new energy development to interfere with military operations should they occur at any significant scale, and if specific design considerations are not incorporated into the project plans.

Figure 20 shows the lands identified for intensive renewable energy development and their association with biological connectivity. There are several DFAs that overlap with mapped wildlife connectivity areas. In particular, biological connectivity south of the CMAGR could be interrupted by significant development actions along the Coachella Canal. Additionally, significant DFAs occur north of Interstate 10, which itself is a significant barrier to connectivity.

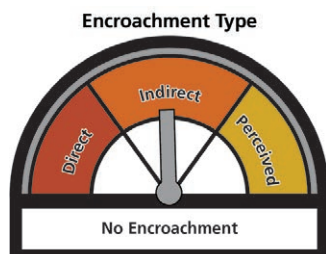
**Renewable Energy Development Encroachment Grade for the CMAGR**

While renewable energy projects could occur directly adjacent to the CMAGR and result in

direct encroachment concerns, provided that there is sufficient scrutiny of individual projects as they are proposed, this is unlikely. A more tangible concern is the incremental fragmentation of habitat connectivity between the CMAGR and the broader Mojave Desert region if significant development activities occur. This concern is somewhat lessened by the amount of conserved land on the north and east of the facility which provides a buffer of adjacent habitat and reduces the management responsibility of the range. The encroachment pressures expected as a result of renewable energy development should be indirect to the military mission.

**Renewable Energy Recommendations**

1. The development of renewable energy in the California Desert provides significant opportunity for the state to meet its robust renewable energy portfolio standard of 50% by 2030. Additionally, the DRECP has provided needed guidance to the region on how to implement energy generation in a thoughtful way. Even so, care needs to be taken to ensure that each project is evaluated to prevent encroachment pressures from occurring. For example, low-lying photovoltaic systems could be compatible with overhead MTRs where other technology in the same location could cause a hazard.
2. In their review of projects, the CMAGR should remain aware that a concentration of renewable energy projects in wildlife corridors that could contribute to the long-term isolation of the facility in their review of projects.



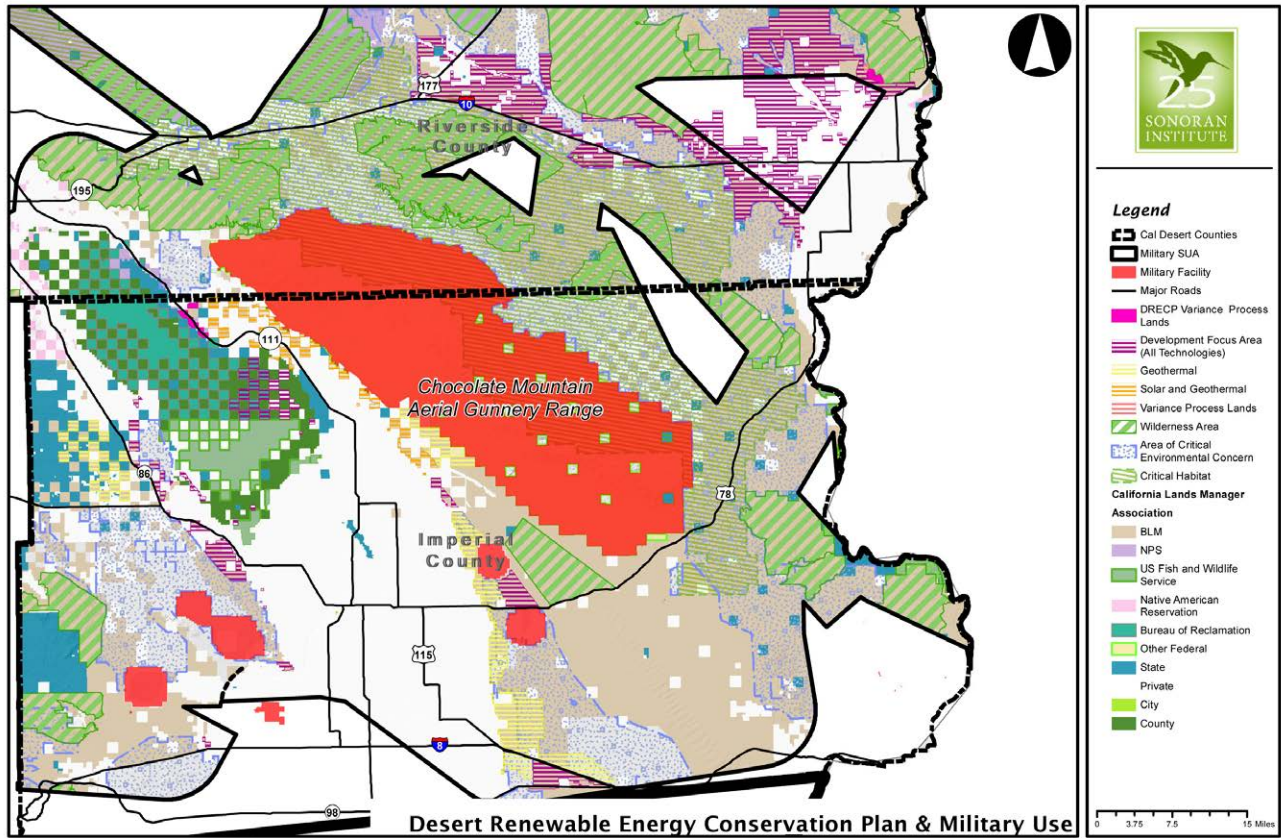


Figure 19. New renewable energy projects could come to the vicinity of the CMAGR that could bring encroachment within SUAs and MTRs around the facility.

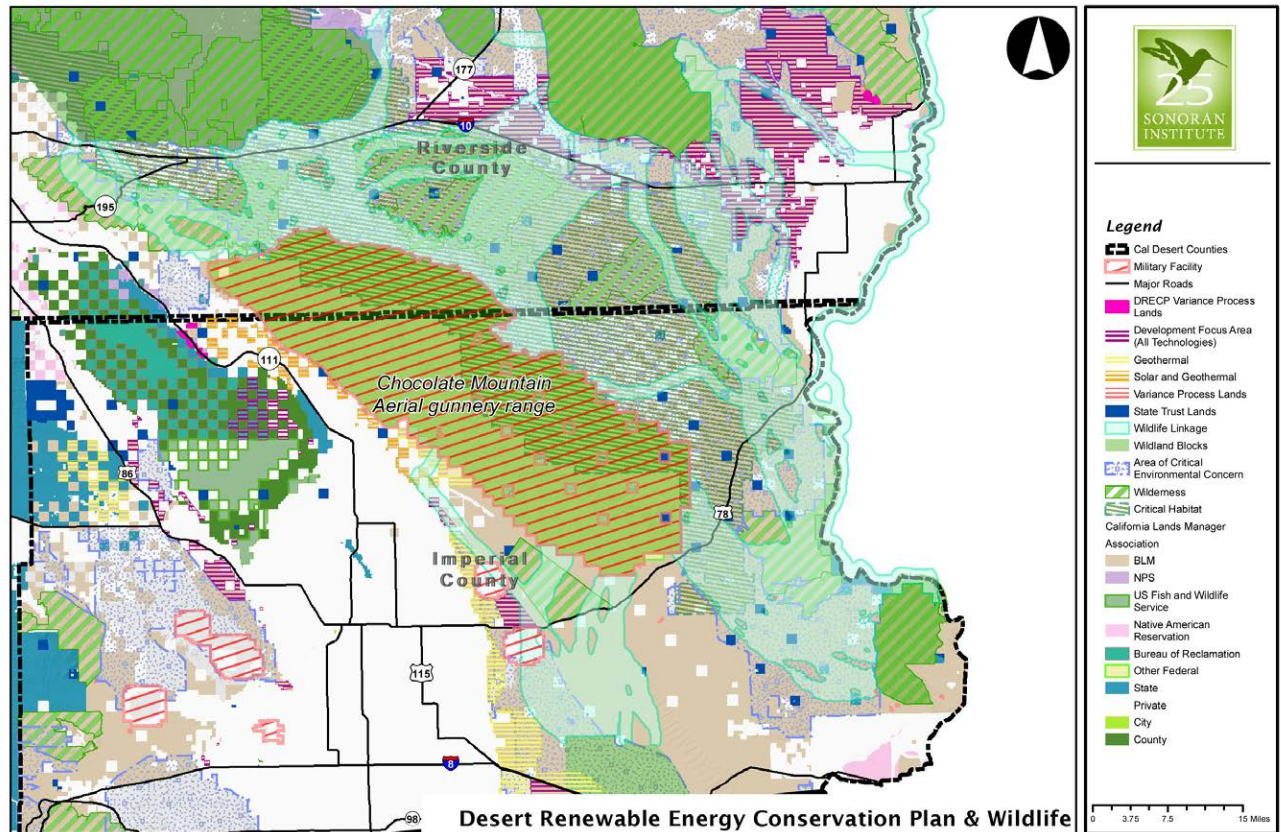


Figure 20. Renewable energy development areas around the CMAGR. In general, there is not significant development planned that would create an obvious encroachment concern.

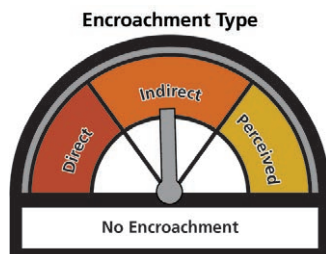
**EDWARDS AIR FORCE BASE**

Renewable energy, whether through geothermal, solar, or wind generation, can be a significant cause of encroachment into military operations. Figure 21 identifies the renewable energy development areas as identified in the DRECP and their location relative to military Special Use Airspace (MTRs and SUAs). These areas are the most likely locations for future projects to occur and could result in encroachment concerns. The military community in the California Desert Region was highly engaged in the DRECP process, yet it is possible that new projects in these areas could present cumulative impairments to the military mission if there is not proper oversight and project-specific input provided to future developers.

Figure 22 shows the lands identified for intensive renewable energy development and their association with biological connectivity. It appears that there is a range of Development Focus Areas (DFAs) that occur within known and mapped wildlife corridors. Of particular interest is the DFA north of Edwards AFB along Interstate 395. While there is a fair amount of renewable energy in the area, a concentration of significant renewable energy projects may pose an additional challenge for maintaining connectivity, especially considering the variety of barriers that exist in other mapped connectivity areas.

*Renewable Energy Development Encroachment Grade for Edwards AFB*

In general, the DRECP has provided a platform that encourages the development of renewable energy outside of areas that are critical for military operations and important ecological resources. In the case of Edwards AFB, some encroachment concerns still exist, including a series of renewable energy DFAs near the installation and within



SUAs. While no immediate threat is known, participation in the development planning of new projects in order to reduce the possibility that new projects create an issue for ongoing military activities is recommended. Some RE DFAs, however, are occurring within the important biological connectivity areas between Edwards AFB and the broader Mojave Desert ecoregion. The practice of developing in these areas, and at any significant scale, may present long-term indirect encroachment due to fragmentation and genetic isolation for the facility.

*Renewable Energy Recommendations*

1. The development of renewable energy in the California Desert provides significant opportunity for the state to meet its robust renewable energy portfolio standard of 50% by 2030. Additionally, the DRECP has provided needed guidance to the region on how to implement energy generation in a thoughtful way. Even so, care needs to be taken to ensure that each project is evaluated to prevent encroachment pressures from occurring. For example, low-lying photovoltaic systems could be compatible with overhead MTRs where other technology in the same location could cause a hazard.
2. Development within the DFA north of Kramer Junction presents a significant future challenge to preserving connectivity between Edwards AFB and the broader Mojave Desert ecoregion. BLM should seek to study the importance of this corridor for key regional species in consideration of its appropriateness for development.
3. Edwards AFB should remain aware that a concentration of renewable energy projects in wildlife corridors could contribute to the long-term isolation of the facility.

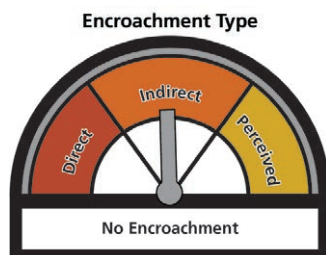
**FORT IRWIN NATIONAL TRAINING CENTER**

Fort Irwin NTC is sheltered by a large amount of federal land on all sides. While this prevents many new development actions from occurring, the DRECP has identified land as DFAs in the immediate vicinity of the installation. Figure 23 identifies the large area around Searles Lake just to the west, along with some potential development around the Barstow area. Recent renewable energy projects near Fort Irwin NTC raised concern about the potential water use that could result from these generation facilities.

In Figure 24, it is apparent that though some new renewable energy development could occur around Fort Irwin NTC, it will be generally outside of biological corridors. Therefore, there is little concern about the future ecological connectivity of the facility.

*Renewable Energy Development Encroachment Grade for Fort Irwin NTC*

Since 2005 there have been many renewable energy proposals in and around Fort Irwin NTC. All incompatible development has either been withdrawn by the developers or curtailed by the land use decision-makers. Even so, some projects could be permitted in nearby DFAs, resulting in



long-term impacts to water resources. As such, this issue remains a concern for indirect encroachment.

*Renewable Energy Recommendation*

The development of renewable energy in the California Desert provides significant opportunity for the state to meet its robust renewable energy portfolio standard of 50% by 2030. Additionally, the DRECP has provided needed guidance to the region on how to implement energy generation in a thoughtful way. Even so, care needs to be taken to ensure that each project is evaluated to prevent encroachment pressures from occurring. For example, low-lying photovoltaic systems could be compatible with overhead MTRs where other technology in the same location could cause a hazard.



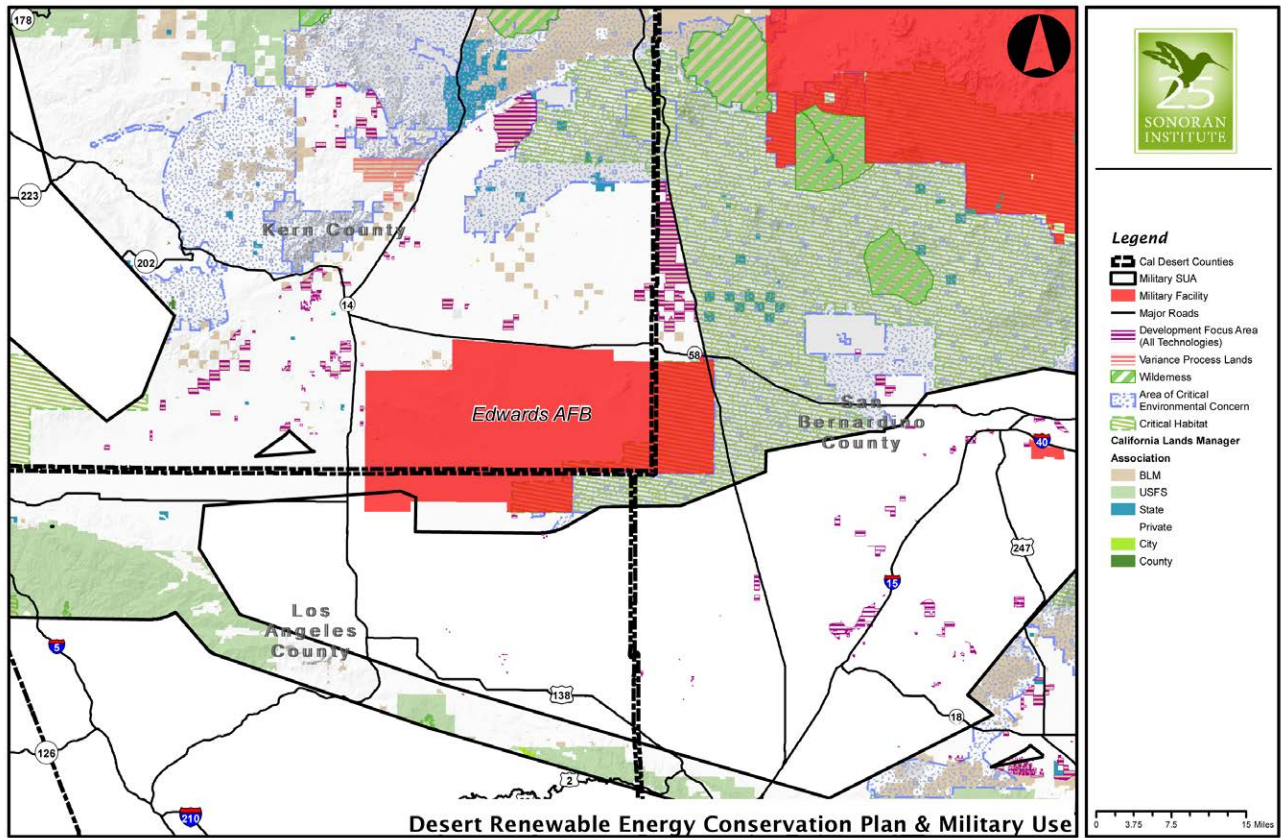


Figure 21. In general, renewable energy development is responsive to environmental considerations. There are some areas, however, where a concentration of new renewable energy projects could contribute to fragmentation and ecological isolation of Edwards AFB.

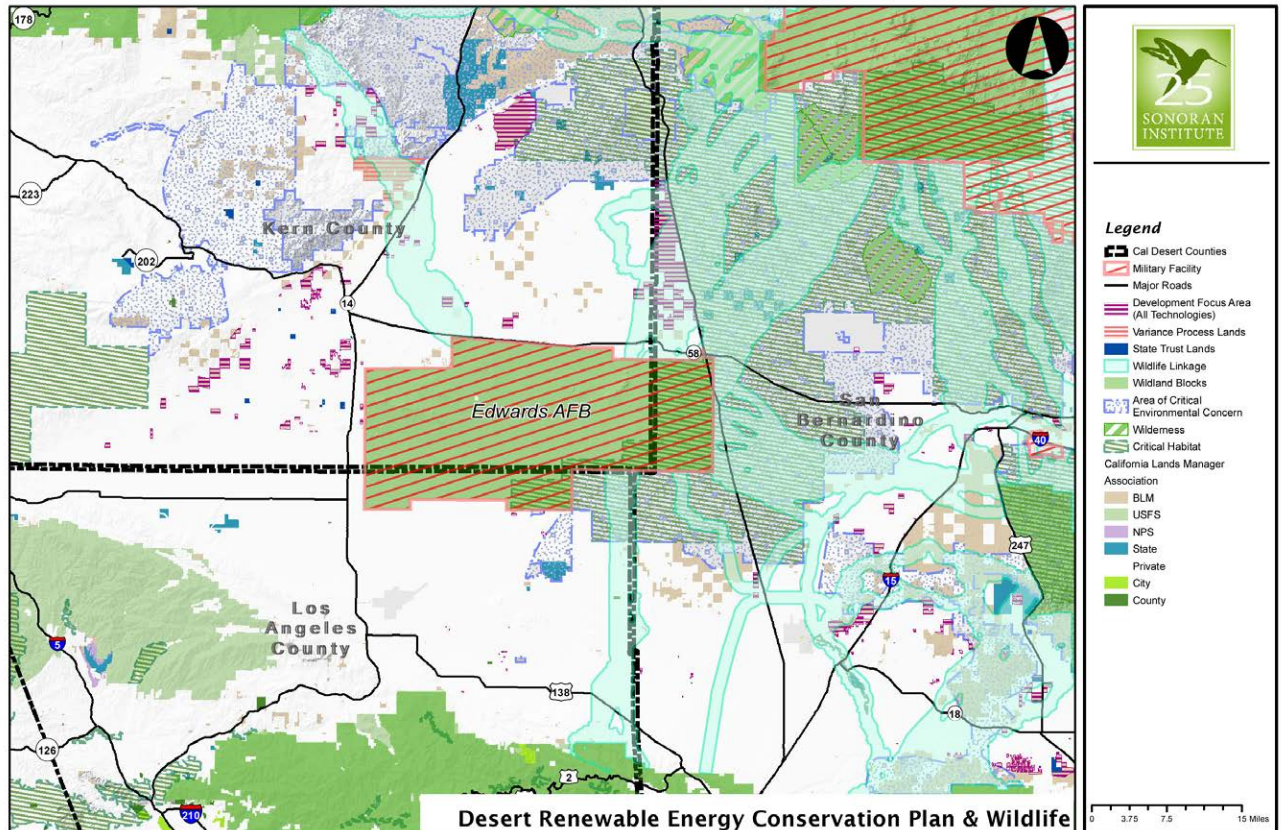


Figure 22. Renewable energy development areas around Edwards AFB. In general, there is not significant development planned that would create an obvious encroachment concern.

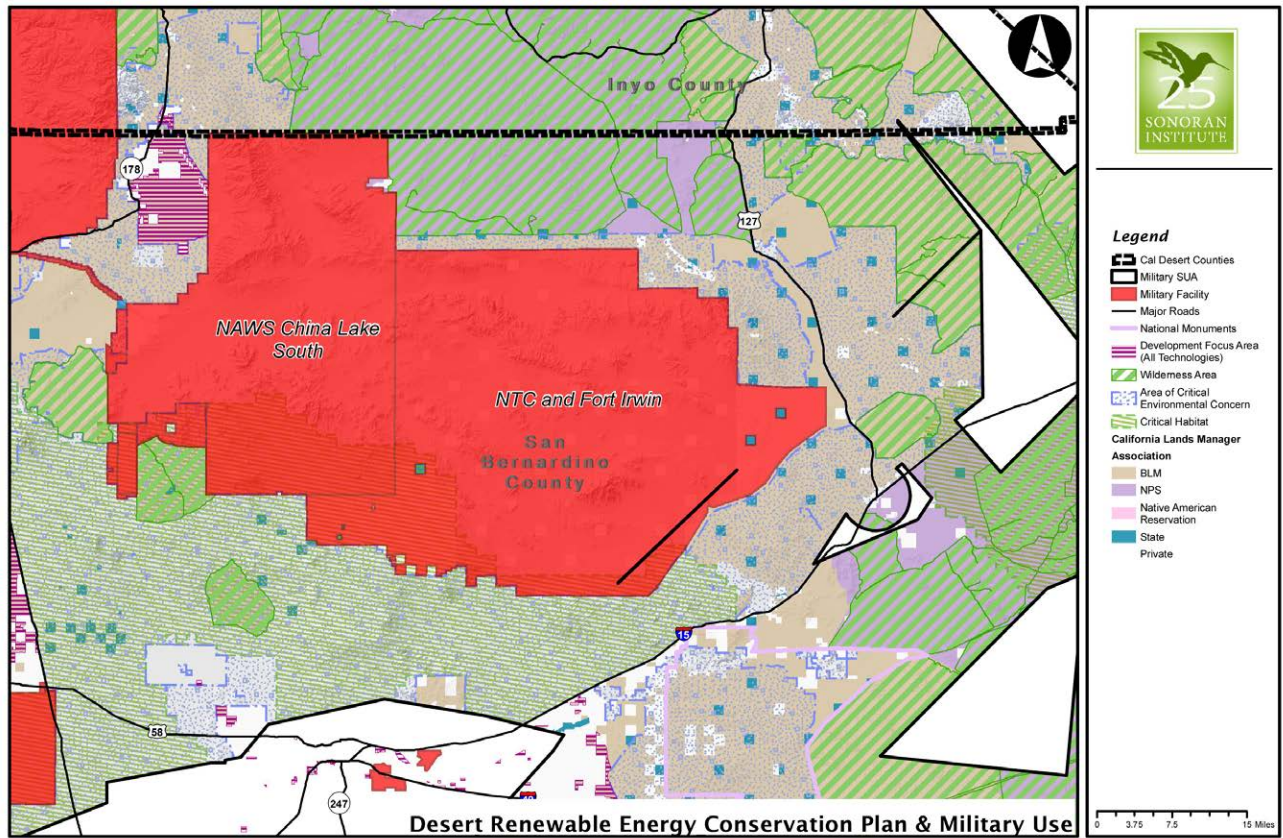


Figure 23. No encroachment is expected from new RE projects near Fort Irwin NTC..

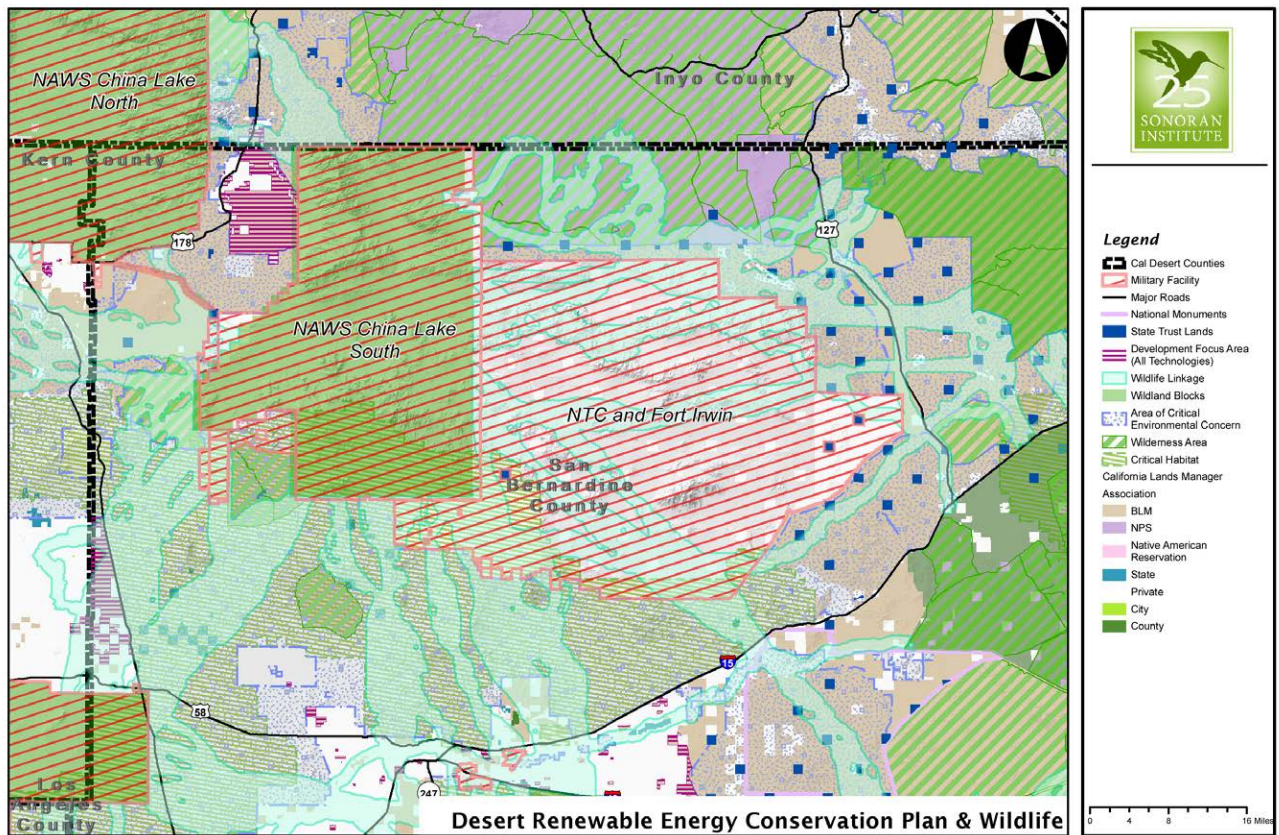


Figure 24. Renewable energy development areas around Fort Irwin. In general, there is not significant development planned that would create an obvious encroachment concern.

*MARINE CORPS AIR GROUND COMBAT CENTER  
TWENTYNINE PALMS*

As shown in Figure 25, the DRECP has identified significant areas for solar development to the west of MCAGCC 29 Palms that are substantially outside of military use areas. The location does not, however, remove all risk of encroachment, as some installations may still be developed in areas where military training does occur. Figure 26 shows that these areas are outside of wildlife corridors and will thereby not contribute to indirect encroachment issues.

*Renewable Energy Development Encroachment  
Grade for MCAGCC 29 Palms*

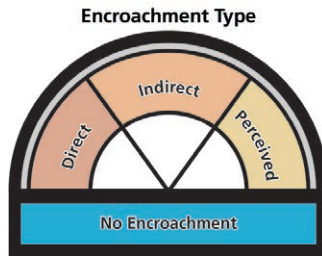
No encroachment is expected from renewable energy development around MCAGCC 29 Palms. However, renewable energy remains a concern because of potential obstructions to low-level training, electromagnetic interference from wind towers and transmission lines, constraints on water resources, and reduction of training areas. Figure 25 demonstrates that this development

largely occurs outside of military use areas. Figure 26 shows that DFAs are outside of wildlife corridors.

*Renewable Energy Recommendations*

The development of renewable energy in the California Desert provides significant opportunity for the state to meet its robust renewable energy portfolio standard of 50% by 2030. Additionally, the DRECP has provided needed guidance to the region on how to implement energy generation in a thoughtful way. Even so, care needs to be taken to ensure that each project is evaluated to prevent encroachment pressures from occurring.

For example, low-lying photovoltaic systems could be compatible with overhead MTRs where other technology in the same location could cause a hazard.



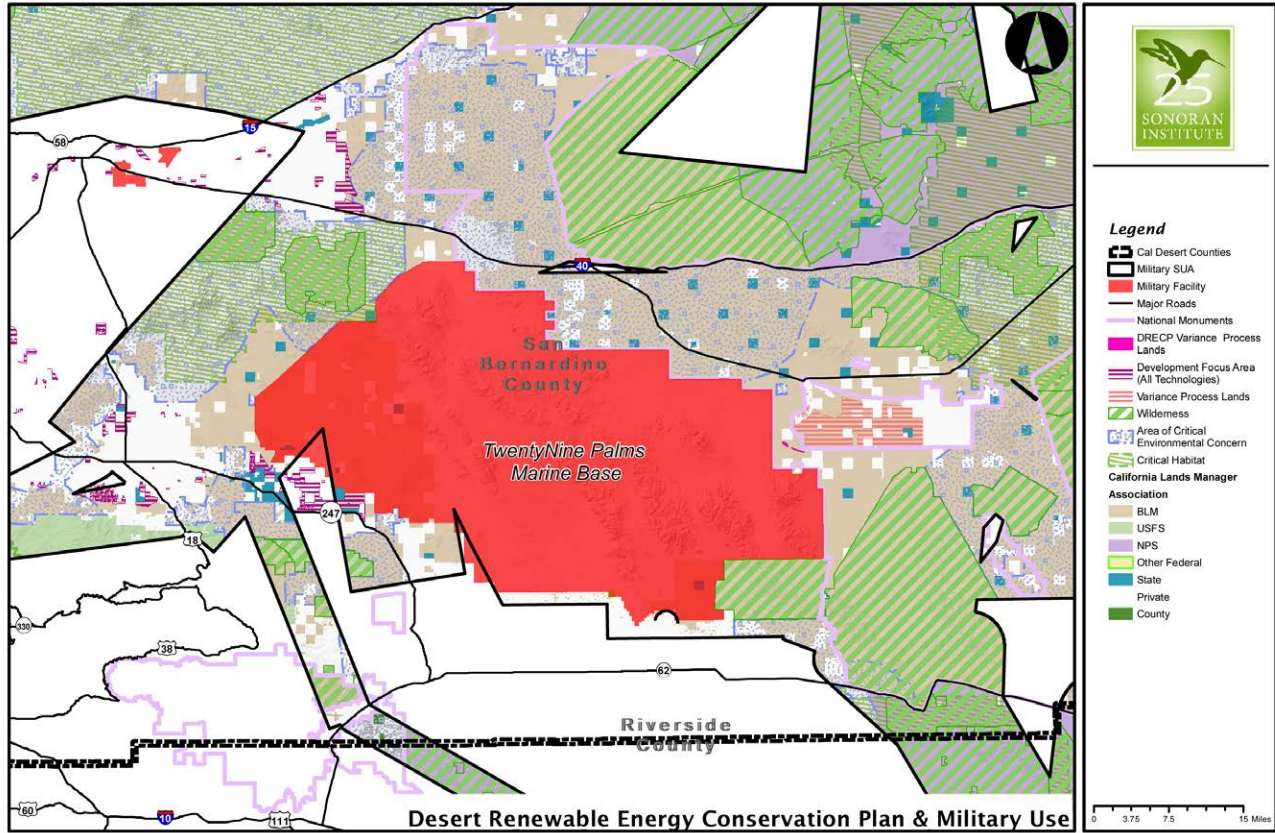


Figure 25 Solar DFAs generally avoid military SUAs.

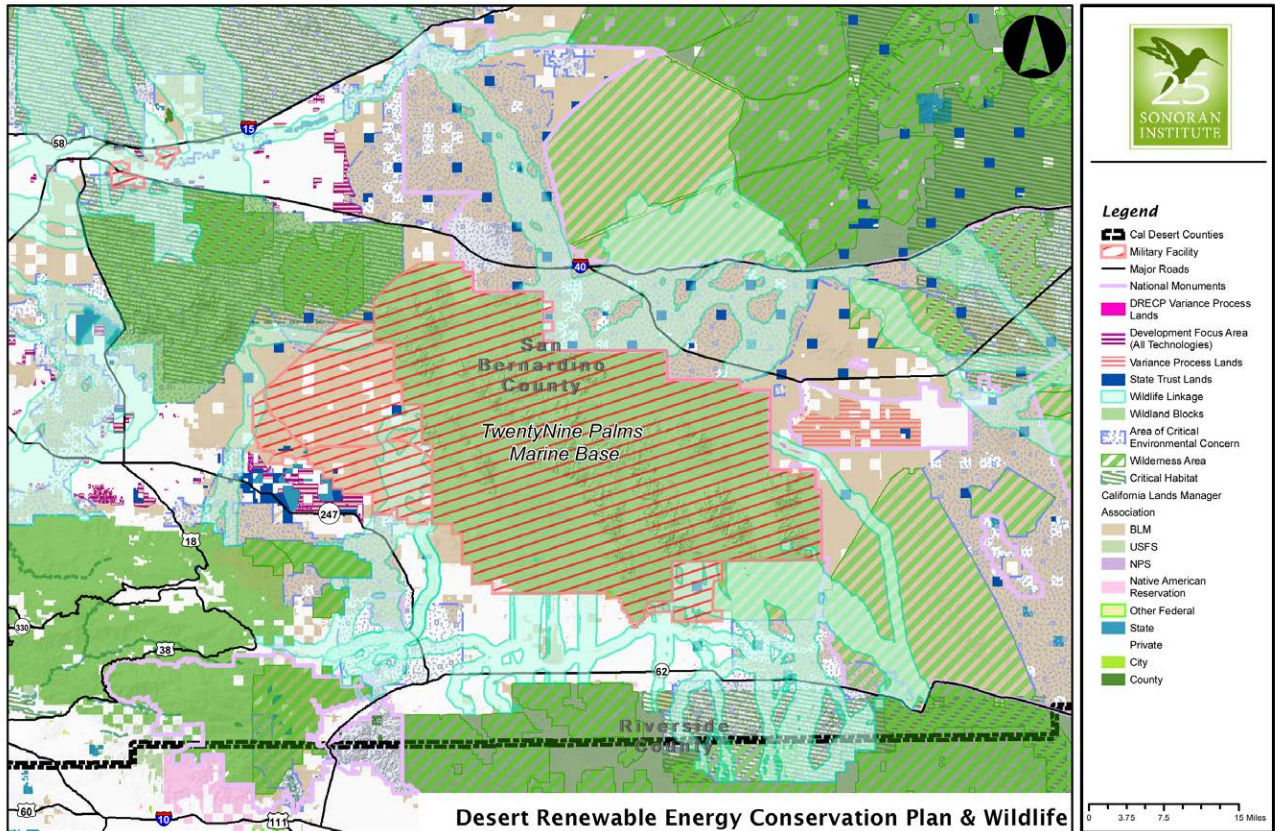


Figure 26. In general, solar development near the MCAGCC 29 is located outside of mapped wildlife corridors.

### 3. TRANSMISSION LINES

Electrical transmission lines are a necessity of modern life. The California landscape hosts significant amounts of transmission infrastructure that move energy from sources like solar, nuclear, and natural gas plants toward demand centers. These infrastructure corridors often extend across federal lands. As a general rule, transmission lines pose low risk to military operations due to their relatively low elevation. In some cases, however, transmission lines interfere with military communication or may impact low-flying military maneuvers. Recently, the White Sands Missile Range in New Mexico opposed the development of the SunZia transmission line connecting wind energy generation areas to load centers in Arizona. Their concerns related to the possibility that missile testing could damage the line, electromagnetic interference could impair the use of the facility, and the line could be an obstruction to their operations (Vestal 2014). Negotiations resulted in a compromise

that requires underground placement of some of the powerline.

In an ongoing process, the BLM is reviewing the West-Wide Energy Corridors (WWECs) that occur in portions of California, Nevada, and Arizona to examine their appropriateness for new transmission infrastructure. This regional review is scheduled to be completed in the summer of 2017. These corridors are the focus of review for this section. Figure 27 identifies WWECs in this area

*Potential Encroachment Pressure: Variable.*

Depends highly on the specific development plan and location of the facility. In many cases, projects can be designed to reduce impacts and avoid conflict with military missions

*Potential Benefit: None.*

It is unlikely that the development of additional transmission lines will bring value to a nearby installation.

Direct	Indirect	Perceived
In some locations, vertical obstructions like transmission lines can reduce the ability of the military to fly or to move ground equipment. Transmission lines can emit electromagnetic interference that can hamper military testing and communication.	Transmission lines can fragment desert habitat, creating challenges for wildlife. In some cases these animals may seek less disturbed lands on military installations or ranges. Roads along transmission lines become corridors for recreation that can facilitate the propagation of invasive species into natural areas and nearby military installations.	Multiple lines near or on installations could contribute to the perception that the facility is impaired.

Table 8. Electrical Transmission Encroachments

#### NAVAL AIR WEAPONS STATION CHINA LAKE

WWECs occur on the west and south sides of the NAWWS China Lake north range facility. The expansion of transmission lines in these corridors should be evaluated for potential impact to military operations. As shown in Figure 28, these lines do occur in airspace that is used by military activities.

NAWS China Lake is adjacent to the southern edge of the Sierra Nevada Mountains to the west, which are important as transition zones in a changing climate. Figure 29 depicts the expansion of multiple new transmission lines in the WWEC that raises a concern about the facility's biological adaptability. Additional disruption of the habitat through the development of additional transmission infrastructure could compound the difficulty that important species have in moving across boundaries and into more habitable terrain (USFWS 2017).

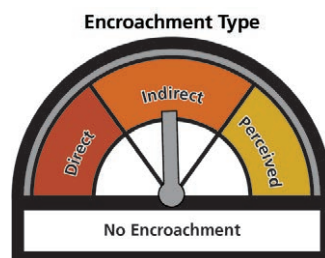
*Electrical Transmission Encroachment Grade for NWS China Lake*

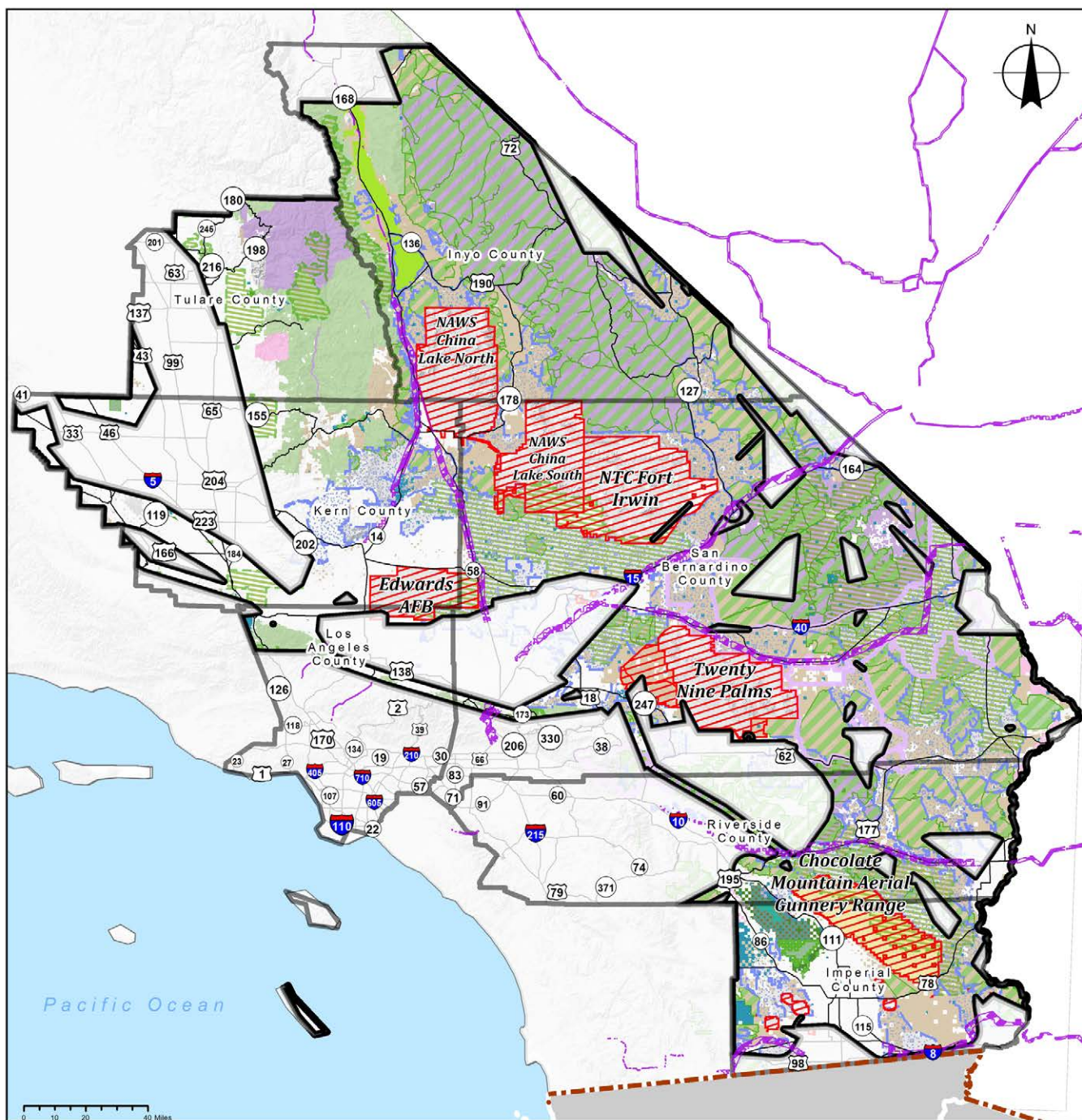
The value of the WWECs is the predictability they offer about where transmission lines may occur and the potential then to focus this type of development in areas where the environmental impact will be lessened. In the case of China Lake, the two corridors on the west and south of the facility's north range present the possibility of physical obstruction and electromagnetic

interference to military operations. Additionally, the location of these corridors may present additional barriers for successful wildlife migration, the introduction of invasive species, and other concerns. Even so, the issues expected to occur as a result of new transmission infrastructure in these corridors is likely to be indirect to military operations provided that they address any physical obstruction and other direct encroachment concerns in the siting and design of the projects.

*Electrical Transmission Recommendations*

1. China Lake and other affected facilities in the California Desert should be aware of the impact of a concentration of additional electrical transmission lines that could be placed within WWECs in the area.
2. Regional transmission planning should occur that will focus development in areas of least impact to natural resources and biological connectivity. A concentration of transmission lines should be avoided in mapped wildlife corridors.





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### Transmission Lines and Military Use

<b>Legend</b>		
International Boundary	Area of Critical Environmental Concern	US Fish and Wildlife Service
Cal Desert Counties	Wilderness Area	Native American Reservation
Military SUA	Critical Habitat	Bureau of Reclamation
Military Facility	<b>California Lands Manager Association</b>	
Major Roads	BLM	Other Federal
National Monuments	USFS	State
West-wide Energy Corridor	NPS	City
		County

Figure 27. Throughout the California Desert region there are many WWECs that pass near to military installations and within SUAs.

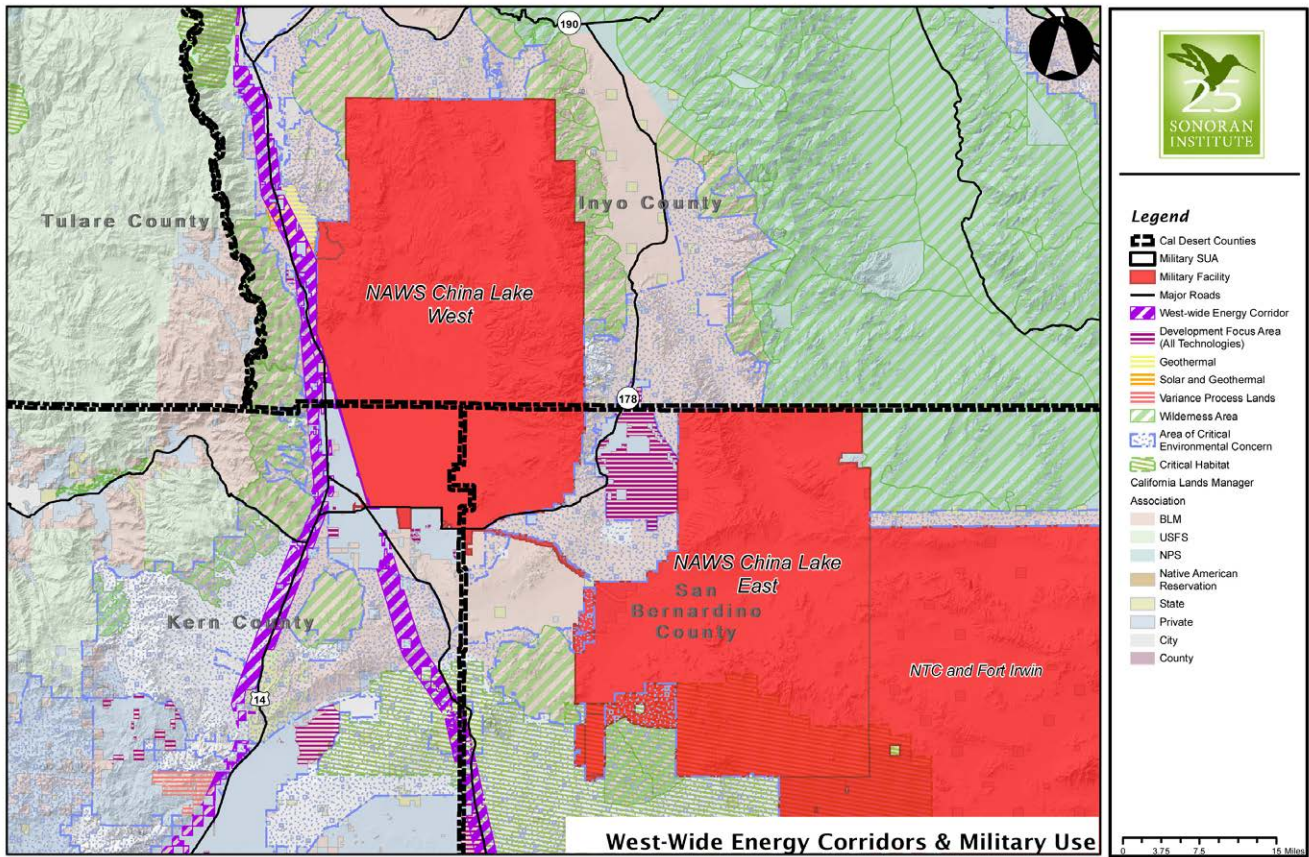


Figure 28. West-Wide Energy Corridors west of NAWS China Lake present a possible encroachment concern.

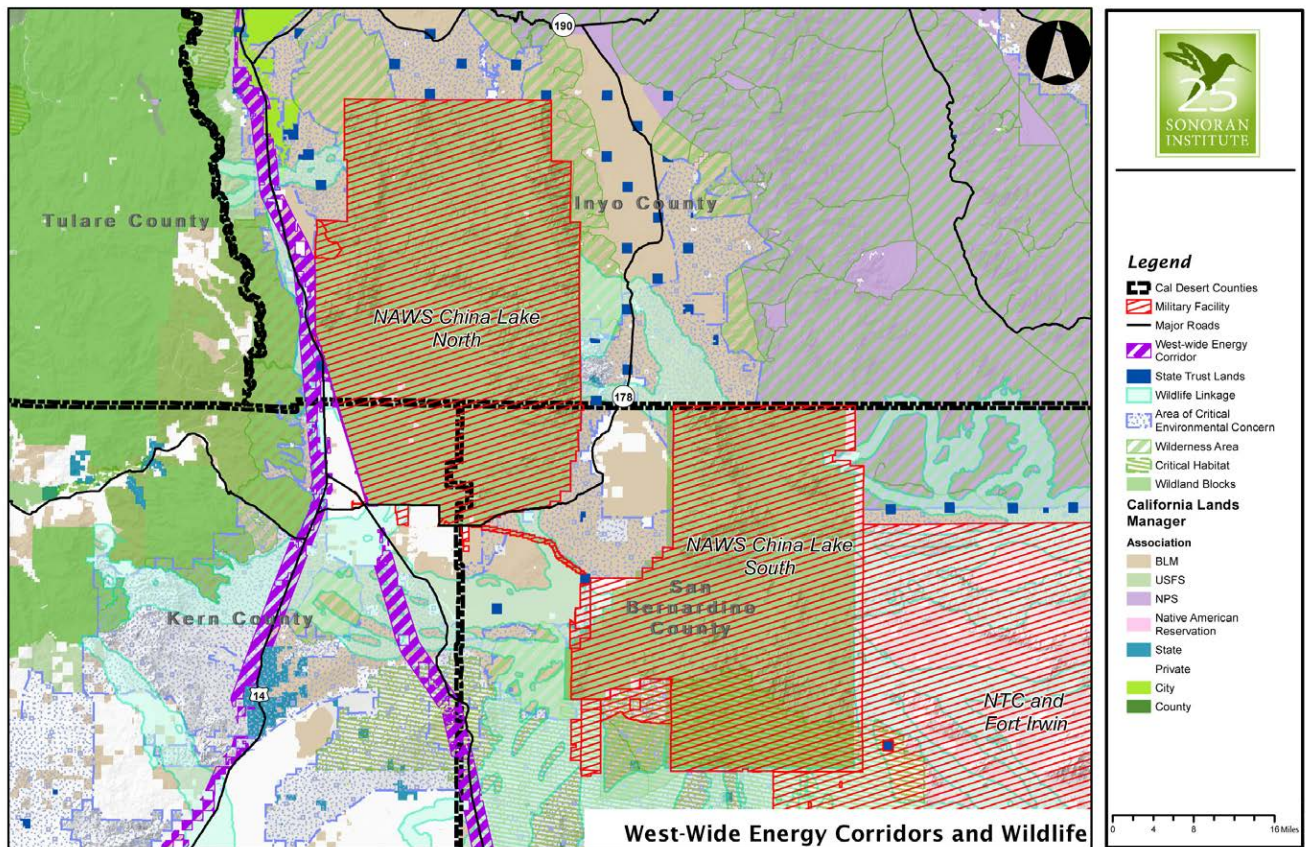


Figure 29. WWECs near NAWS China Lake may contribute to the isolation of the installation from the broader Mojave Desert ecoregion.

### CHOCOLATE MOUNTAIN AERIAL GUNNERY RANGE

Around the CMAGR, there are several West-Wide Energy Corridors (WWECs) designated that could result in a concentration of new electrical transmission projects. A variety of issues could result from these projects, including physical obstructions within military operation areas, electromagnetic interference with equipment, an increase of recreation activity, and the propagation of invasive species, among others. Figure 30 identifies SUAs and MTRs that could be subject to new transmission line development.

As shown in Figure 31, around the CMAGR, new transmission lines could occur in one of two significant WWECs—one on the south and one to the north of the facility. Of particular concern, the WWEC along Interstate 10 may compound the existing condition of fragmentation caused by the highway. While this location is preferable to transmission infrastructure in natural areas, the concentration of infrastructure together should be thoughtfully planned to reduce the introduction of an additional barrier to connectivity.

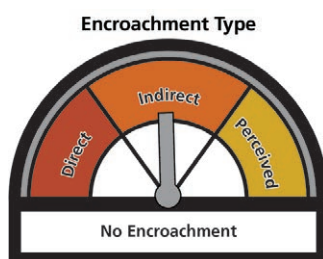
#### Electrical Transmission Encroachment Grade for the CMAGR

The construction of a significant number of new transmission lines in WWECs to the north of the

CMAGR could provide additional complexity for connectivity of flora and fauna across the landscape. Care should be taken to explore how connectivity could be improved across Interstate 10 as a way to improve connectivity to the habitat block in which the CMAGR is located. Additionally, the construction of these new projects could contribute to direct encroachment of military missions if they are not appropriately designed or located. Primarily, it appears that the WWECs around the CMAGR will likely present a cause for potential new indirect encroachment concerns.

#### Electrical Transmission Recommendations

1. The CMAGR and other affected facilities in the California Desert should be aware of the impact of a concentration of additional electrical transmission lines that could be placed within WWECs in the area.
2. Regional transmission planning efforts by the various local and federal planning agencies should occur in a manner that will focus development in areas of least impact to natural resources and biological connectivity. A concentration of transmission lines should be avoided in mapped wildlife corridors.



### EDWARDS AIR FORCE BASE

Around Edwards AFB, there are several WWECs designated that could result in a concentration of new electrical transmission projects. A variety of issues could result from these projects, including physical obstructions within military operation areas, electromagnetic interference with equipment, an increase of recreation activity, and the propagation of invasive species, among others. Table 8 provides an overview of these potential concerns. As shown in Figure 32, around Edwards AFB, new transmission lines could occur in the WWECs along Interstate 395 and near State Route 14 west of California City.

While transmission lines do not create a significant physical barrier for ecological connectivity, they do fragment habitat and add an additional complexity for ranging species. Figure 33 identifies WWECs in the vicinity of Edwards AFB and shows how they interact with known and mapped connectivity areas. In a particular, both corridors contribute to additional fragmentation of habitat, and any significant development in them could isolate Edwards AFB from the broader Mojave Desert ecoregion.

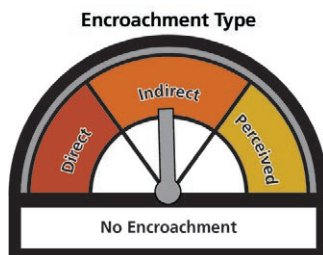
#### Electrical Transmission Encroachment Grade for Edwards AFB

It appears that the development of new transmission lines in WWECs near Edwards AFB could encroach on the installation's military mission. In particular, the addition of numerous

new transmission lines could hamper the movement of flora and fauna between the installation and the broader Mojave Desert ecoregion. Due to the location and the low incremental impact of these activities, the type of encroachment that is most likely is indirect to the operations of the facility.

#### Electrical Transmission Recommendations

1. Edwards AFB and other affected facilities in the California Desert should be aware of the impact of a concentration of additional electrical transmission lines that could be placed within WWECs in the area.
2. Regional transmission planning efforts by the various local and federal planning agencies should occur in a manner that will focus development in areas of least impact to natural resources and biological connectivity. A concentration of transmission lines should be avoided in mapped wildlife corridors.





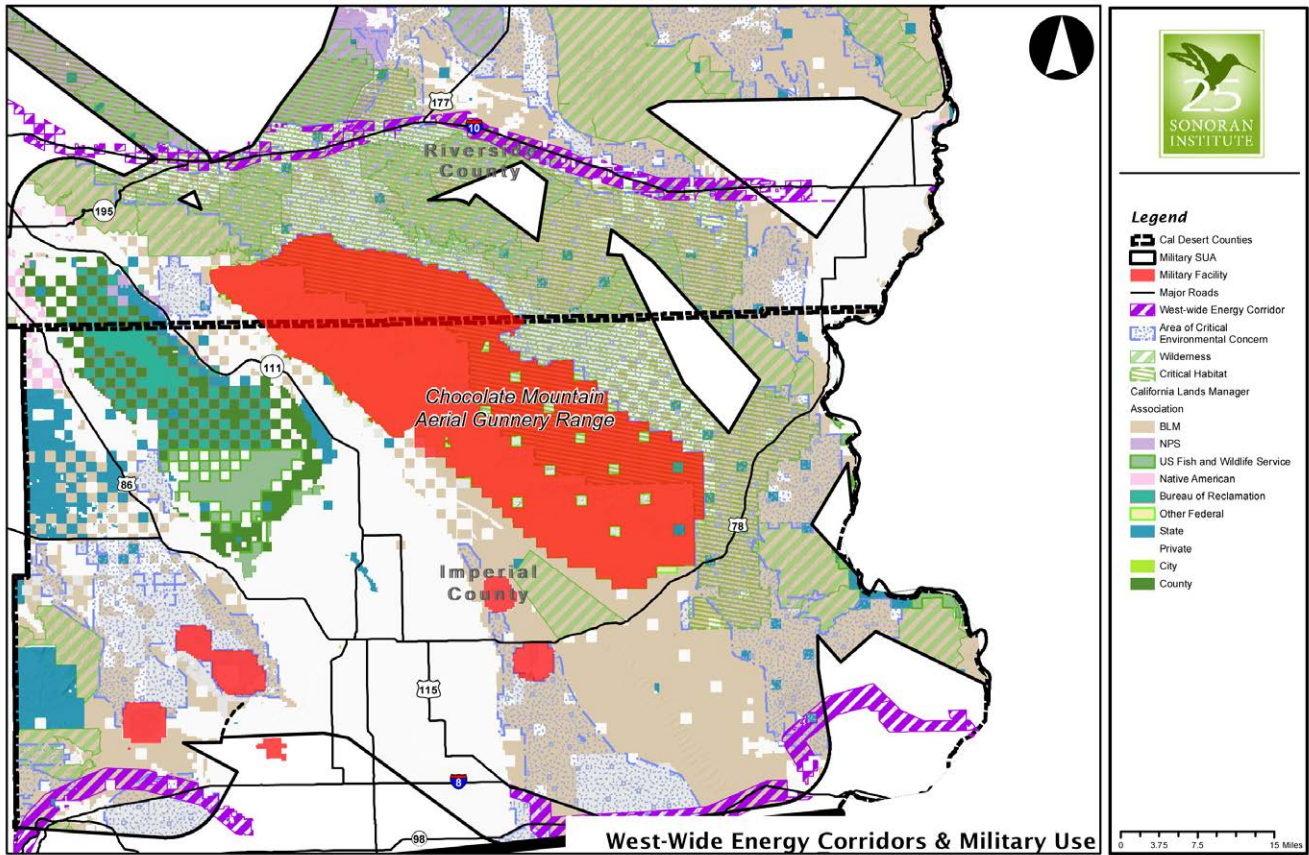


Figure 30. West-Wide Energy Corridors and the military operations near the CMAGR.

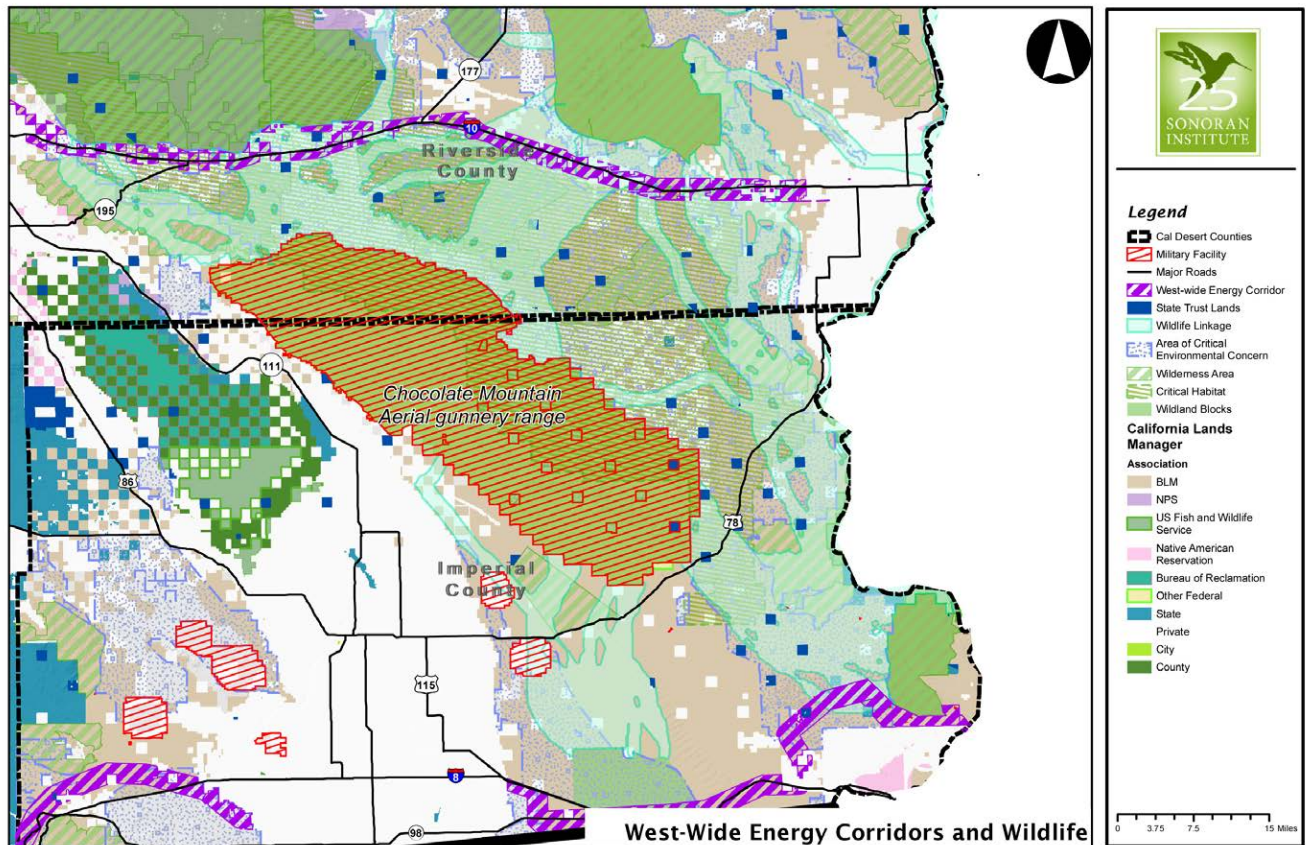


Figure 31. WWECs near the CMAGR may contribute to the isolation of the installation from the broader Mojave Desert ecoregion.

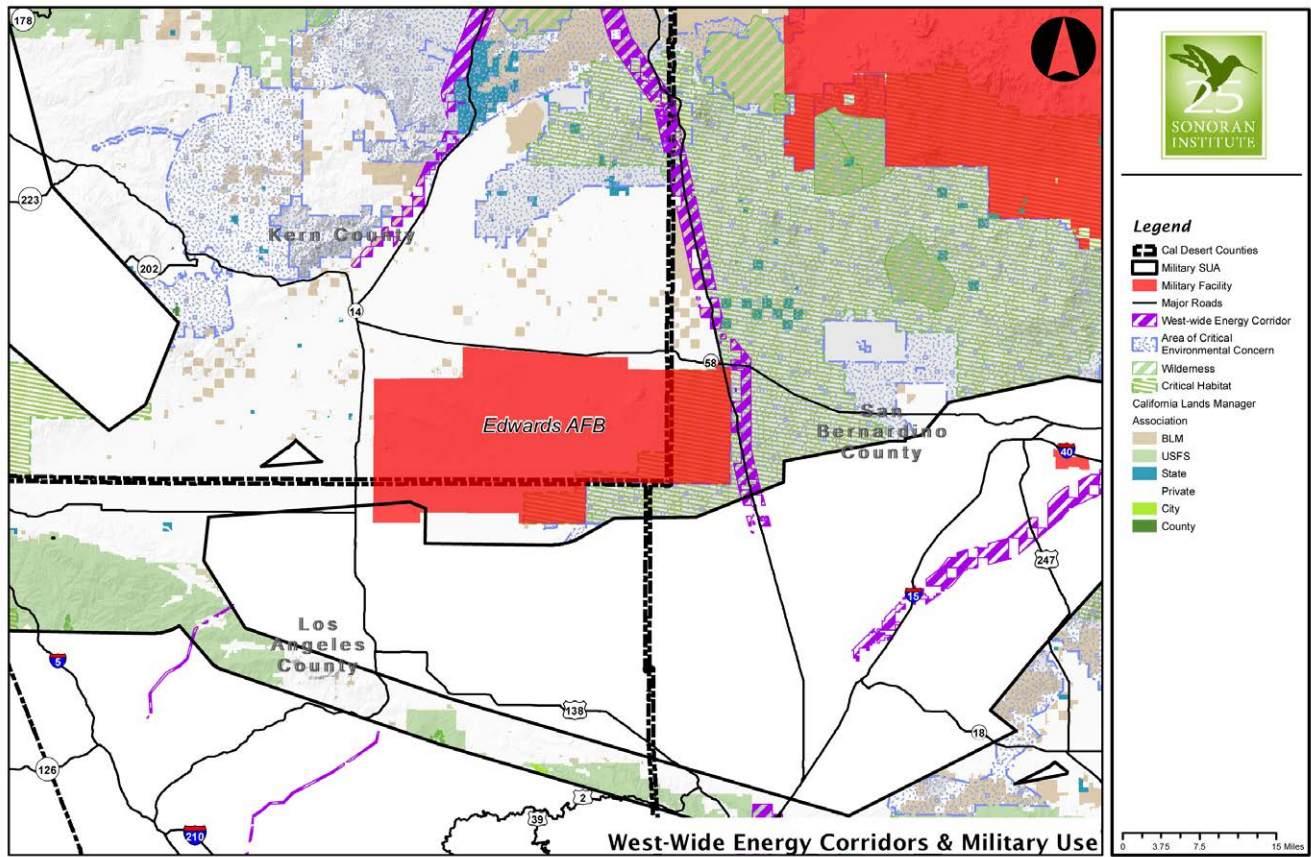


Figure 32. West-Wide Energy Corridors and the military operations near Edwards AFB.

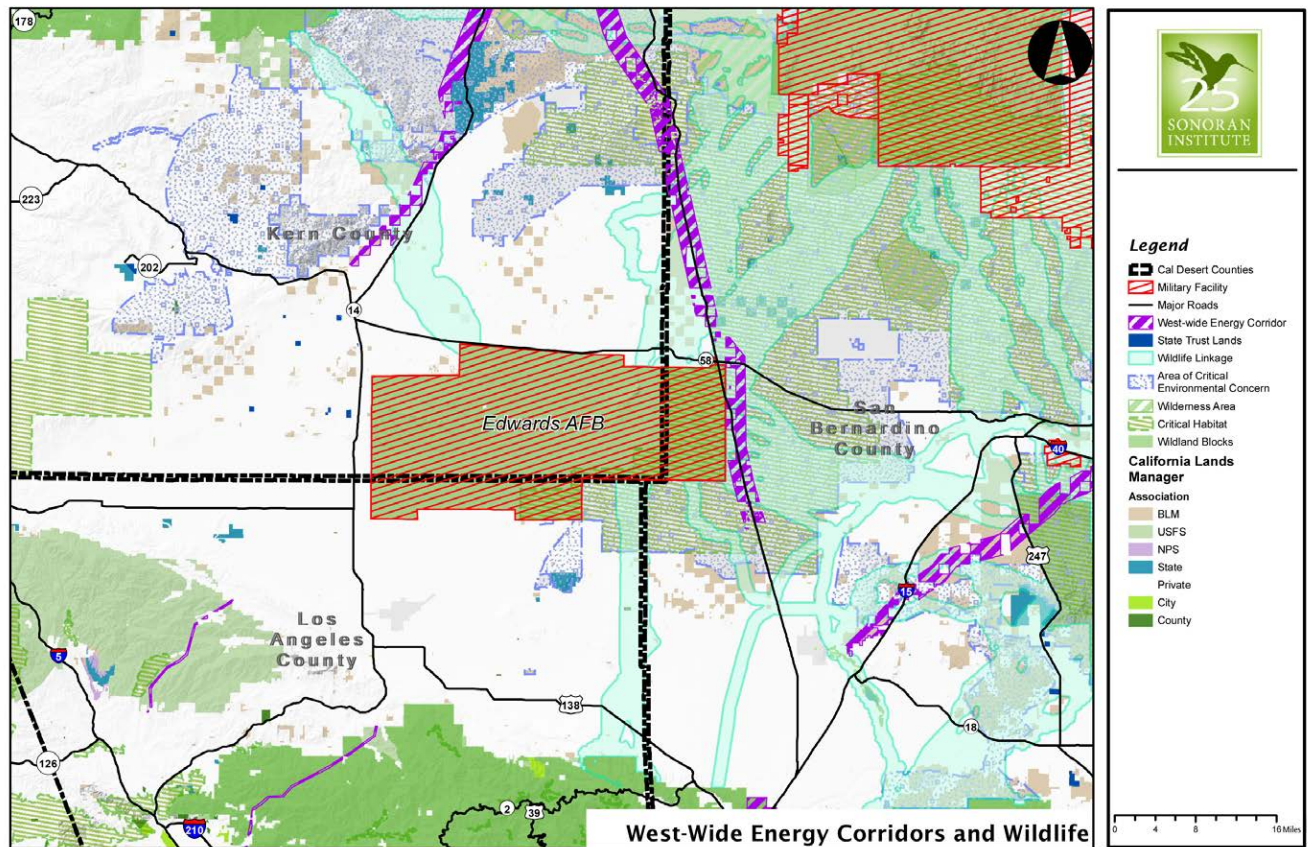


Figure 33. WWECs near Edwards AFB contribute to the isolation of the installation from the broader Mojave Desert ecoregion.

**FORT IRWIN NATIONAL TRAINING CENTER**

Two WVECs are designated near Fort Irwin NTC — one along Interstate 15 to the south and another along Highway 395 to the west. As shown in Figure 34, these corridors may see significant additional development of transmission infrastructure that could present an additional concern for direct impairment to the military mission at the facility.

Figure 35 identifies these WVECs as they relate to ecological connectivity from Fort Irwin NTC to the broader Mojave Desert ecoregion. It seems that additional infrastructure, at any large degree, could cause long-term impairment to the facility.

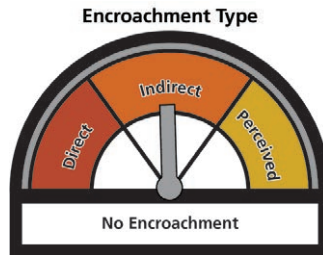
*Electrical Transmission Encroachment Grade for Fort Irwin NTC*

The addition of new transmission infrastructure near Fort Irwin NTC could contribute to

fragmentation and isolation of Mojave Desert habitat, and may present a challenge to ongoing military operations. Generally, these threats are indirect to military operations.

*Electrical Transmission Recommendations*

1. Fort Irwin NTC and other affected facilities in the California Desert should be aware of the impact of a concentration of additional electrical transmission lines that could be placed within WVECs in the area.
2. Regional transmission planning efforts by the various local and federal planning agencies should occur in a manner that will focus development in areas of least impact to natural resources and biological connectivity. A concentration of transmission lines should be avoided in mapped wildlife corridors.



**MARINE CORPS AIR GROUND COMBAT CENTER TWENTYNINE PALMS**

With respect to the area around MCAGCC 29 Palms, there are a few transmission lines that pass near the installation that have been in operation for decades. There is however a designated WVEC located to the north of the installation that may bring a number of new electrical transmission lines. Figure 36 identifies this corridor and its general location. The BLM has been reviewing the WVECs that are located in the desert region of California over the past year, allowing for further scrutiny of whether this corridor presents a long-term risk for MCAGCC 29 Palms. Additionally, the California Renewable Energy Transmission Initiative 2.0 has looked at the use of WVECs in this area as high-priority opportunities.

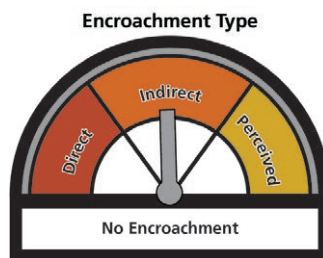
*Electrical Transmission Encroachment Grade for the MCAGCC*

As an initial response, the development of multiple transmission lines in the West-Wide Energy Corridor could interrupt important wildlife connectivity between the north side of the

installation and the broader ecological network as shown in Figure 37. Additionally, transmission infrastructure is known to facilitate additional off-highway vehicle (OHV) use and the propagation of invasive species that can alter the fire regime and damage ecological integrity. Stakeholders who are interested in preserving the viability of MCAGCC 29 Palms should carefully consider the indirect impacts from the development of regional transmission infrastructure in this location

*Electrical Transmission Recommendation*

1. MCAGCC 29 Palms and other affected facilities in the California Desert should be aware of the impact of a concentration of additional electrical transmission lines that could be placed within WVECs in the area.
2. Regional transmission planning efforts by the various local and federal planning agencies should occur in a manner that will focus development in areas of least impact to natural resources and biological connectivity. A concentration of transmission lines should be avoided in mapped wildlife corridors.



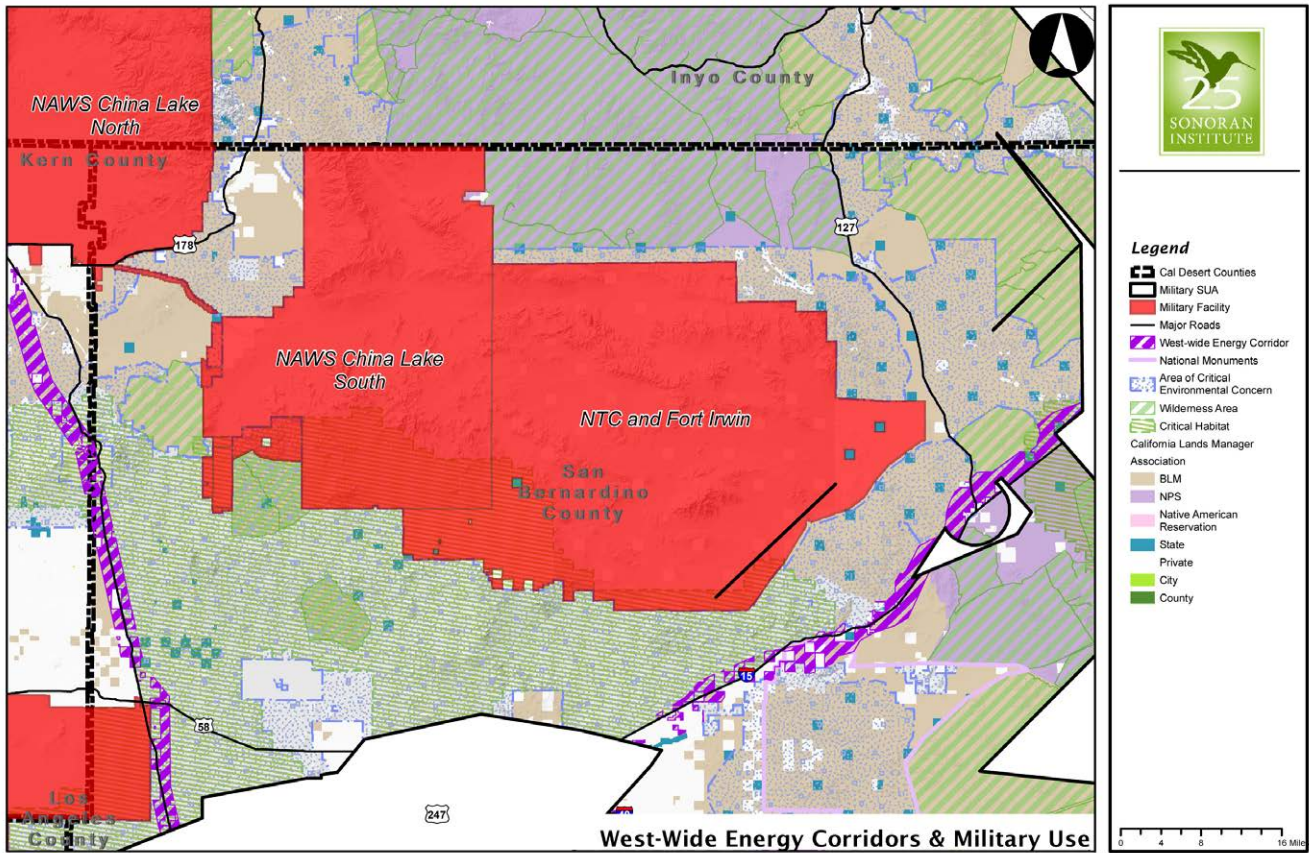


Figure 34. West-Wide Energy Corridors south and west of Fort Irwin NTC may contribute to direct and indirect encroachment concerns.

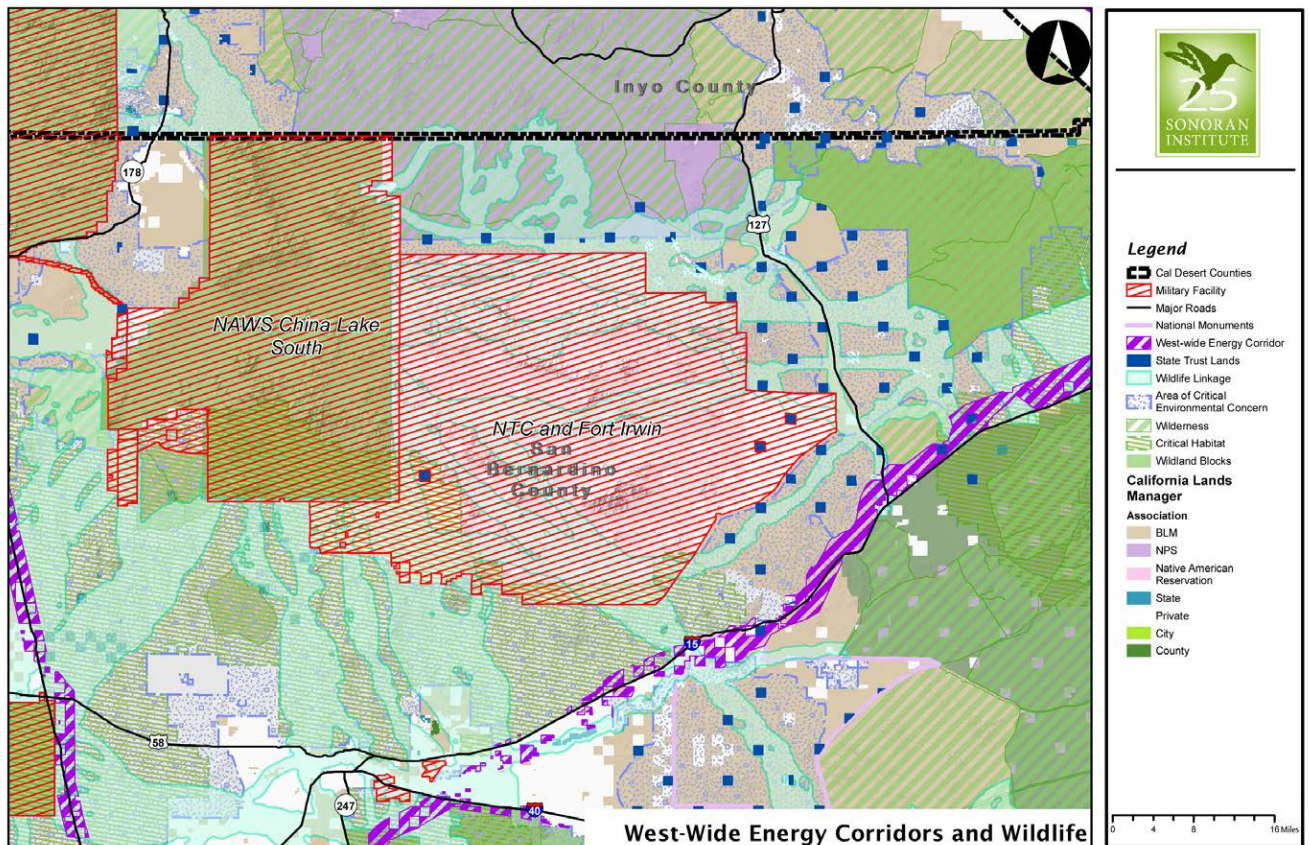


Figure 35. Ecological connectivity passes through two significant WWECs near the Fort Irwin NTC facility.

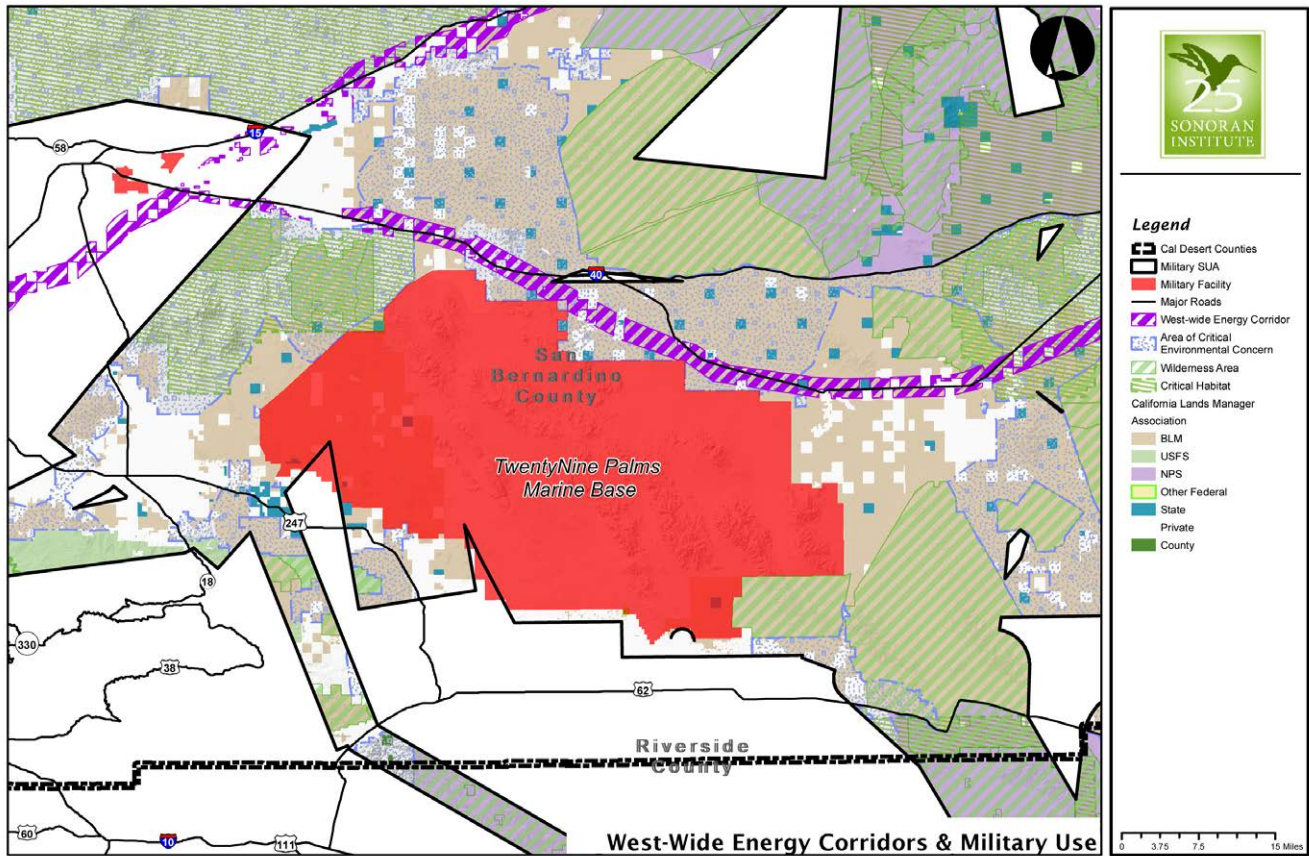


Figure 36. West-Wide Energy Corridors and the military operations near MCAGCC 29 Palms.

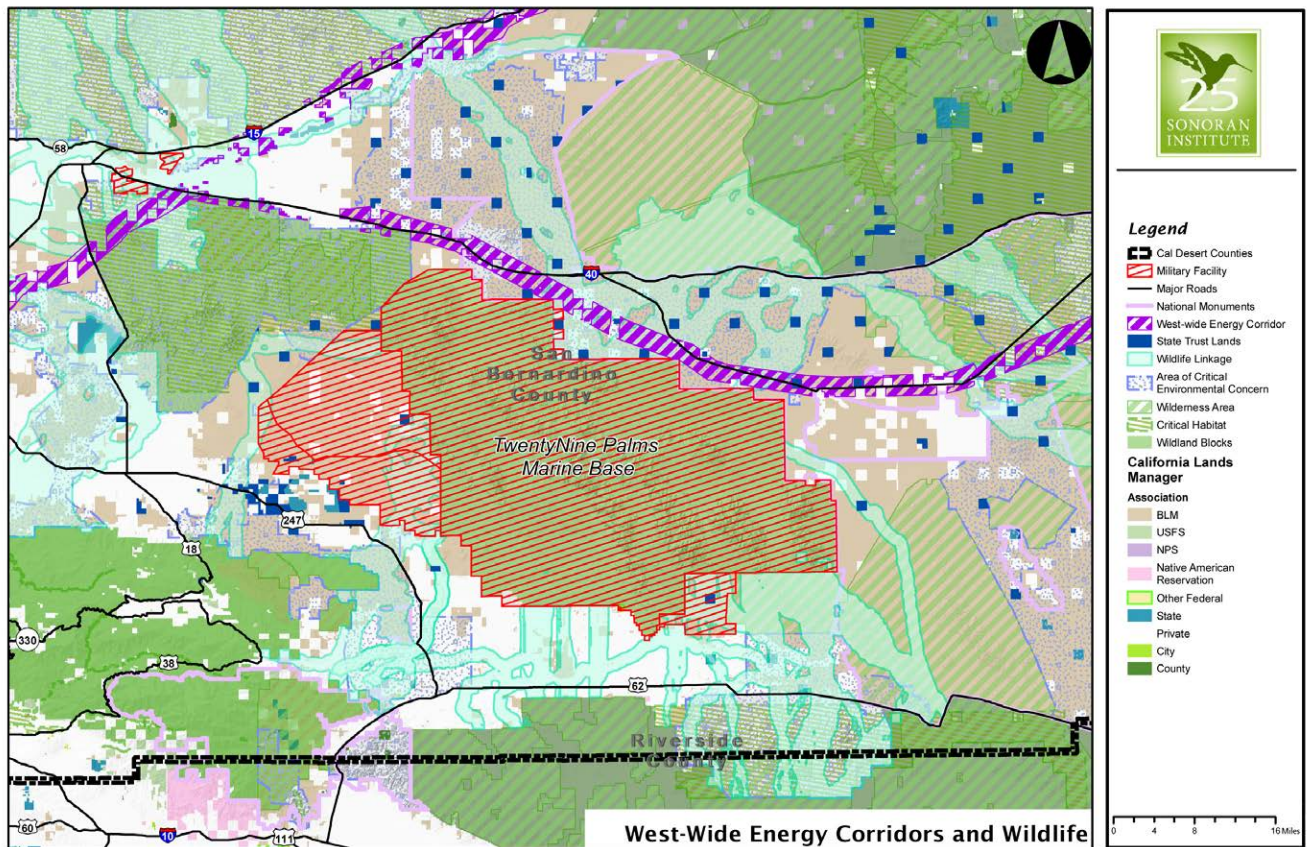


Figure 37. The development of a WWEC in this location could be problematic for the continuation of wildlife connectivity between the MCAGCC 29 Palms and the conservation lands north of the installation.

#### 4. EXTRACTIVE INDUSTRIES

Extraction activities, including mining of hard rock and metals, aggregate extraction, and forest products harvesting, are carried out on public lands throughout California. These activities are permitted individually and occur in the location where the resources are found. On occasion, extractive activities can pose encroachment pressures to military facilities and missions and should be evaluated on a case-by-case basis.

Sonoran Institute completed an assessment of mining activity in this region in fall 2015 that was intended to explore the degree to which mining was in conflict with conservation actions in the region. The full report is located at <https://sonoraninstitute.org/resource/california-mining-report-10-27-15/>. Generally, the study found that mining operations’ contributions to the regional economy of the California Desert are modest and that the proposed National Monument protections for the Sand to Snow and Desert Trails proposals would not significantly impact mining in the region. In the near future, the BLM may withdraw lands from mining exploration, pursuant to the DRECP, and could benefit the military mission in situations where mining activities

are contributing to encroachment concerns. Figure 38 identifies the mining activities as measured by active mining claims in the region.

*Potential Encroachment Pressure: Variable*

Encroachment potential depends highly on the size, complexity, disturbance, operations, and location of the operation.

*Potential Benefit: Limited.*

Some extraction activities, if appropriately sited and designed, could benefit military installations. Additionally, if sited in publicly owned buffer lands that have low environmental value, extractive projects could make positive use of these lands.

Type	Direct	Indirect	Perceived
Mining and Aggregate Extraction	In some landscapes, publicly owned lands may be locations for on-the-ground military training maneuvers. These activities will occur on a limited basis but require the landscape to maintain natural character. Significant amounts of extraction activity could remove the natural character and reduce the benefit of the landscape for this use.  Dust, light pollution, noise and other impacts can also directly impair military missions.	Mining activities can create impacts to wildlife habitat that increase the amount of fragmentation and encourage the migration of species to undeveloped adjacent lands like military installations.  Roads and increased travel through natural areas can facilitate the propagation of invasive species into natural areas and nearby military installations.	Intensely disturbing activities like mining can raise the level of scrutiny on military installations that are proximate to the activity area.
Oil and Gas Extraction	In some landscapes, publicly owned lands may be locations for on-the-ground military training maneuvers. These require the landscape to maintain natural character. Significant amounts of extraction activity could remove the natural character and reduce the benefit of the landscape for this use.  Towers, drills, and other vertical components can interfere with military training maneuvers and other activities.	Extractive activities can create impacts to wildlife habitat that increase the amount of fragmentation and encourage the migration of species to undeveloped nearby lands like military installations.  Roads and increased travel through natural areas can facilitate the propagation of invasive species into natural areas and nearby military installations.	Intensely disturbing activities like oil and gas extraction can raise the level of scrutiny on military installations that are proximate to the activity area.

Table 9. Extractive Industries Encroachments

**NAVAL AIR WEAPONS STATION CHINA LAKE**

South of NAWS China Lake there is significant mining activity as shown in Figure 39. Additionally, there are areas with mineral potential on the east side of the facility as well as in other areas where military activity occurs. Any appreciable increase in the scale of this activity should be monitored to ensure that no direct impairment to military missions results from the expansion of mining activities in the vicinity of NAWS China Lake Ranges.

The significant scope of the activity south of the installation may not pose a direct risk of encroachment on military missions as a physical obstruction but it may cause environmental and other indirect pressure on NAWS China Lake. Figure 40 shows that the significant concentration of mining activity is within important ecological connectivity and mapped wildlife corridors (SCW 2012). As another concern, water resources are scarce around this region, and any mining activity that is known to use a significant quantity of water and also reduce water quality—both of which could contribute to indirect encroachment on the facility—should be mitigated and addressed prior to permitting any increase in mining operations.

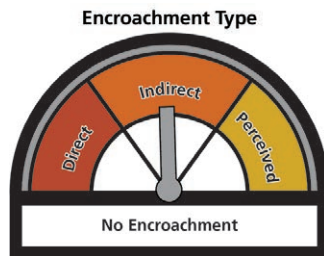
*Mining Activity Encroachment Grade for NAWS China Lake*

Mining activity is pronounced south of the NAWS China Lake facility. The direct impacts to military operations may be insignificant, but this widespread and concentrated extraction

of minerals could include a loss of biological connectivity and habitat fragmentation, as well as a possible reduction of water resources needed to sustain the military mission if the mining activity requires significant amounts of water. In general, large scale expansions of mining activity could contribute indirect encroachment to future ongoing operations at NAWS China Lake.

*Mining Activity Recommendation*

As envisioned by the DRECP, the Bureau of Land Management should evaluate the withdrawal of appropriate public lands from new mining exploration and seek input from NAWS China Lake and the military community regarding potential effects of mining operations around the NAWS China Lake Ranges. In some areas, continued mining activity may reduce the effective connectivity of wildlife, degrade valuable habitat, and could create dust, noise, light, and other impairments to the military mission. With the prevalence of lands with mineral potential, it is important that the military community remain aware of future mining activity through BLM permitting actions and continued communication and outreach.



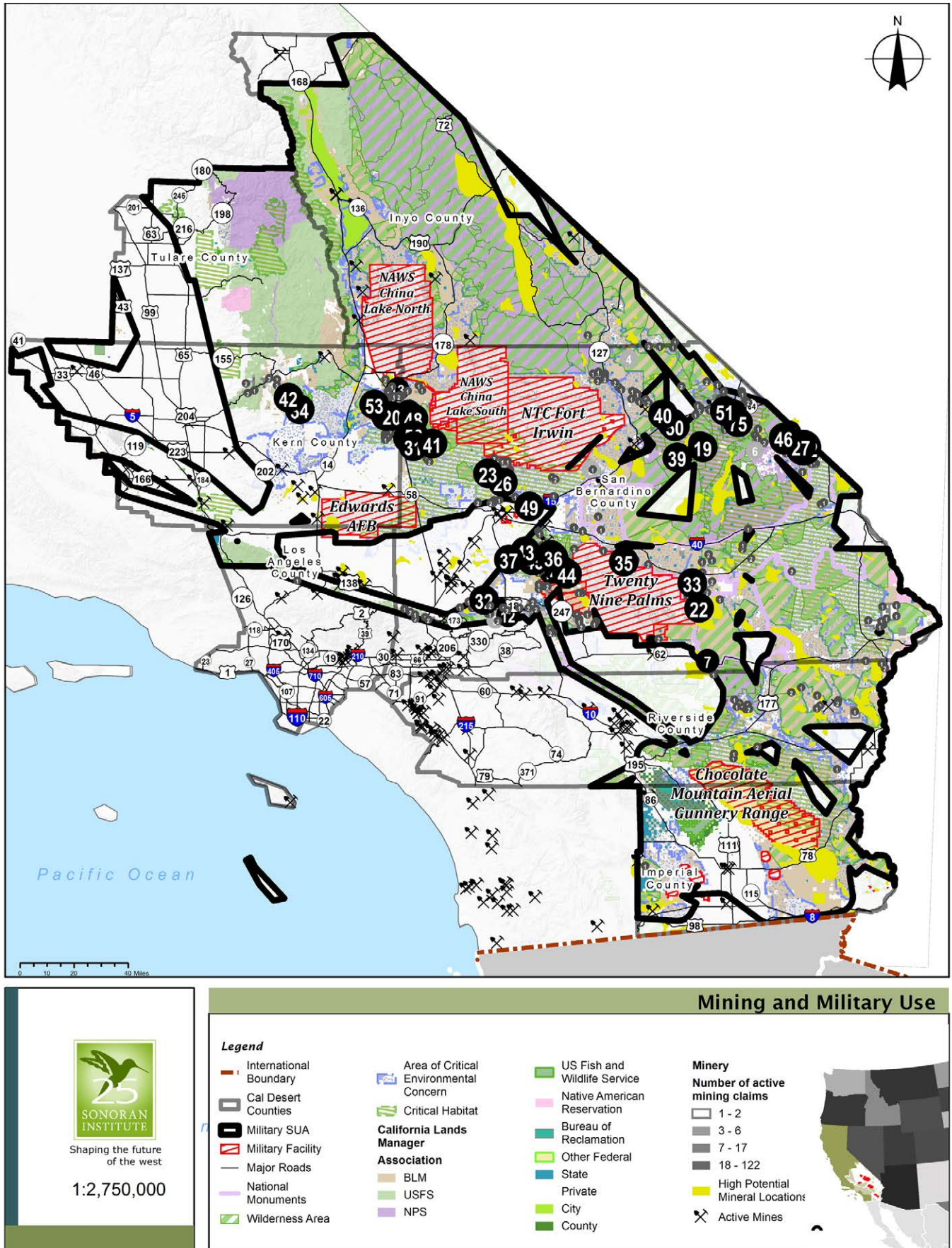


Figure 38. Mining activity occurs throughout the California Desert region.



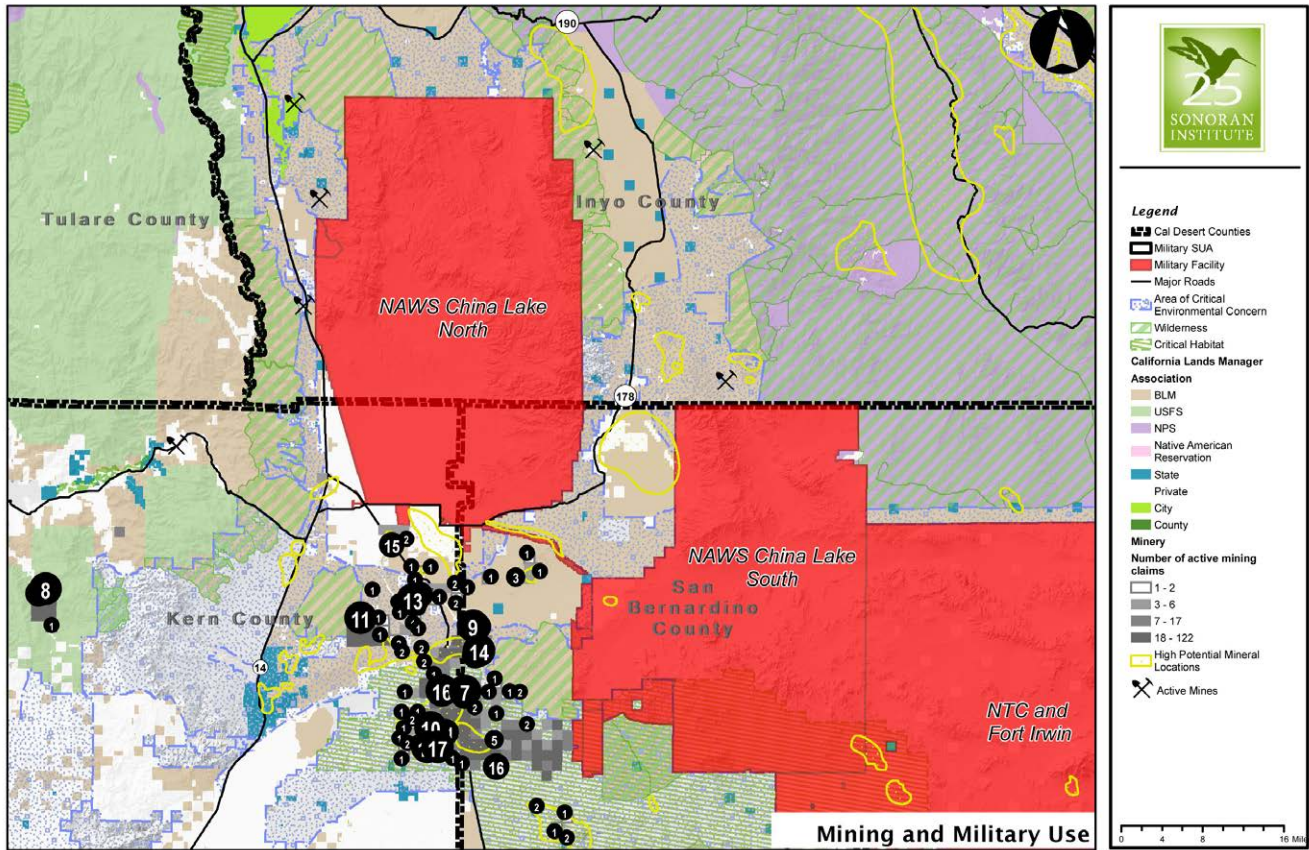


Figure 39. Mining activities, as demonstrated by active claims, are prevalent between the NAWS China Lake north and south ranges.

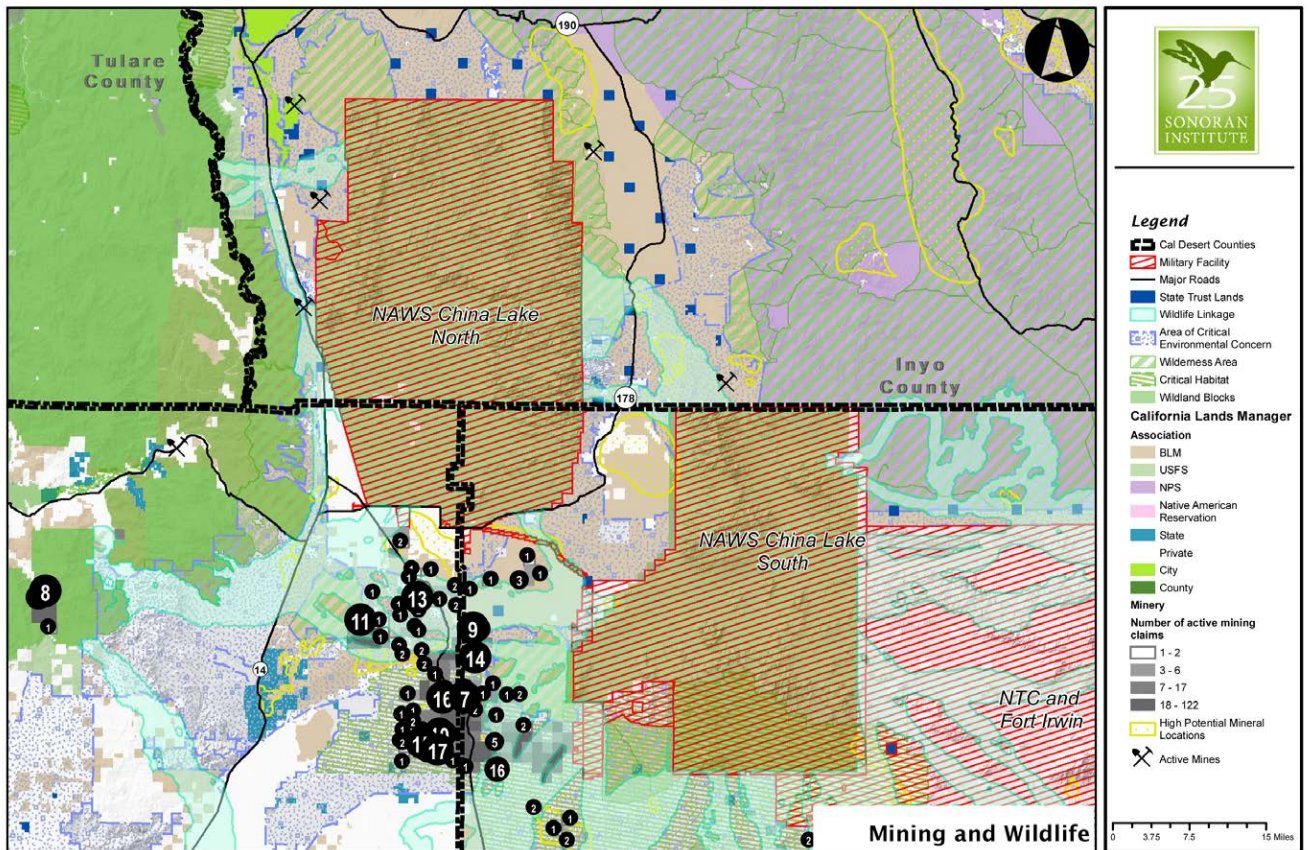


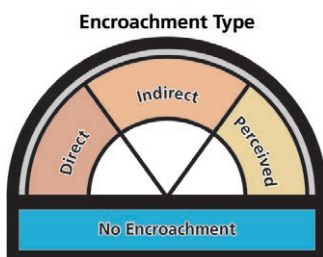
Figure 40. Mining activities occur in areas of important wildlife connectivity near NAWS China Lake.

**CHOCOLATE MOUNTAIN AERIAL GUNNERY RANGE**

Around the CMAGR, there are few mining operations. Though a historic mine directly on the southeast edge of the mountains has become a landfill operation for Los Angeles County, mining is not a significant concern for encroachment in this area. Figure 41 shows mining activities around military SUAs and MTRs, while Figure 42 shows the intersection between these activities and ecological resources and connectivity.

*Mining Activity Encroachment Grade for the CMAGR*

There is very little current mining activity near the CMAGR. In the future, however, there could be new and significant operations as there are lands with significant mineral potential near the facility. Currently and in the near future, however, we expect little encroachment concern from mining activity in this area.



*Mining Activity Recommendation*

As envisioned by the DRECP, the CMAGR and the military community should advocate for expeditious action by the BLM to evaluate the withdrawal of appropriate public lands from new mining exploration. In some areas, continued mining activity may reduce the effective connectivity of wildlife, degrade valuable habitat, and could create dust, noise, light, and other impairments to the military mission. With the prevalence of lands with mineral potential around the CMAGR, it is important that the military community remain aware of future mining activity through BLM permitting actions and continued communication and outreach.



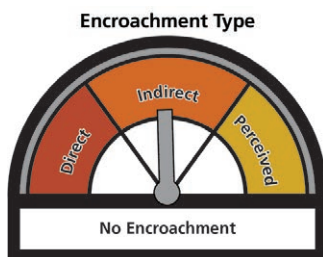
**EDWARDS AIR FORCE BASE**

Near Edwards AFB, there are a number of active mining claims that could transition into intensive operations. Figure 43 identifies these areas. In particular, mining occurs north of the installation near Fort Irwin NTC within SUA and/or MTRs. Mining activity also occurs east of the installation, but at a lower concentration.

Intensive activities occur within important ecological areas in the vicinity of Edwards AFB. As shown in Figure 44, there is significant activity in ecological connectivity corridors and Critical Habitat Area north of the installation. If this activity causes substantial fragmentation, it could be the source of significant and long-term impacts to the preservation of species that are also managed on military installations in the California Desert Region

*Mining Activity Encroachment Grade for Edwards AFB*

In the vicinity of Edwards AFB there are some significant mining activities, as evidenced by the high number of mining claims in certain areas. While these operations are not expected to contribute a significant amount to direct encroachment for military missions, there is



a likelihood that any significant expansion of mining activity could contribute to further fragmentation of wildlife habitat. Additionally, the presence of mining activity within habitats occupied by protected species presents a concern as the degradation of these habitats can cause indirect and long-term impacts to the conservation success of species that live on military lands like Edwards AFB. These concerns extend to the threatened desert tortoise and Mohave ground squirrel. Overall the cumulative grade of encroachment caused from mining activity seems to be generally indirect in nature.

*Mining Activity Recommendation*

As envisioned by the DRECP, BLM should evaluate the withdrawal of appropriate public lands from new mining exploration. In some areas, continued mining activity may reduce the effective connectivity of wildlife, degrade valuable habitat, and could create dust, noise, light, and other impairments to the military mission. With the prevalence of lands with mineral potential around Edwards AFB, it is important that the military community remain aware of future mining activity through BLM permitting actions and continued communication and outreach.

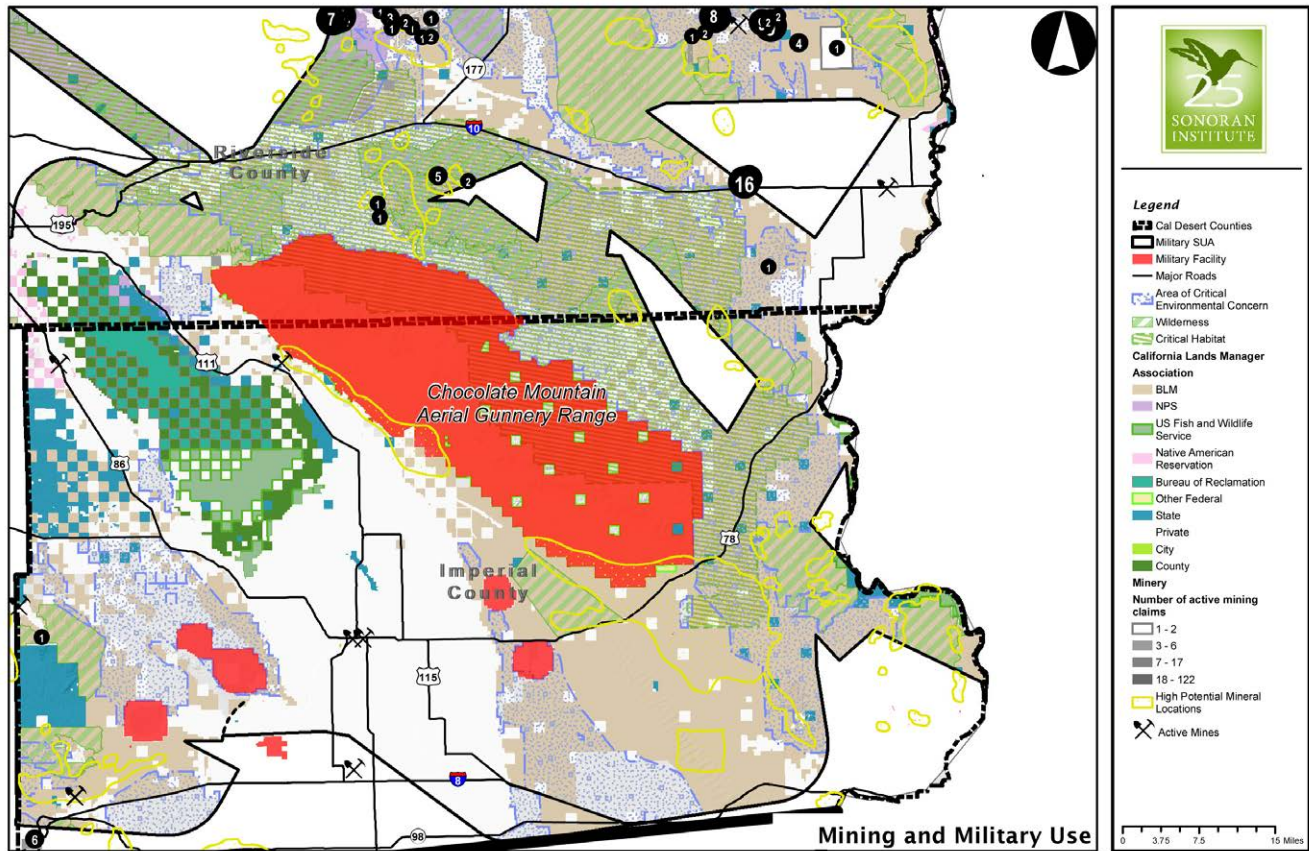


Figure 41. Very few mining activities occur around the CMAGR facility, though mineral potential is believed to exist.

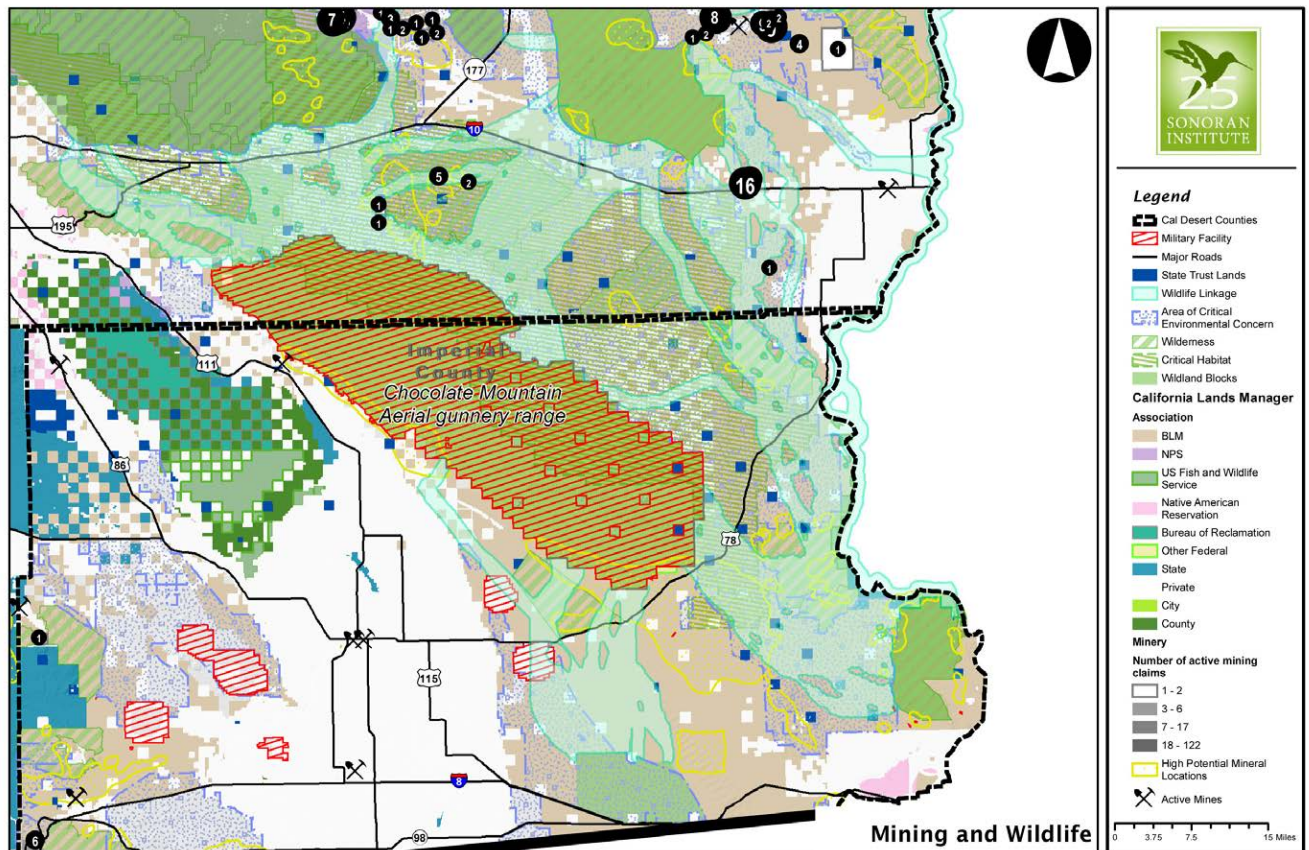


Figure 42. Mining activity is not a significant source of indirect encroachment caused by impaired wildlife connectivity.

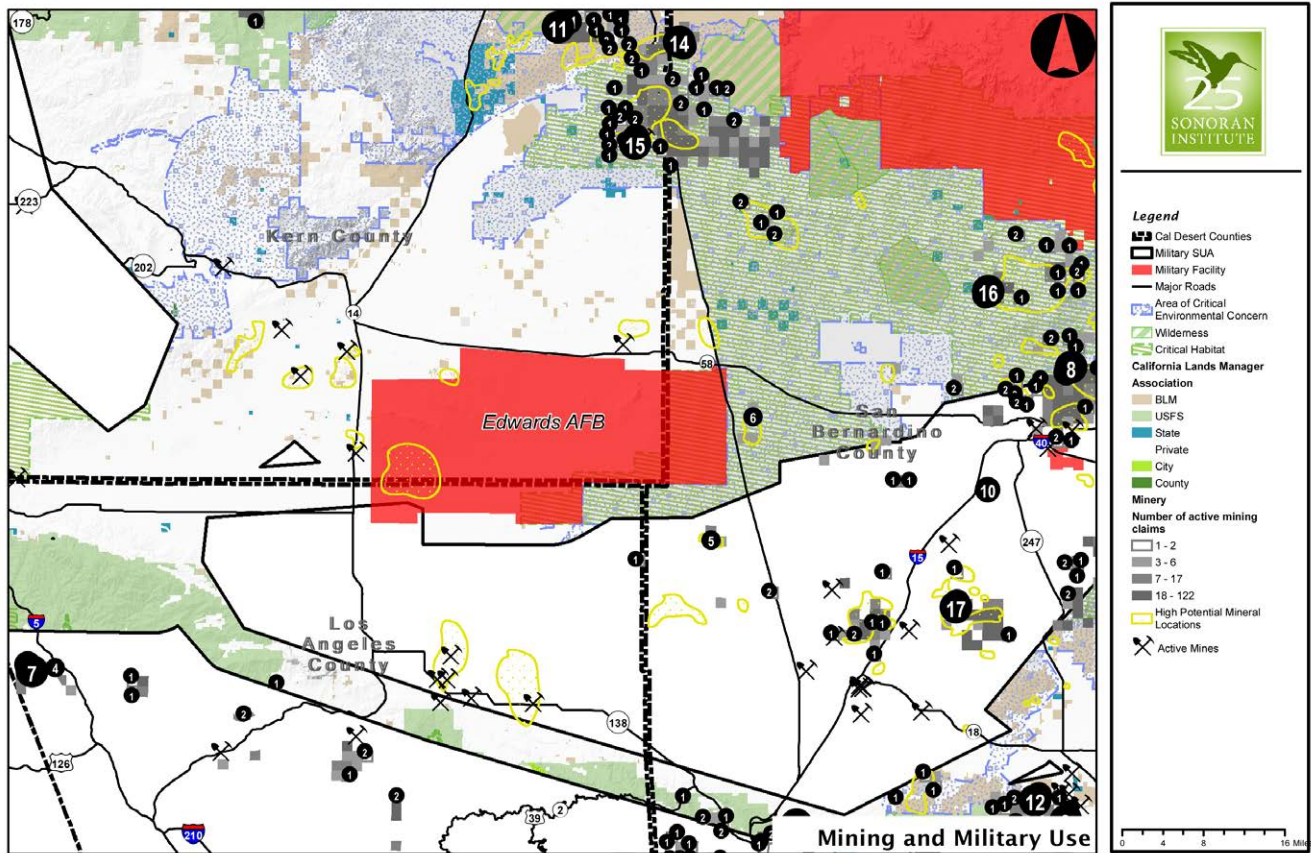


Figure 43. Mining activities and wildlife connectivity near Edwards AFB does not appear to contribute to significant direct encroachment concerns.

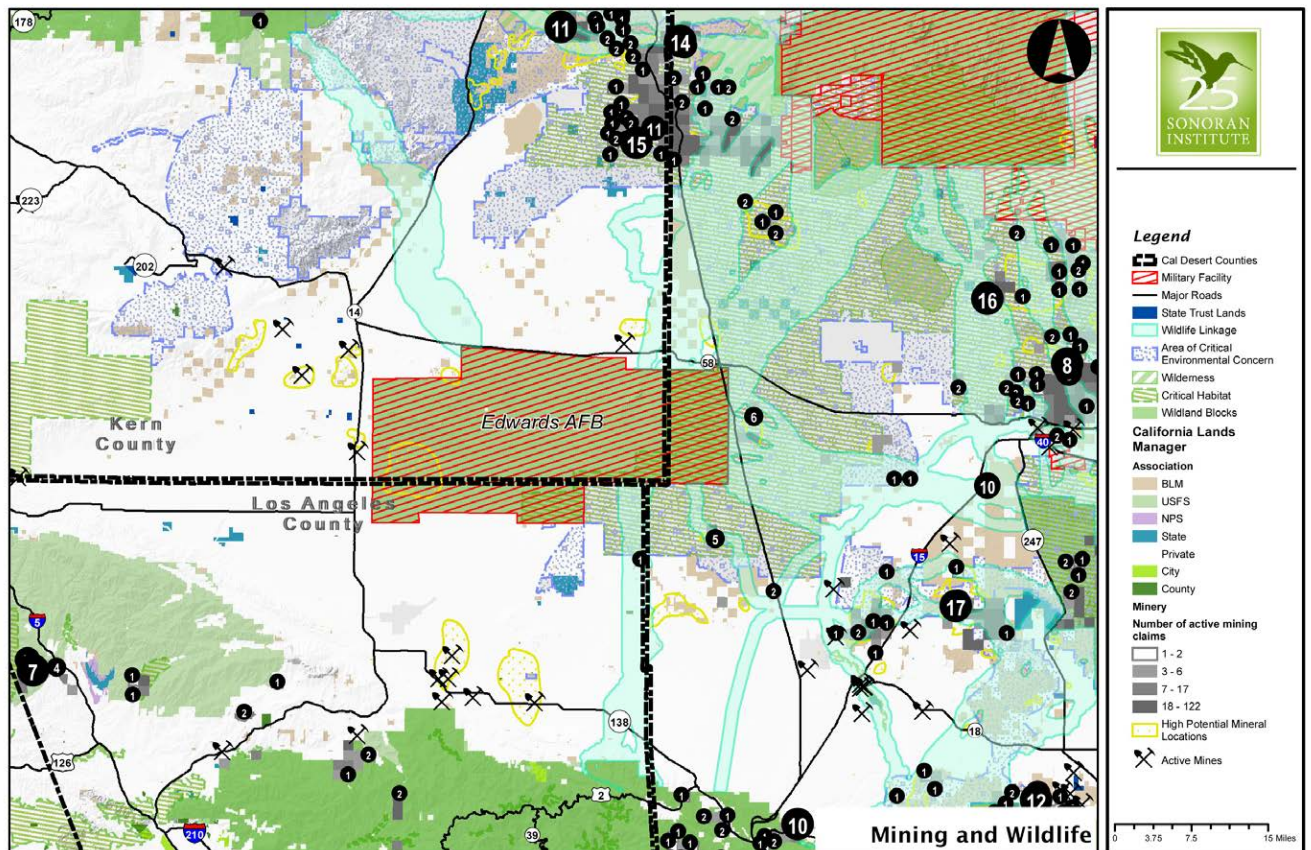


Figure 44. Mining activities are generally outside of identified wildlife corridors near Edwards AFB.

**FORT IRWIN NATIONAL TRAINING CENTER**

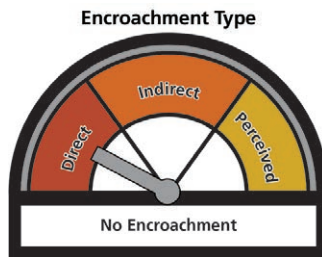
In Figure 45, it is apparent that a significant concentration of mining claims occurs around Fort Irwin NTC. These generally occur to the south and west of the facility, with some in the east. While these claims may not result in significant and intensive mining activity, their presence indicates that mineral potential exists and that activity is likely to continue. This activity at a small scale is not likely to contribute a direct impact to military operations, though intensive operations could, in some areas, present an impact.

To the east of the facility, mining activity has created direct encroachment for military operations. In particular, blasting activity has occasionally occurred with little notice to military personnel, requiring last-minute cancellations of training operations.

Ecological connectivity appears to occur in areas of mining concentration. In this situation, the activity of large-scale and/or intensive mining in wildlife corridors could result in the fragmentation of the Mojave Desert habitat. Figure 46 identifies these areas of concern which are generally to the south and west of Fort Irwin NTC.

*Mining Activity Encroachment Grade for Fort Irwin NTC*

When mining occurs in a large concentration, such as south and east of Fort Irwin NTC, it could present a direct encroachment concern. Iron ore mining activity on Fort Irwin NTC has presented a direct encroachment concern due to trucking operations, blasting, lighting, noise, dust, and/or electromagnetic interference. To the north, west and south of Fort Irwin NTC, the concentration of mining activity as evidenced by mining claims, presents a barrier to successful



biological connectivity corridors. Fort Irwin NTC suffers from some fragmentation, a form of indirect encroachment, to the south and west of the facility.

*Mining Activity Recommendation*

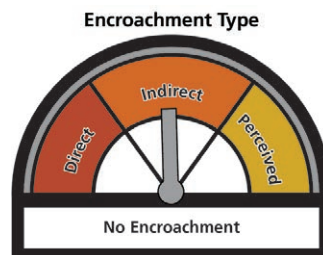
As envisioned by the DRECP, Fort Irwin NTC and the military community should advocate for expeditious action by the BLM to evaluate the withdrawal of appropriate public lands from new mining exploration. In some areas, continued mining activity may reduce the effective connectivity of wildlife, degrade valuable habitat, and could create dust, noise, light, and other impairments to the military mission. With the prevalence of lands with mineral potential around Fort Irwin NTC, it is important that the military community remain aware of future mining activity through BLM permitting actions and continued communication and outreach.

**MARINE CORPS AIR GROUND COMBAT CENTER TWENTYNINE PALMS**

Near the MCAGCC there are a number of active mining claims that could transition into intensive operations. Figure 47 identifies these areas which lie generally to the east and west of the facility where some ongoing military operations occur. As an additional concern, as shown in Figure 48, some of these activities may conflict with ecological connectivity corridors.

*Mining activity encroachment grade for the MCAGCC*

There is significant mining activity in the area of the MCAGCC and some mineral potential. This activity could present challenges to the long-term viability of the local ecology through additional habitat fragmentation and the use of limited water resources. In other areas of the country, mining has overused water resources and has contributed to water conservation expenses at military facilities. Also, if significantly expanded, mining operations near the MCAGCC could present additional demand for housing and urban development that could further impair wildlife connectivity around the installation. At the scale of existing operations, and considering the locations of mineral resources,



mining remains an indirect concern for operations at the MCAGCC; however, with expansion, it could eventually become a direct impact.

*Mining activity recommendation*

As envisioned by the DRECP, the MCAGCC and the military community should advocate for expeditious action by the Bureau of Land Management to evaluate the withdrawal of appropriate public lands from new mining exploration. In some areas, continued mining activity may reduce the effective connectivity of wildlife, degrade valuable habitat, and could create dust, noise, light, and other impairments to the military mission.

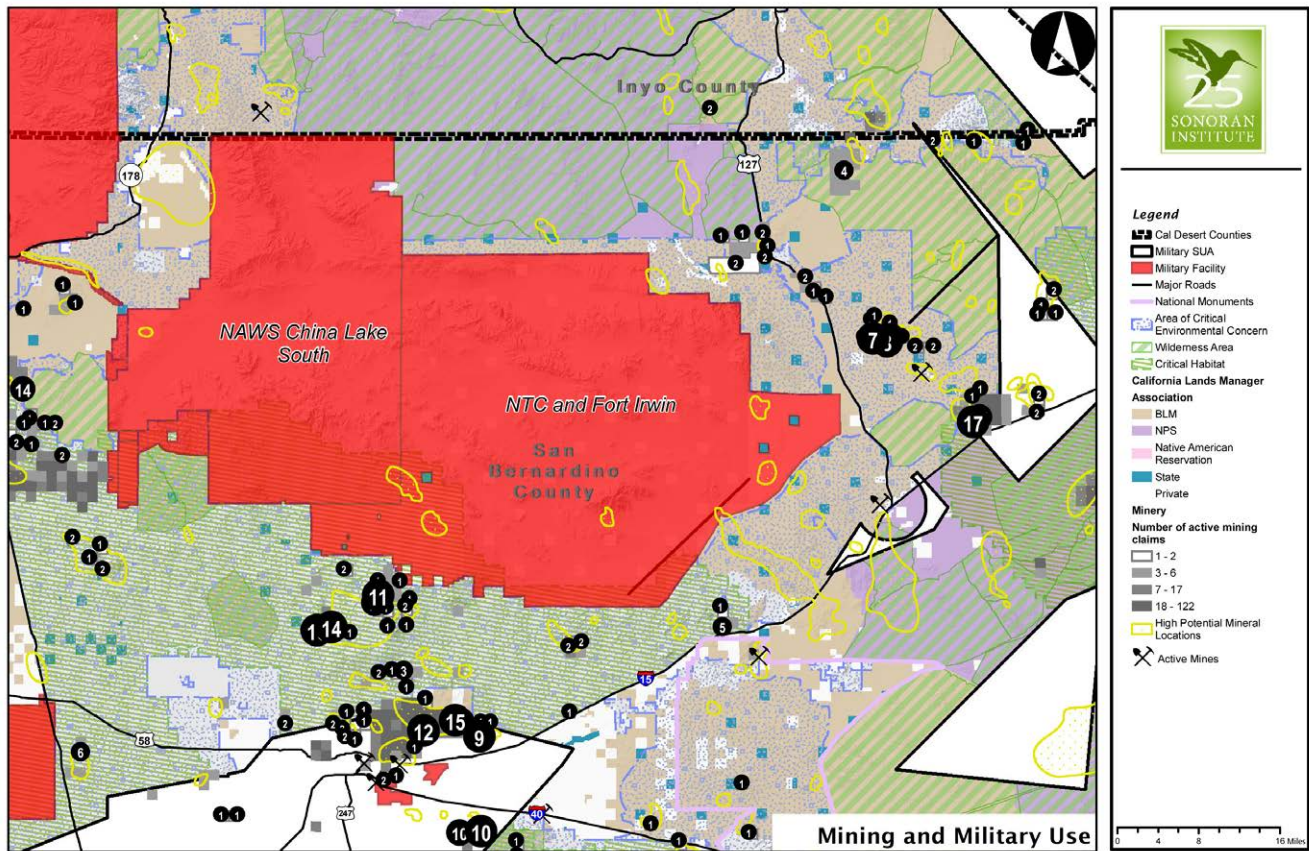


Figure 45. Mining activity south and east of Fort Irwin NTC may contribute to direct and/or indirect encroachment.

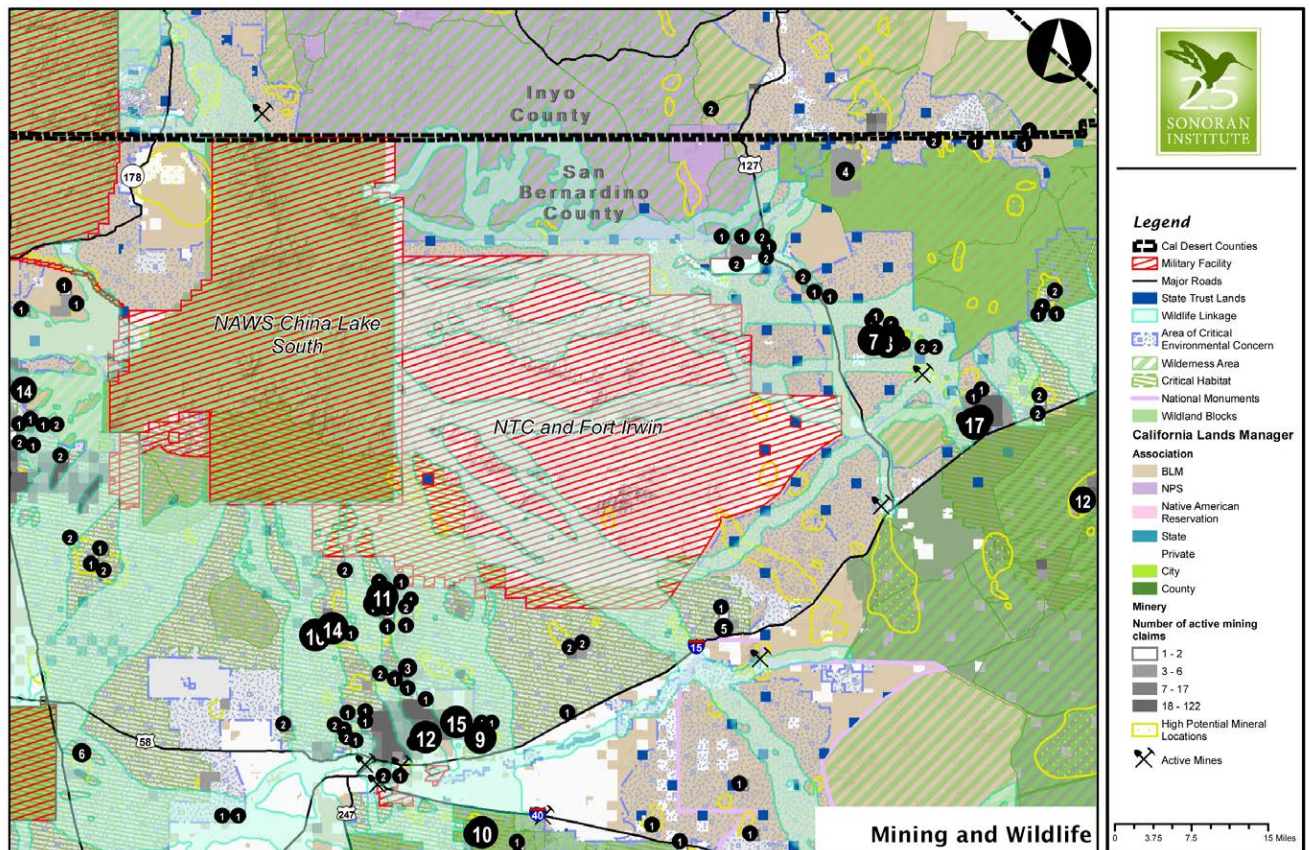


Figure 46. Mining activities and their relationship to military activity within the Fort Irwin NTC area.

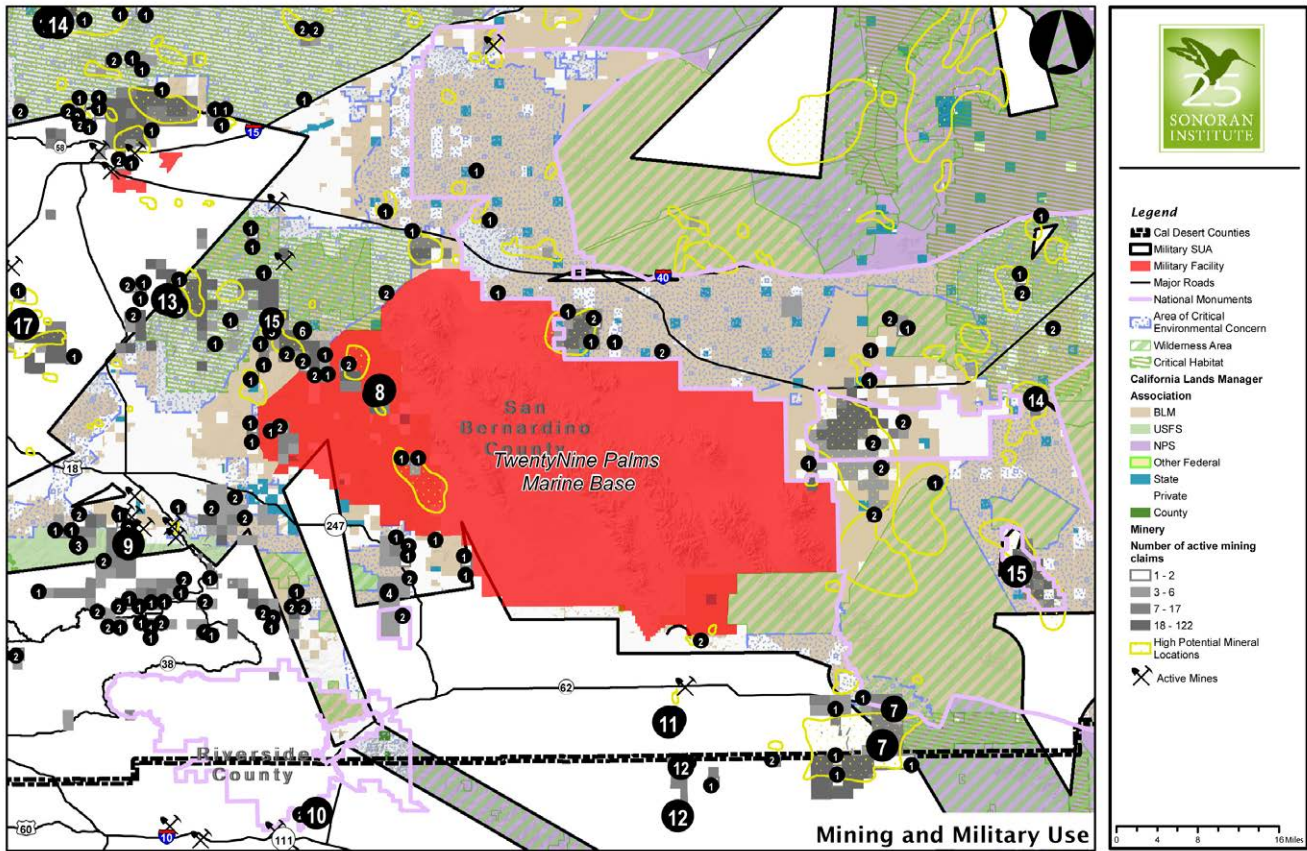


Figure 47. Mining activities near the MCAGCC 29 Palms present encroachment concerns particularly on the west and south of the facility.

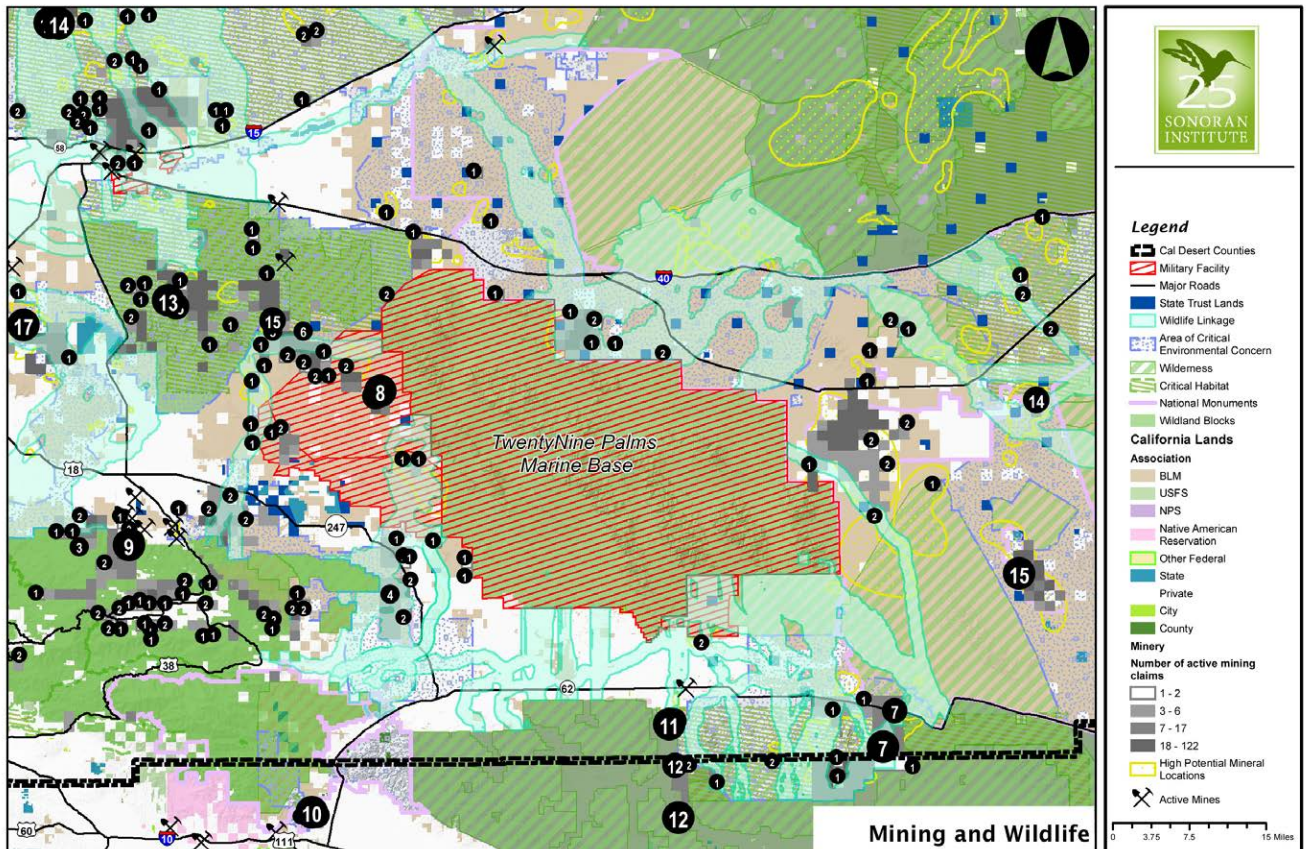


Figure 48. In some areas, mining activity has contributed to fragmentation of wildlife corridors.

## 5. RECREATION

Recreation activities occur throughout publicly owned lands in California. Generally these activities are welcome due to their contribution to the economy and their benefit to a healthy lifestyle. Some recreation activities, however, can create impacts on installations and military missions if they are poorly managed or bring certain encroachment risks. Near MCAGCC 29 Palms, efforts have been made to identify areas where recreation activities like off-highway vehicle (OHV) use is appropriate. Various areas are identified by the BLM as Special Recreation Management Areas (SMRAs), in large part due to the demand for intense recreation activities. The DRECP has identified significant areas where OHV use may be compatible with conservation efforts and continued viability of military operations. In most cases these lands have seen significant historic use and may be appropriate for this use.

Table 10 identifies the most prevalent examples of encroachment concerns with respect to recreation activities. Figure 48 identifies the areas in the region where these situations occur.

*Potential Encroachment Pressure: Variable.*

Depends highly on effective management of the recreation activity and the areas in which it is concentrated.

*Potential Benefit: Conditional.*

Recreation activities on publicly owned lands around military installations can promote a good-neighbor relationship and advance public relations strategies. In most cases, recreation can occur around military activities with no conflict and can even enhance the beneficial use of buffer lands with environmental value. Management actions are necessary to ensure the appropriate use of these areas.

Type	Direct	Indirect	Perceived
Off-Highway Vehicle (OHV) Recreation	Occasionally, OHV use can stray into military operation areas, especially in instances where military ranges were previously public lands that have been withdrawn for military use.	Poorly managed OHV use can fragment habitat and facilitate the migration of species to nearby natural landscapes like military lands.  OHV use can facilitate the propagation of invasive species into natural areas and nearby military installations.	OHV use around installations can create the impression that there may be security risks and/or competing desires for the use of the land.
Recreational Shooting	Recreational shooting near installations and training ranges can present challenges for low-flying aircraft and other military operations.	Shooting areas near military facilities may cause changes to training procedures.	Shooting activities near installations may create the impression that military personnel and/or equipment are in danger.

Table 10. Recreation Encroachments

### NAVAL AIR WEAPONS STATION CHINA LAKE

Near NAWS China Lake, as in the rest of this region, there is a fair amount of OHV use. The BLM has designated an open OHV area south of the facility that is remote enough to reduce the likelihood of trespassing and other direct encroachment concerns. Figure 50 identifies this area as being between the north and south ranges of NAWS China Lake along Randsburg Wash Road. Generally speaking, use of the OHV area is not expected to add any significant concerns for direct impacts to military operations. However, use of the OHV area in and around the Trident Loading Dock, located along the south side of the Randsburg Wash Access Road, could pose an impact to military operations and use of that area.

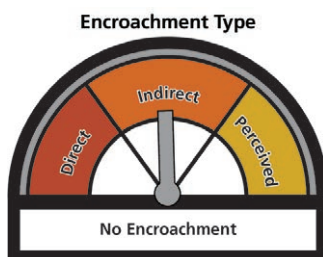
Figure 51 shows the open OHV area in association with certain ecological resources. Unfortunately, its location occurs within a mapped ecological connectivity area, which raises concern about the potential that significant and long-term activity may contribute to the fragmentation of habitat between NAWS China Lake's two ranges and within the broader ecoregion.

### Recreation Activity Encroachment Grade for NAWS China Lake

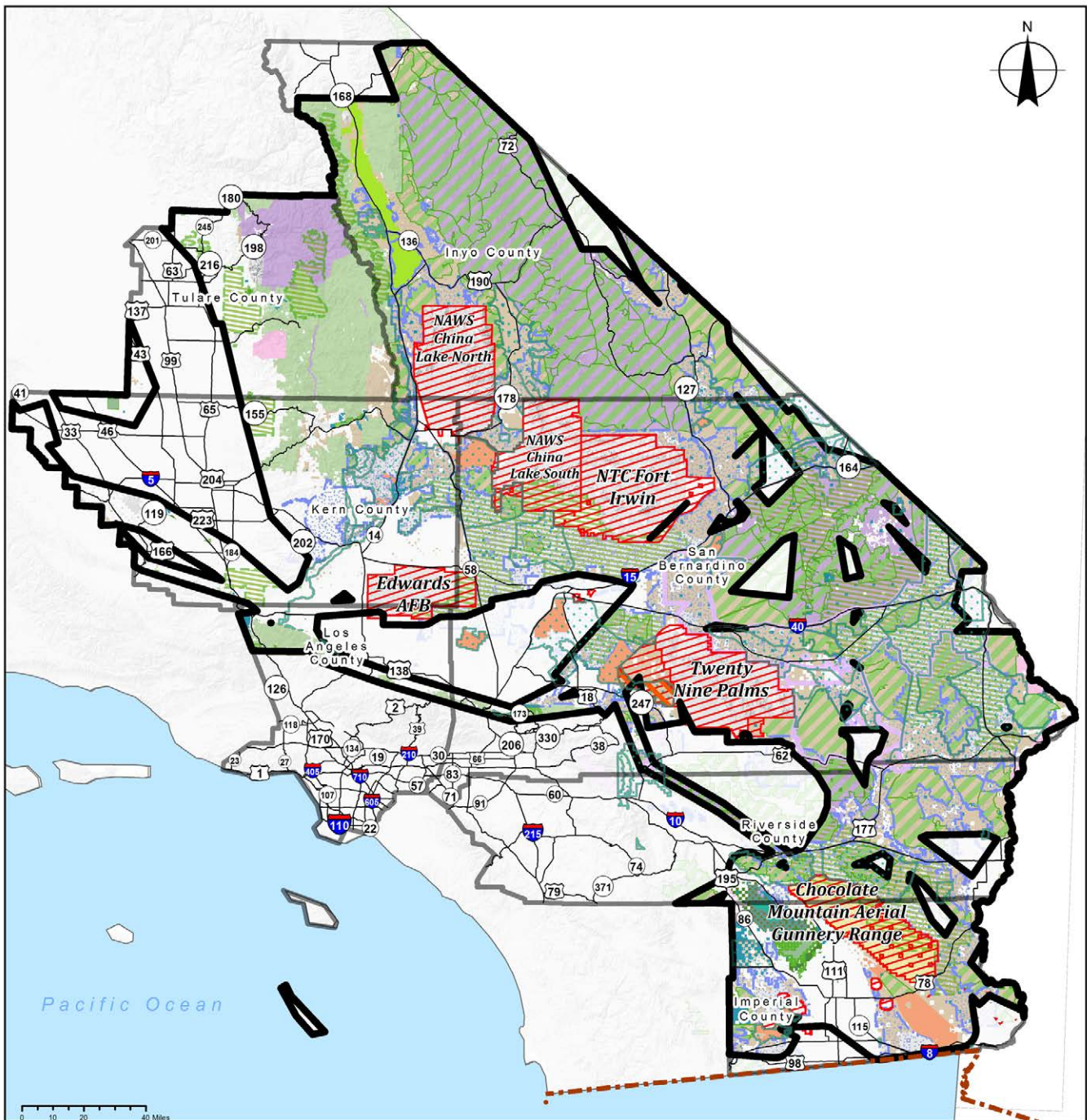
OHV use in the California Desert Region is an important recreational activity. Around NAWS China Lake, this use is concentrated in an open OHV area between the two ranges of NAWS China Lake. This activity is unlikely to present a direct encroachment concern since it is remote from the installation and managed carefully. Unfortunately, however, there is concern that the OHV activity is within mapped biological connectivity corridors that serve to connect the facility to the broader Mojave Desert landscape

### Recreation Activity Recommendation

The wildlife corridors around NAWS China Lake should be managed to reduce the impact of recreational activities. In particular, some corridors to the southwest of the facility may require additional management actions by the BLM or other agencies within the appropriate land use jurisdictions to prevent their degradation. Mitigation could occur to this heavy use by restoring connectivity in other corridors around the installation.







Shaping the future of the west

1:2,750,000

### Recreation and Military Use

<p><b>Legend</b></p> <ul style="list-style-type: none"> <li> International Boundary</li> <li> Cal Desert Counties</li> <li> Military SUA</li> <li> Military Facility</li> <li> Major Roads</li> <li> National Monuments</li> </ul>	<ul style="list-style-type: none"> <li> Recreation management areas</li> <li> Shared OHV (Johnson Valley)</li> <li> Open OHV Areas</li> <li> Area of Critical Environmental Concern</li> <li> Wilderness</li> <li> Critical Habitat</li> </ul>	<p><b>California Lands Manager Association</b></p> <ul style="list-style-type: none"> <li> BLM</li> <li> USFS</li> <li> NPS</li> <li> US Fish and Wildlife Service</li> <li> Native American Reservation</li> <li> Bureau of Reclamation</li> </ul>	<ul style="list-style-type: none"> <li> Other Federal</li> <li> State</li> <li> Private</li> <li> City</li> <li> County</li> </ul>
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Figure 49. There are many places where OHV use is designated in managed areas within the California Desert Region.

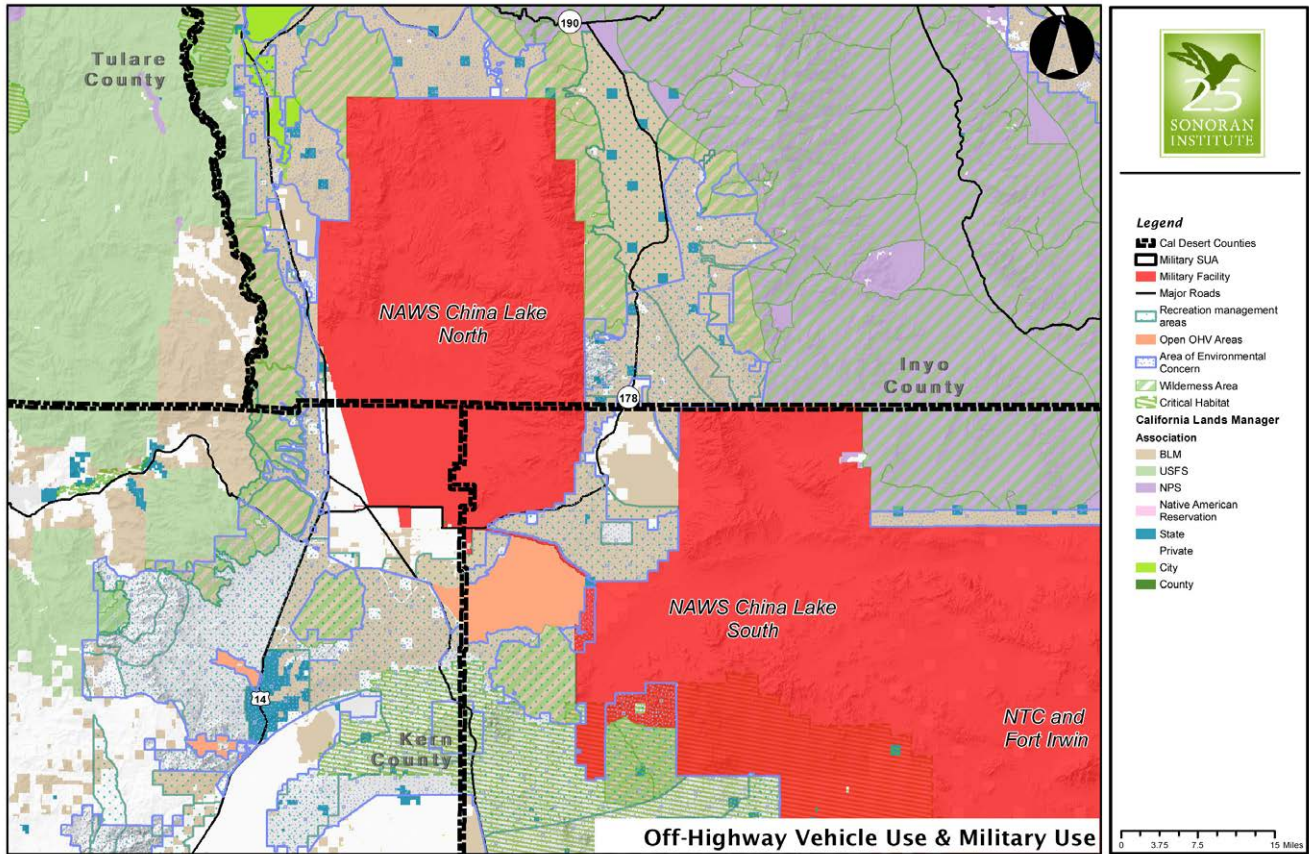


Figure 50. An open OHV area is not likely to create significant concern for direct impacts to military operations.

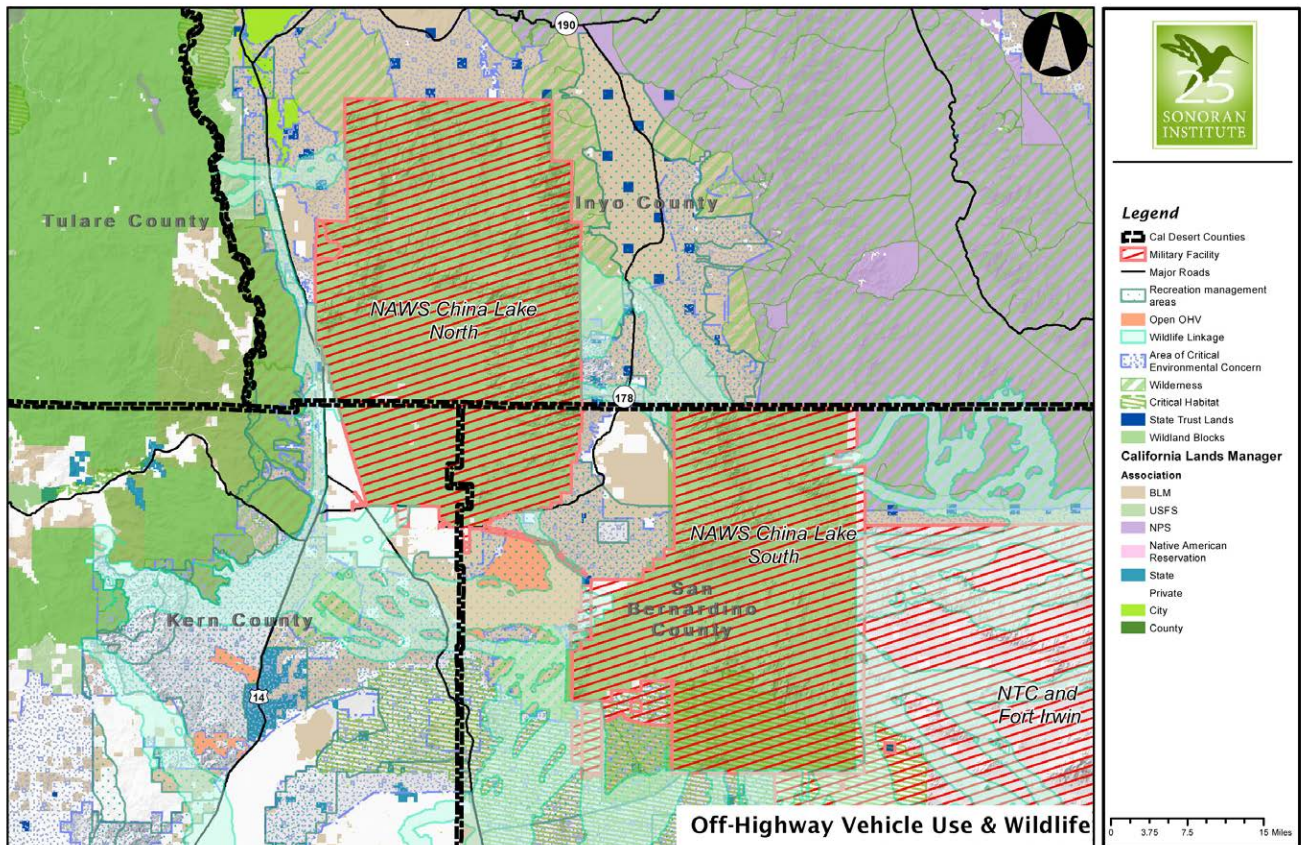


Figure 51. Wildlife connectivity around NAWS China Lake may be interrupted by a concentration of recreation activity in the open OHV area south of China Lake.

**CHOCOLATE MOUNTAIN AERIAL GUNNERY RANGE**

Figure 52 identifies areas near the CMAGR that are designated for OHV use and their relationship with military uses around this facility. Of particular interest is the Imperial Sand Dunes open OHV area that is used by millions of recreationists every year. This area will continue to be utilized and presents little concern for direct encroachment within the area. The vast majority of this recreation relies upon the sandy dunes that are present here, and rarely strays onto the mountainous terrain of the CMAGR.

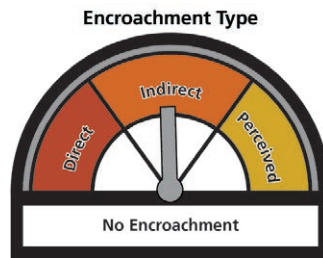
Ecological connectivity is important in order to preserve the integrity of the landscape around the CMAGR. As shown in Figure 53, OHV areas are occasionally in conflict with connectivity corridors that connect the facility to the broader ecoregion. In particular, the Imperial Dunes OHV area occurs across a broad swath of mapped connectivity areas to the south of the CMAGR. It is important that management of these recreation activities is balanced with the continuation of flora and fauna migration.

*Recreation Activity Encroachment Grade for the CMAGR*

Much of the area around the CMAGR remains free of a concentration of OHV use. In particular, lands to the north and east seem to be fairly well intact. Of concern is the area south of the facility where the frequently used Imperial Dunes OHV area can restrict connectivity. With respect to military uses, it appears that this recreational use is generally secluded from the facility boundaries and presents little direct encroachment concern.

*Recreation Activity Recommendation*

The wildlife corridors around the CMAGR should be managed to reduce the impact of recreational activities. In particular, some corridors on the south of the facility may require additional management actions by the BLM or other agencies within the appropriate land use jurisdictions to prevent their degradation. A possible approach to mitigating lost connectivity may lie in facilitating the crossing of the Coachella Canal to the south and Interstate 10 to the north for a range of species.



**EDWARDS AIR FORCE BASE**

There has historically been a large amount of OHV use near Edwards AFB. Figure 54 identifies OHV areas and the relationship with military activities. In general, these lands are remote from Edwards AFB and are expected to contribute no additional encroachment concern.

Ecological connectivity, as demonstrated through mapped wildlife corridors shown in Figure 55, is sometimes interrupted by the intense and frequent recreation activity that occurs in SRMAs and open OHV areas. Care needs to be taken that this connectivity is not lost to mismanaged or unrestricted OHV use, especially in areas where connectivity is critical to preserving the viability of species common across military and public lands. In general, OHV areas in the vicinity of Edwards AFB appear to have little conflict with wildlife corridors.

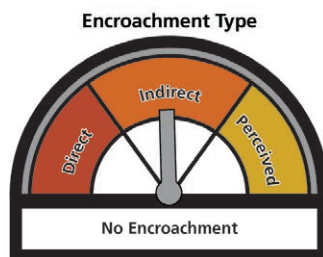
for a range of indirect encroachment concerns. These include landscape fragmentation, which reduces valuable habitat and ecological connectivity, and contributes to the mortality of certain species, especially the Mojave desert tortoise. Care needs to be taken to reduce the potential long-term impact from OHV use within known wildlife corridors and in areas known to contain desert tortoise and other key regional species.

*Recreation Activity Recommendation*

The wildlife corridors around Edwards AFB should be managed with appropriate enforcement to reduce impacts from recreational activities on natural resources. In particular, some corridors on the south and east sides of the facility may require additional management actions by the BLM or other agencies within the appropriate land use jurisdictions to prevent their degradation.

*Recreation Activity Encroachment Grade for Edwards AFB*

Recreation activity seems to be actively managed around Edwards AFB, as evidenced through the designated SRMAs and open OHV areas. This activity, however, does present an opportunity



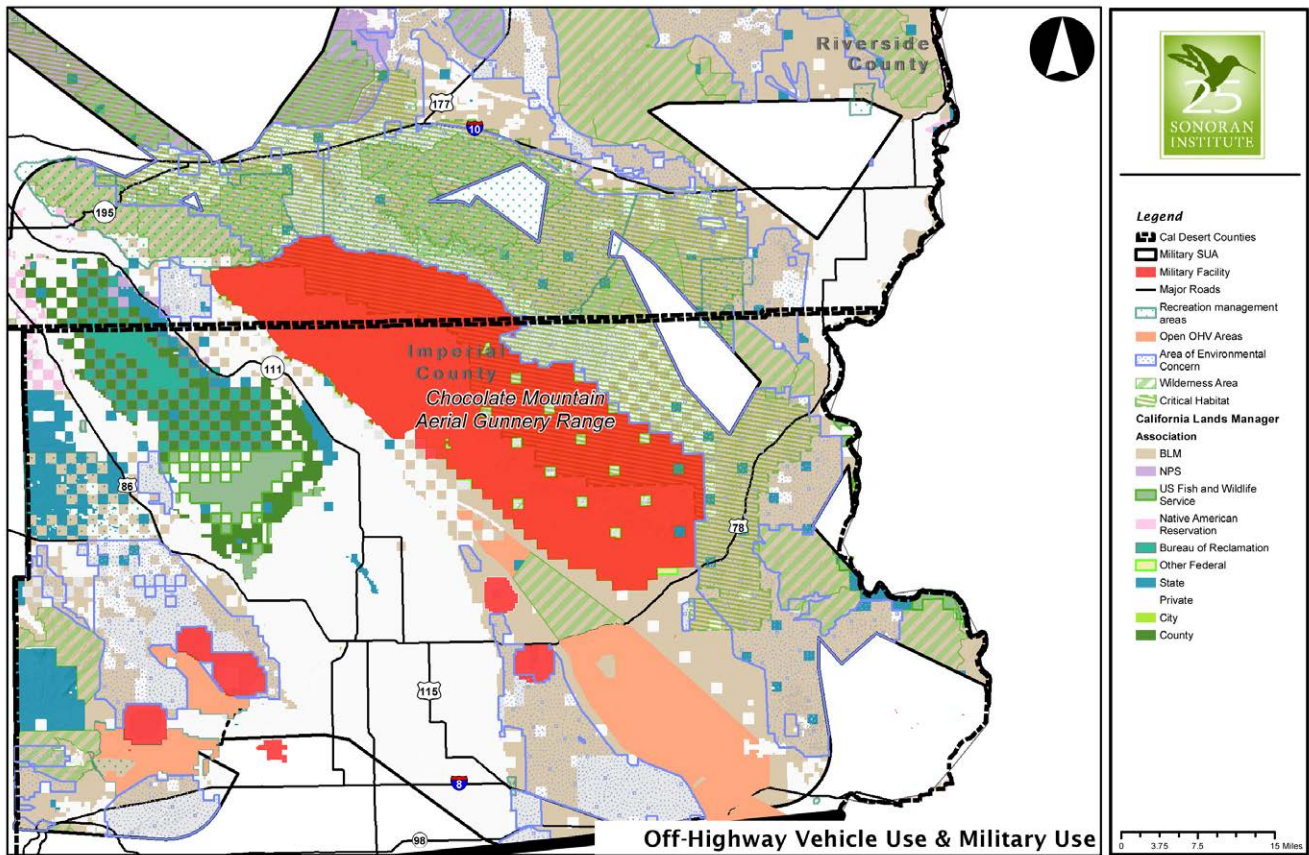


Figure 52. The Imperial Dunes OHV area is a prominent site for recreation near the CMAGR facility.

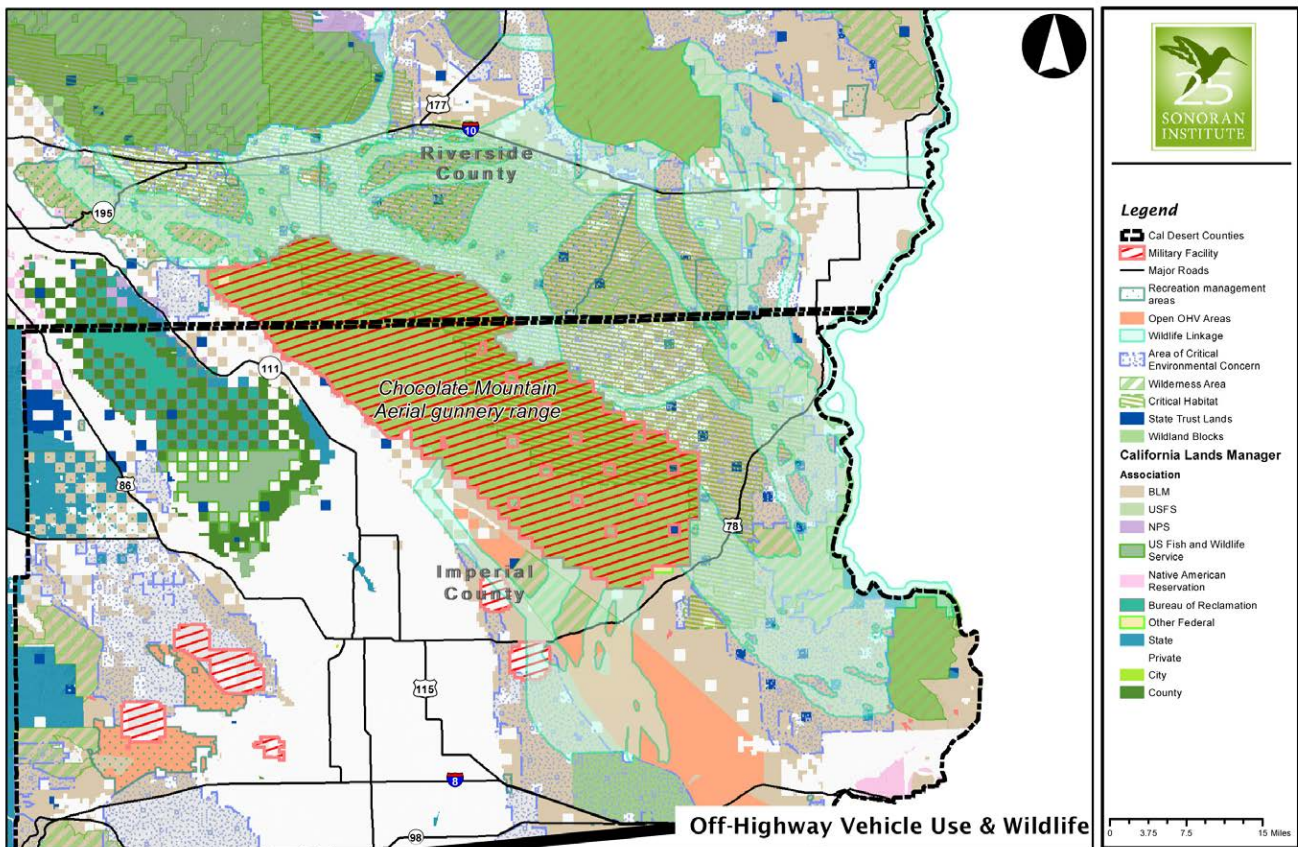


Figure 53. OHV areas and wildlife connectivity around the CMAGR may be interrupted by a concentration of recreation activity.

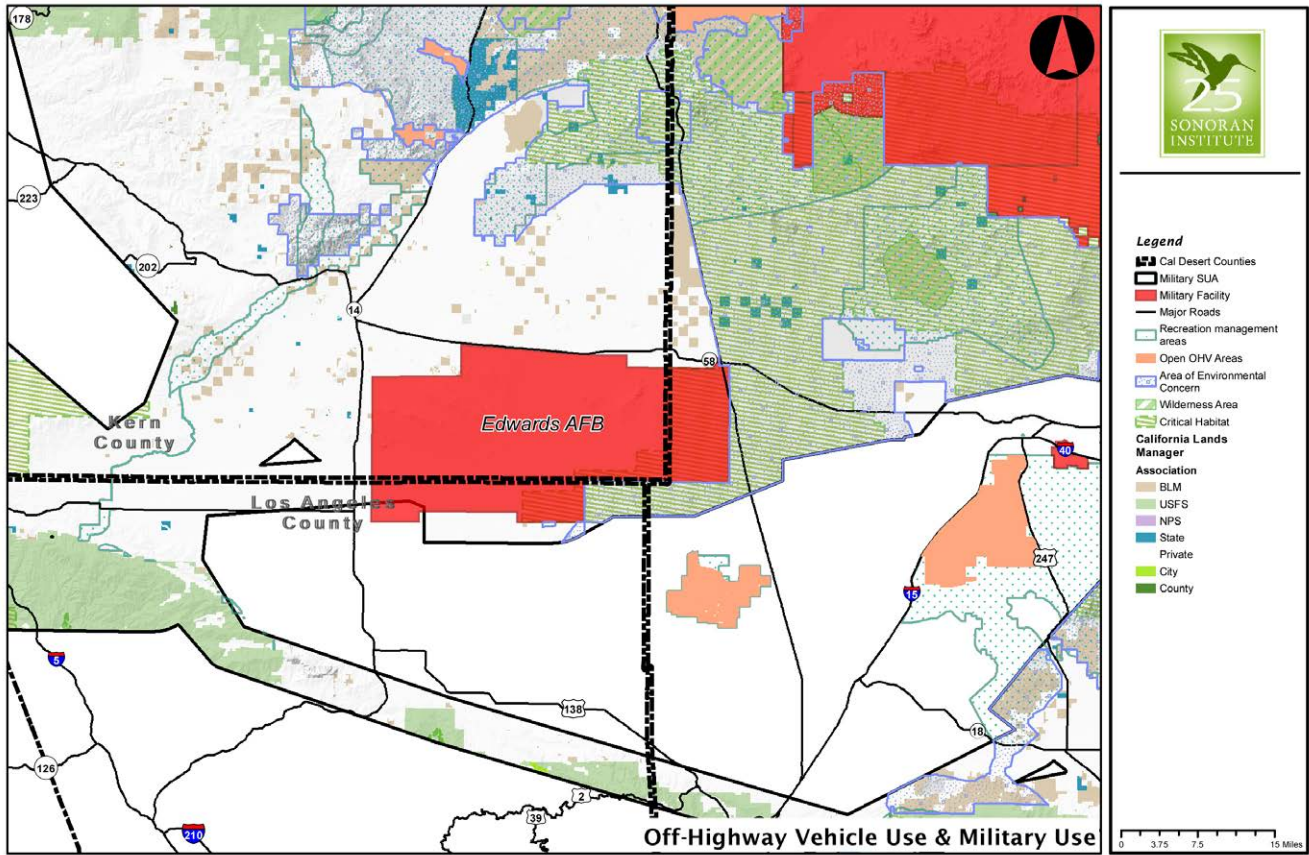


Figure 54. Designated OHV use near Edwards AFB within SUA and MTRs.

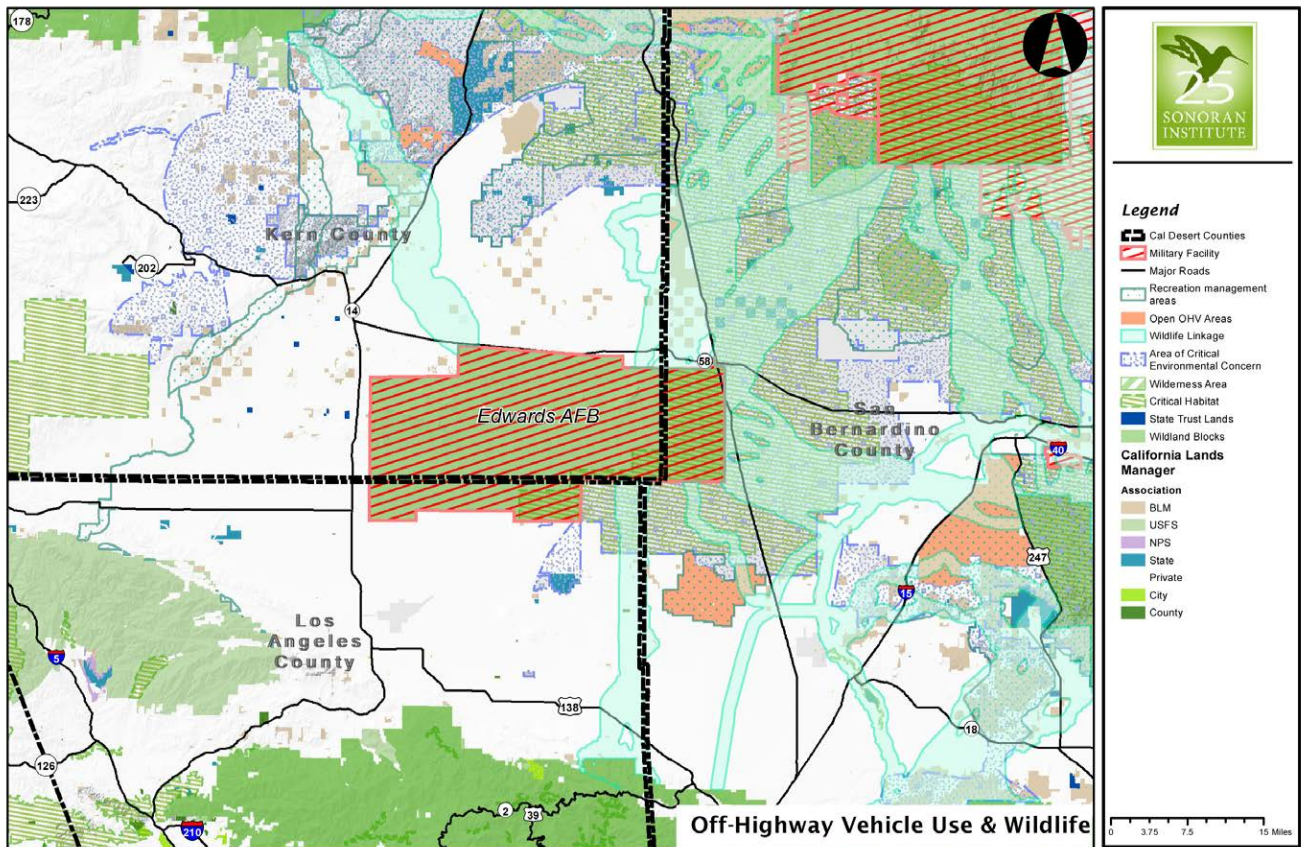


Figure 55. OHV areas and wildlife connectivity around Edwards AFB.

**FORT IRWIN NATIONAL TRAINING CENTER**

OHV use in the area around Fort Irwin NTC is shown in Figure 56. Generally, though this activity occurs on federal lands around the region, it is concentrated in open OHV areas southeast and northeast of the installation. While generally remote from the facility, this activity does occur within areas of military activity. Figure 57 shows open OHV areas are generally not a barrier for wildlife connectivity.

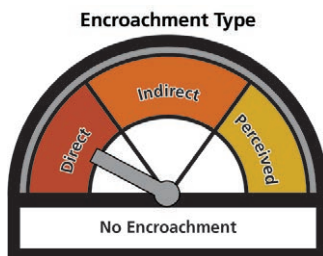
*Recreation Activity Encroachment Grade for Fort Irwin*

The BLM has designated an open OHV area south of the Fort Irwin NTC that is close enough to the

installation that has increased the likelihood of trespassing and other direct encroachment concerns.

*Recreation Activity Recommendation*

1. Fort Irwin NTC should continue to work closely with the BLM and the County of San Bernardino to ensure that recreation activities respect the boundaries of the military installation.
2. The wildlife corridors around the Fort Irwin NTC should be managed to reduce the impact of recreational activities. Fort Irwin NTC should continue to work closely with the BLM and other agencies within the appropriate land use jurisdictions to prevent their degradation.



**MARINE CORPS AIR GROUND COMBAT CENTER TWENTYNINE PALMS**

The DRECP has identified significant areas where OHV use may be compatible with conservation efforts and continued viability of military operations. Figure 58 identifies OHV areas and the relationship with military activities. Figure 59 identifies wildlife connectivity and how it may relate to these activities. In general, OHV use is occurring around the facility and its continued use and expansion may contribute to direct and indirect impacts on the facility.

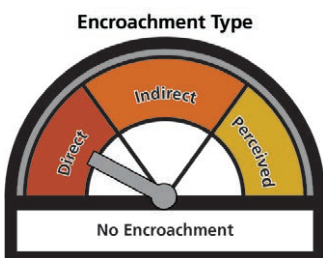
*Recreation Activity Encroachment Grade for the MCAGCC*

Recreation activities around MCAGCC 29 Palms are significant, especially with OHV users who use the natural terrain and the many trails that occur primarily to the west of the facility. Recent efforts have identified two OHV areas, including the Johnson Valley OHV Shared Use Area as identified in the DRECP, and other unnamed lands to the west of the facility. OHV recreation is an encroachment risk to MCAGCC 29 Palms due to trespass of users into training areas. Additionally, designated

OHV use areas could contribute to degradation of habitat for important species that share the landscape, which would create an indirect impact to the facility. Without appropriate precautions, wildlife corridors to the west and southwest of the facility could be impacted. It will be important that future planning processes explore how OHV use can occur without degrading key resources, especially considering the vulnerability of other wildlife corridors south of MCAGCC 29 Palms.

*Recreation Activity Recommendations*

The wildlife corridors around MCAGCC 29 Palms should be managed to reduce the impact of recreational activities. In particular, some wildlife corridors on the west and southwest side of the facility may require additional management actions to prevent their degradation. MCAGCC 29 Palms should work closely with the BLM to ensure that recreation activities respect the boundaries of the military installation. If necessary, the BLM should increase enforcement activities around the military installation and improve access control.



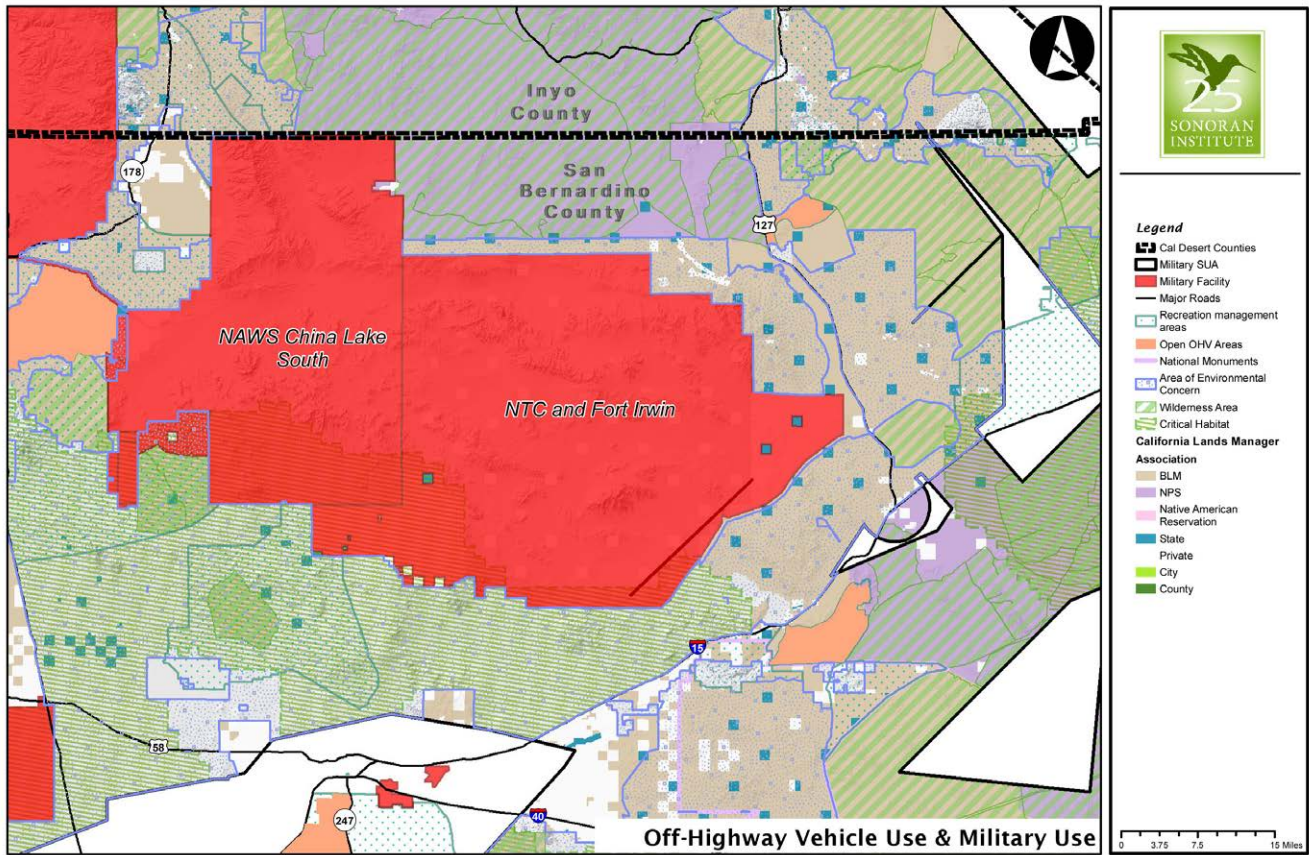


Figure 56. Open OHV areas are not likely to create significant concern for direct impacts to military operations at Fort Irwin NTC.

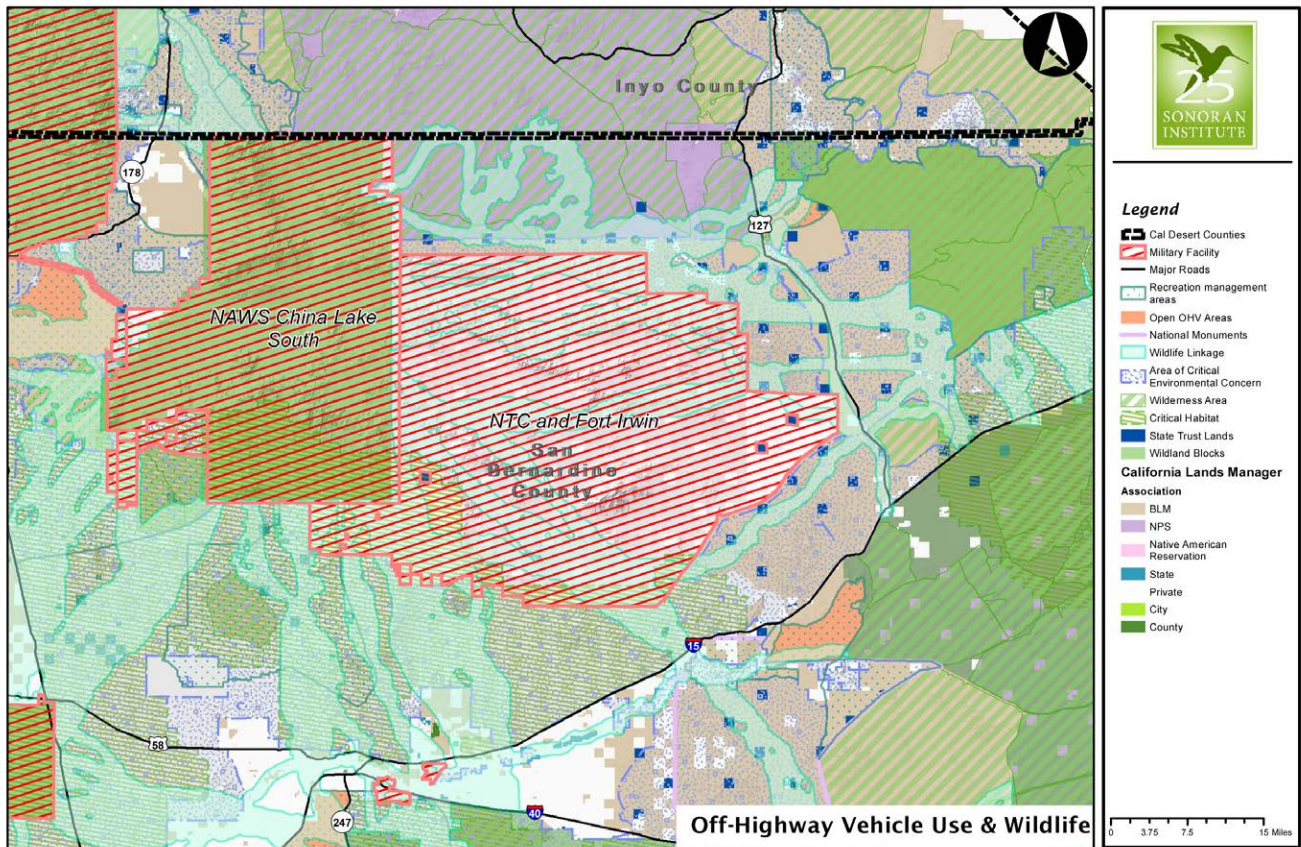


Figure 57. Wildlife connectivity does not appear to be impacted to any significant degree by OHV areas.

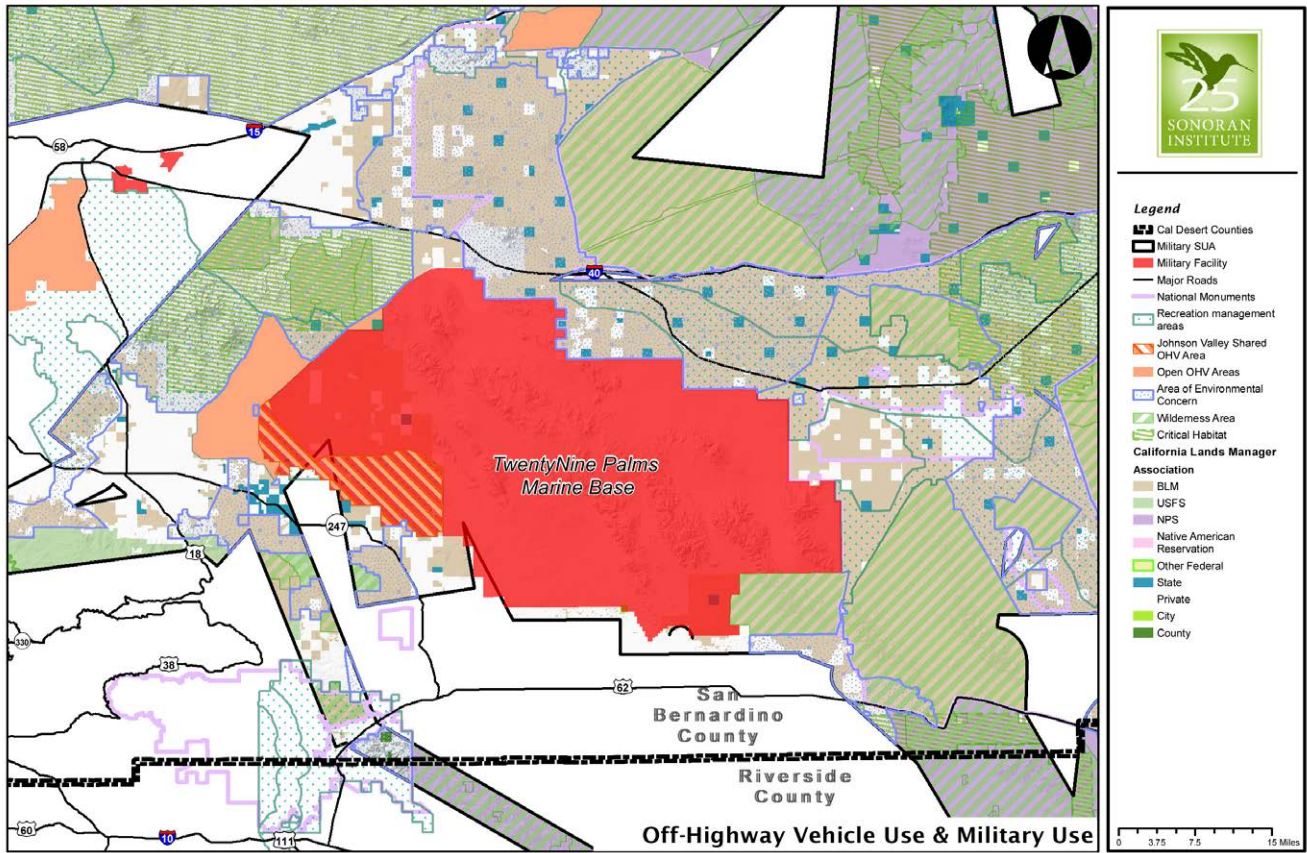


Figure 58. Designated OHV use near the MCAGCC 29 PALMS occurs adjacent to the military facility and on an area shared between recreationists and the Marine Corps.

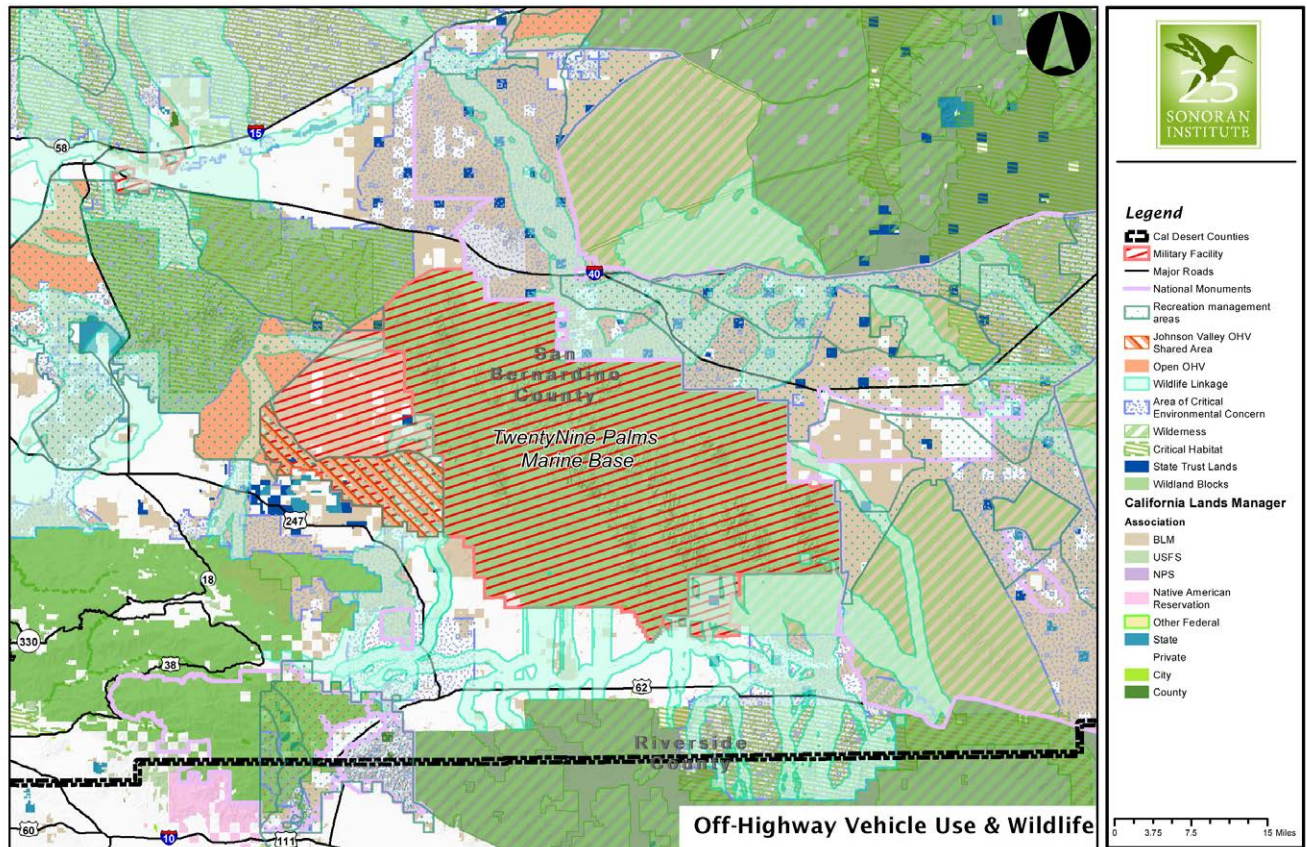


Figure 59. OHV areas occur across some wildlife corridors around the MCAGCC 29 Palms.



## 6. NATURAL RESOURCE MANAGEMENT

Military facilities around the West are challenged by the need to maintain operational viability over the long term. However, facilities whose operations and natural resource management are incompatible are destined to be subjected to increased management requirements for special status flora and fauna (including threatened and endangered species), suffer increased water constraints and conservation expenses, and could be faced with continuous pressure to protect natural resources at the expense of the military mission. The best way to prevent possible mission curtailment is to ensure that the natural resources surrounding the installation are integrated into the long-term operations and management plans and that the facility exerts leadership in the region to ensure that unintended consequences are addressed in a timely manner.

Often, publicly owned lands are havens for natural resources, including wildlife, riparian areas, unique vegetation, and other features. The management of these resources rarely occurs solely on these lands and often extends throughout the region, depending on the issue. In some cases, the protection of natural resources extends into military facilities through increased responsibility to manage endangered species or to prevent increased degradation of the connected landscape.

As has been recognized by many military leaders over the past few decades, large ranges throughout the country rely on an interconnected landscape to ensure that long-term ecological

viability is preserved in the area. Military facilities, especially those that house a large acreage of natural landscape, steward the same wildlife that may be of conservation concern and require sometimes expensive management actions. In order to reduce these costs and preserve the viability of the military missions that occur on these facilities, it is imperative that the landscape retain its function and that wildlife be able to move freely on and off these lands in pursuit of mates, forage, water, and other important life pursuits.

### *Potential Encroachment Pressure: Variable*

Encroachment potential depends highly on the value of natural resources across the broad ecoregion and upon the success of ecological connectivity objectives. Generally it is in the best interest of all managers of land, including the military, to ensure that a balance is achieved between the use of land and its role in preserving ecological viability.

### *Potential Benefit: Conditional*

Management of natural resources on military facilities is a necessary component of the modern military landscape. Proper public awareness actions can demonstrate to the public that the military is performing a stewardship function and is benefiting the environment through their actions. Additionally, appropriate advocacy by military leaders can help to resolve complex and controversial issues by demonstrating reasonable and pragmatic natural resource management approaches.

Type	Direct	Indirect	Perceived
<b>Threatened and Endangered Species (T&amp;E) Management</b>	The management of T&E species can cause operational impairment on military installations. Occasionally activities must be halted or reconfigured to respond to changing migration patterns or other animal behaviors.	Management of an endangered species may impact nearby installations that are not the physical home of the plant or animal of interest.  Long-term drought and constrained water supplies can cause encroachment issues on military facilities due to requirements to change procedures and approaches in response to regional management goals.	Reports of endangered species management concerns and increased controversy around natural resource management can create the perception of encroachment on military facilities.  Resource constraints near military facilities can create the impression that the site may be impaired.
<b>Water Restrictions</b>	None	Water resources are shared by all users in a particular area. In many cases the overuse of this water could impact riparian and natural areas and special status species that rely upon them. In some cases, increased oversight and water conservation results from these conditions.	Water restrictions and water-related issues concerning special status species in the area of a military installation can present the perception that a military facility is at risk for expensive measures and/or litigation.

Table 11. Natural Resource Management Encroachments

**NAVAL AERIAL WEAPONS STATION CHINA LAKE**

NAWS China Lake sits within the northern portion of the California Desert ecoregion as shown in Figure 60. The facility is an important component of preserving the habitat and ecological character of the area, in part because it hosts over a million acres of habitat, but also due to the connectivity that passes through the facility from Fort Irwin NTC. The range of development activities as shown in Figure 61 presents some significant concern due to the potential impact of fragmentation that may occur. On the west side, a WWEC could bring several new transmission lines; to the south, there is significant mining activity, OHV use, and another WWEC. Suburban and scattered development is also occurring on the southwest side of the facility, which could contribute to its isolation from the broader ecology. These impacts together constitute the possibility of long-term indirect encroachment to military activities.

Of particular concern is the ongoing situation that started decades ago with the draining of Owens Lake on the northwest side of the facility—namely, the unsustainable use of water resources and its long-term impact on economic resources in the region. NAWS China Lake relies on the sustainability of the Indian Wells Valley aquifer, which is currently critically overdrafted and is subject to a regional planning effort to bring the area into compliance with the California Sustainable Groundwater Management Act of 2014. Currently, unsustainable water use, primarily from agricultural operations, is contributing to the overdrafted status of the aquifer, which may be contributing to long-term indirect encroachment on the installation

*Natural Resource Management Encroachment Grade for China Lake*

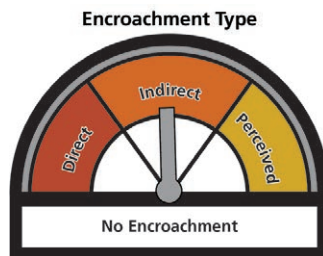
The military mission around NAWS China Lake appears to be relatively free of direct encroachment pressure. The OHV area between the north and south ranges lies directly within a mapped connectivity area and should be addressed through careful management practices. See Figure 60 for a map that describes the broad range of possible activities and their relationship with areas of military use.

The primary concern relative to the ongoing success of military operations at NAWS China Lake is the possibility of compounding indirect

encroachment related to the fragmentation and loss of ecological function of lands surrounding the facility as shown in Figure 59. Efforts should be undertaken by the BLM or appropriate jurisdictional agency to preserve as much of this connectivity as possible in order to sustain the ecological viability of the adjoining military installation and reduce the likelihood of future expensive and debilitating natural resource management requirements.

*Natural Resource Management Recommendations*

1. NAWS China Lake should continually monitor natural resource management activities and policies around the installation and keep the INRMP up to date. The approved DRECP presents new policy positions that may not be currently aligned with the installation’s management policies.
2. Management of the Mojave desert tortoise is a regional challenge shared by all installations in the California Desert. NAWS China Lake should continue to participate in planning and activities that serve to protect this important species.
3. As shown in Figure 60, connectivity to NAWS China Lake is somewhat hampered by a range of development activities. The installation should be considered and even integrated by the BLM as an important regional stakeholder in the preservation and connectivity of flora and fauna to the broader region, as it may be that current BLM management policies are insufficient to achieve this goal.
4. NAWS China Lake should remain active in the Desert Managers Group, a regular convening of regional military facilities and other interested parties around natural resource issues. These meetings should serve to identify areas of alignment and opportunities to collaborate toward mutually beneficial objectives.
5. Water resources are precious in this area of the California Desert. NAWS China Lake should continue to participate in the development of the state-mandated Groundwater Management Plan that will strive to eliminate unsustainable water use and large-scale groundwater extraction projects in the IWV and adjoining aquifers.



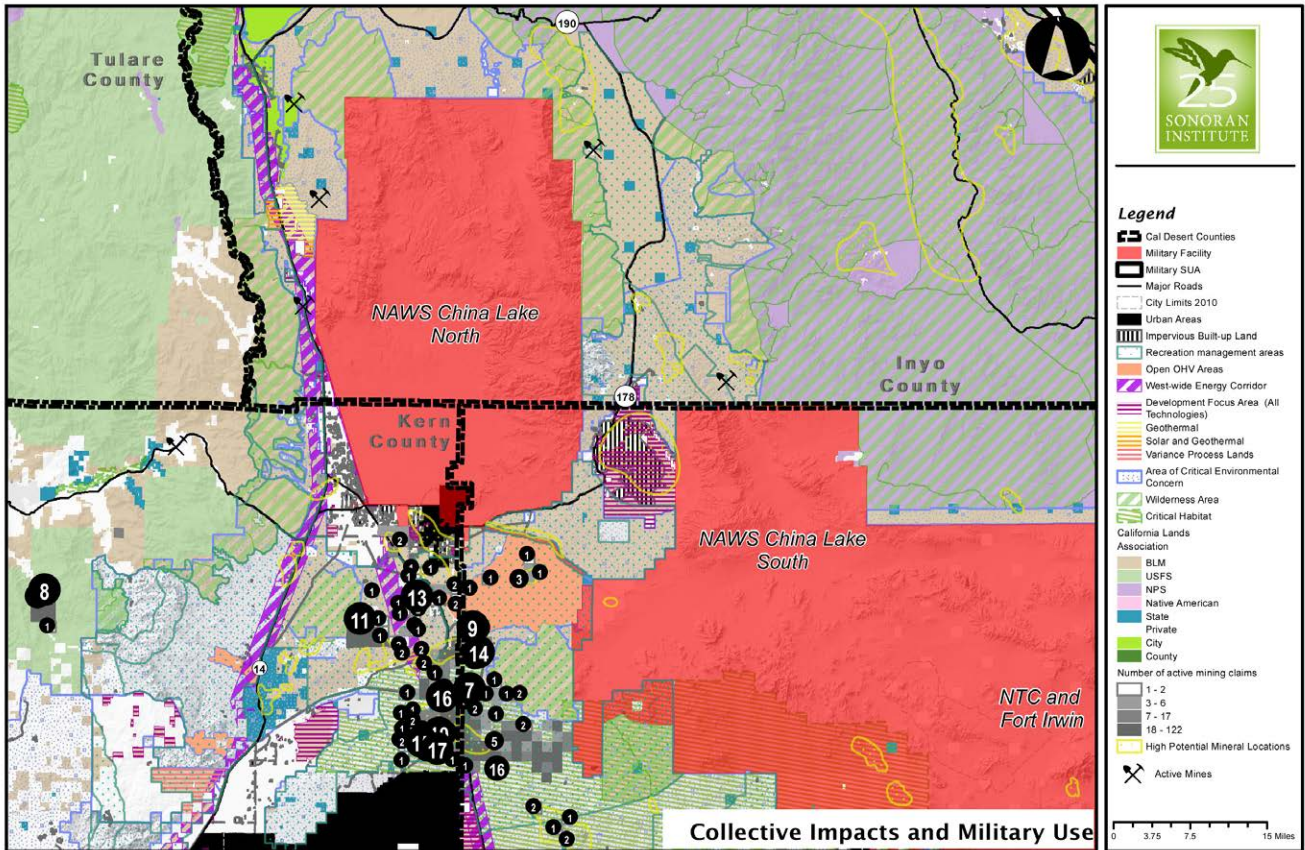


Figure 60. The range of activities around NAWS China Lake that could contribute to encroachment concerns within military use areas.

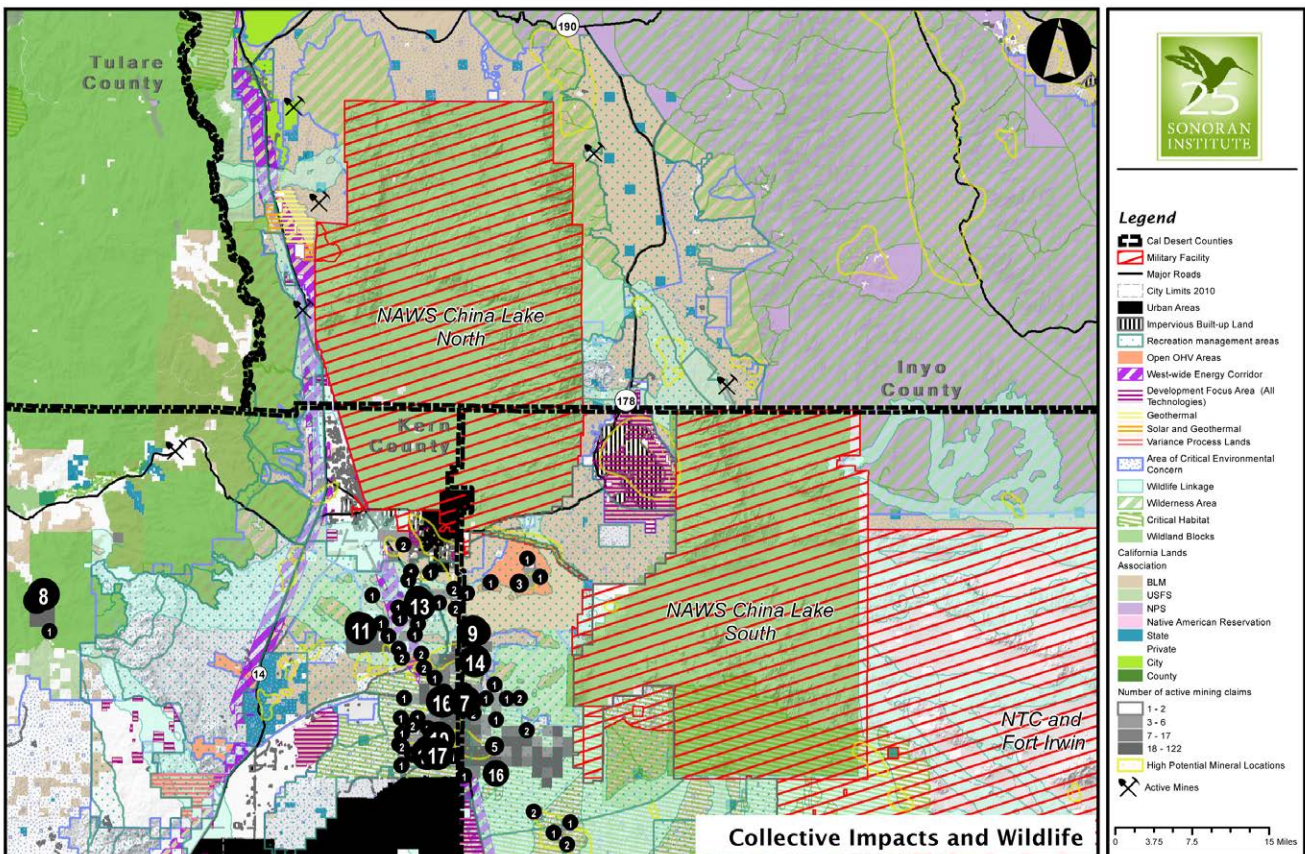


Figure 61. The range of activities around NAWS China Lake that could contribute to wildlife connectivity concerns within conservation areas.

**CHOCOLATE MOUNTAIN AERIAL GUNNERY RANGE**

The CMAGR is a steward of species of concern, threatened and endangered species, and other natural resource management obligations that are essential to maintaining a facility in the Mojave Desert landscape. The management of these resources is the responsibility of all parties in the region—the CMAGR, like other installations, would find it in their best interest to ensure that regional goals and actions are responsive to the needs of these natural resources.

*Natural Resource Management Encroachment Grade for the CMAGR*

In order to preserve the viability of the CMAGR Aerial Gunnery Range, activities should occur that enhance the viability of the landscape around the facility. Though better situated than most other California Desert facilities with respect to urban, mining, and recreation-based encroachment pressures, the facility should continue to enhance its viability by addressing the remaining concerns.

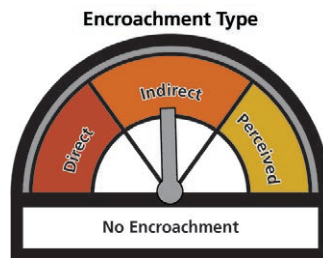
The military mission around the CMAGR appears to be relatively free of direct encroachment pressure. The possible exception is the presence of significant renewable energy development potential in areas in the vicinity of the southern boundary of the facility. Care should be taken to encourage the development of these areas to occur in a way that is compatible with ongoing mission operations. See Figure 62 for a map that describes the broad range of possible activities and their relationship with areas of military use.

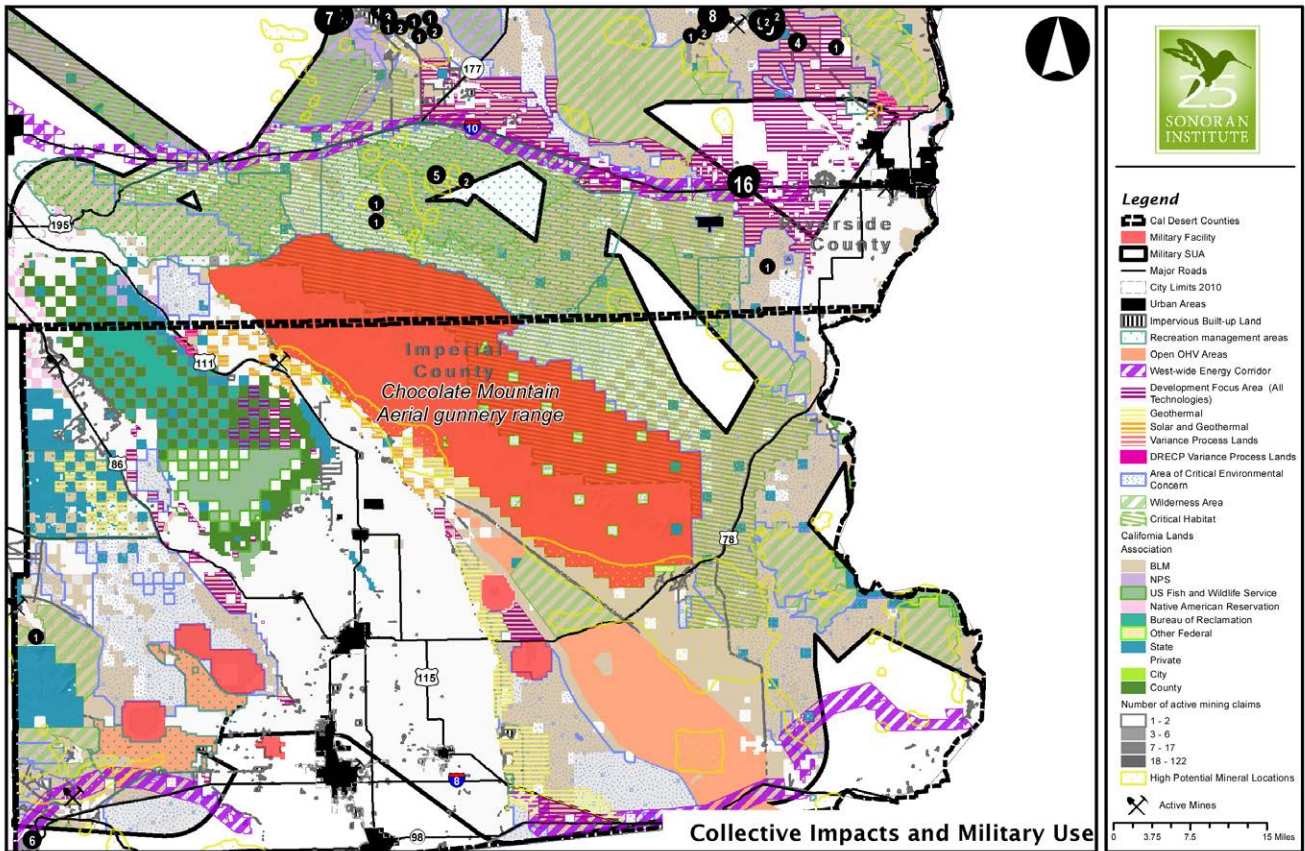
The primary concern relative to the ongoing success of military operations at the CMAGR is the possibility of compounding indirect encroachment related to the fragmentation and loss of ecological function of lands surrounding the facility. In particular, the habitat block in which the facility sits does not have particularly good connectivity due to the large agricultural operations to the west, the canal and OHV recreation area to the

south, and Interstate 10 to the north. These conditions could be further impacted by significant renewable energy development to the south and north along the interstate, as well as the potential for multiple new transmission lines. Efforts should occur that preserve as much of this connectivity as possible in order to enhance the ecological viability of the installation and reduce the likelihood of expensive and debilitating natural resource management requirements.

*Natural Resource Management Recommendations*

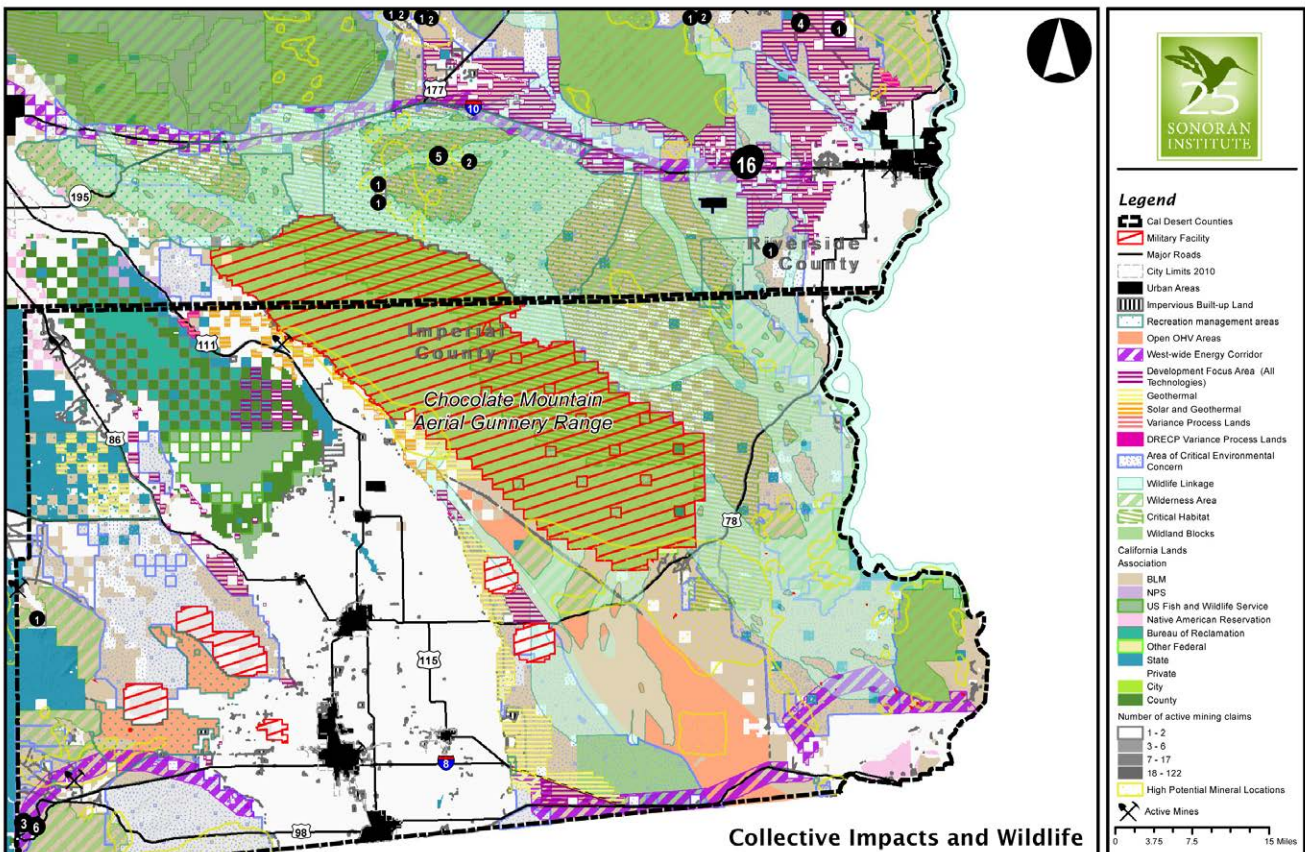
1. The CMAGR should continually monitor natural resource management activities and policies around the installation and keep the INRMP up to date. The approved DRECP presents new policy positions that may not be currently aligned with the installation’s management policies.
2. Management of the Mojave desert tortoise is a regional challenge shared by all installations in the California Desert. Marine Corps Air Station Yuma should continue to participate in planning and activities that serve to protect this important species.
3. As shown in Figure 63, connectivity to the CMAGR is somewhat hampered by a range of development activities. Marine Corps Air Station Yuma should be considered and even integrated by the BLM as an important regional stakeholder in the preservation and connectivity of flora and fauna to the broader region as current management policies may be insufficient to achieve this goal.
4. Marine Corps Air Station Yuma should remain active in the Desert Managers Group, a regular convening of regional military facilities and other interested parties around natural resource issues. These meetings should serve to identify areas of alignment and opportunities to collaborate toward mutually beneficial objectives.





Collective Impacts and Military Use

Figure 62. The range of activities around the CMAGR that could contribute to encroachment concerns within military use areas.



Collective Impacts and Wildlife

Figure 63. Some activities around the CMAGR could contribute to the fragmentation of habitat around the facility.

**EDWARDS AIR FORCE BASE**

Edwards AFB is the steward of species of concern and other natural resource management obligations that are essential to maintaining a facility in the Mojave Desert landscape. The management of these resources is the responsibility of all parties in the region—Edwards, like other bases, would find it in their best interest to ensure that regional goals and actions are responsive to the needs of these natural resources. Figure 64 identifies all the known development concerns and their relationship with military use. Figure 65 demonstrates that many of these uses are in conflict with ecological connectivity.

*Natural Resource Management Encroachment Grade for Edwards AFB*

Edwards AFB is challenged to preserve natural resources around the installation while maintaining connectivity with the broader landscape. This is critical to ensuring that the facility is not unduly burdened with the expense and complexity of managing secluded yet critical environmental resources. Should the biological connectivity of the installation be severed or should it lose a significant amount of its function, the installation may eventually see a reduction in effectiveness, an increase in expense, and become less attractive for investment and sustainment as compared to other facilities that offer a similar range of military missions.

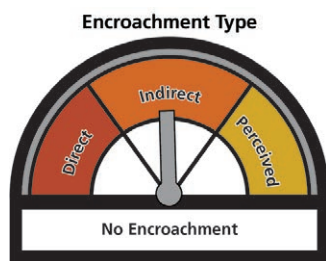
An additional and significant challenge is for Edwards AFB to retain access to important natural resources that are essential to the viability of its mission. Among these are clean air, which is maintained by mitigation of particulates and other pollution, and sufficient and reliable sources of water, which is often shared with other users. Climate change is contributing to the reduction in visibility through less vegetation, a lower amount of surface water, and other related impacts. Additionally, the challenge faced by the Colorado River basin to manage and allocate sufficient water to meet the needs of communities is extending to installations like Edwards AFB through the ongoing acquisition of groundwater rights that are transferred to sometimes remote communities. Though this

installation has a recent adjudication that solidifies its rights to a known amount of groundwater, changes in climate and the uncertainty of the actualized water distribution presents an ongoing challenge to Edwards AFB.

These issues present very indirect, yet real, encroachment concerns that need to be carefully monitored. Through careful conservation actions, engagement in policy decisions, and a vigilant proactive stance on natural resource management, Edwards AFB can preserve its long-term viability.

*Natural Resource Management Recommendations*

1. Edwards AFB should continually monitor natural resource management activities and policies around the installation and keep the INRMP up to date.
2. Edwards AFB should continue to participate in planning and activities that serve to protect the threatened Mojave desert tortoise and threatened Mohave ground squirrel.
3. As shown in Figure 65, connectivity to Edwards AFB is severely hampered by a range of development activities. The installation should be considered and even integrated by the BLM as an important regional stakeholder in the preservation and connectivity of flora and fauna to the broader region, as current management policies may be insufficient to achieve this goal.
4. Edwards AFB should remain active in the Desert Managers Group, a regular convening of regional military facilities and other interested parties around natural resource issues. These meetings should serve to identify areas of alignment and opportunities to collaborate toward mutually beneficial objectives.
5. Water resources are precious in this area of the California Desert. Edwards AFB should pay close attention to water resource issues in order to preserve water-reliant ecosystem function and the supplies needed to achieve military missions.



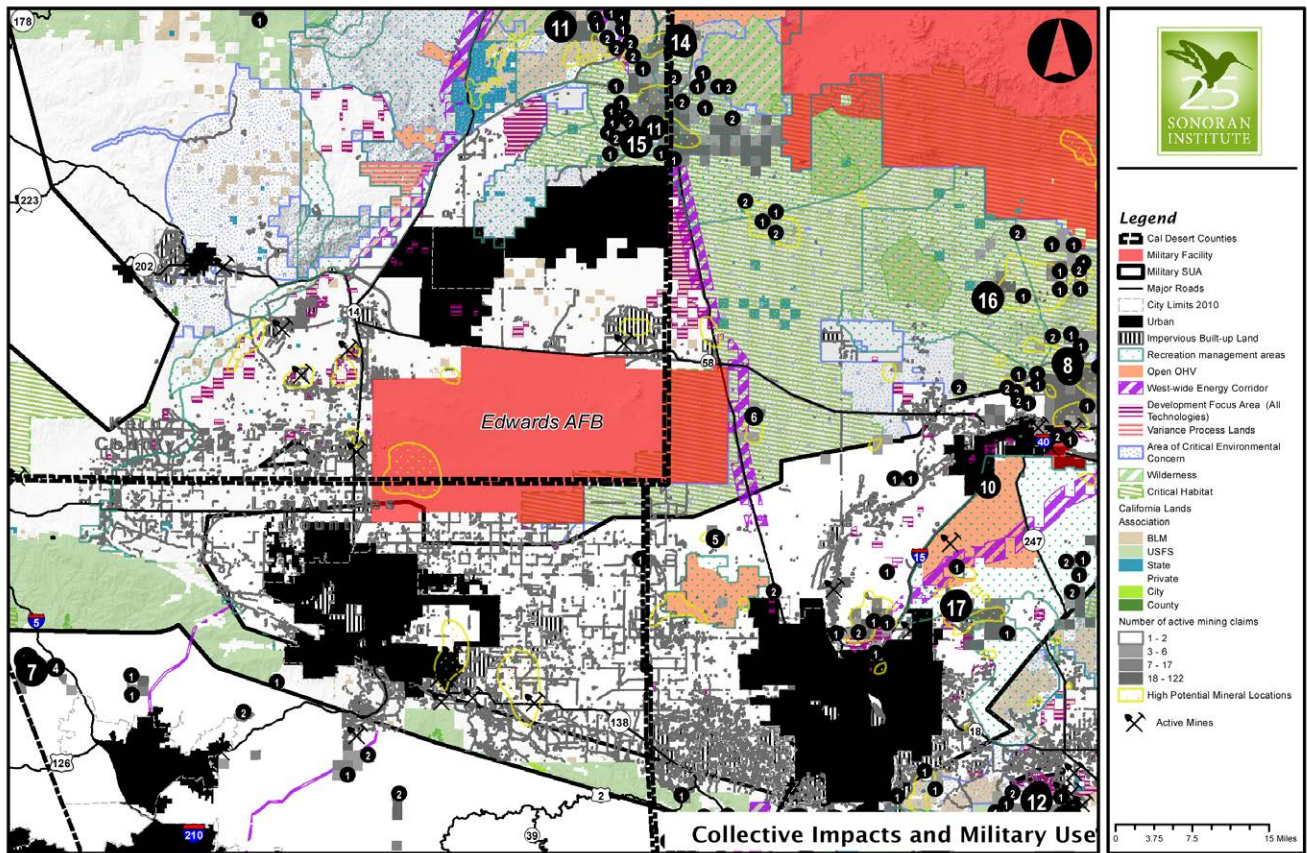


Figure 64. The range of activities around Edwards AFB that could contribute to encroachment concerns within military use areas.

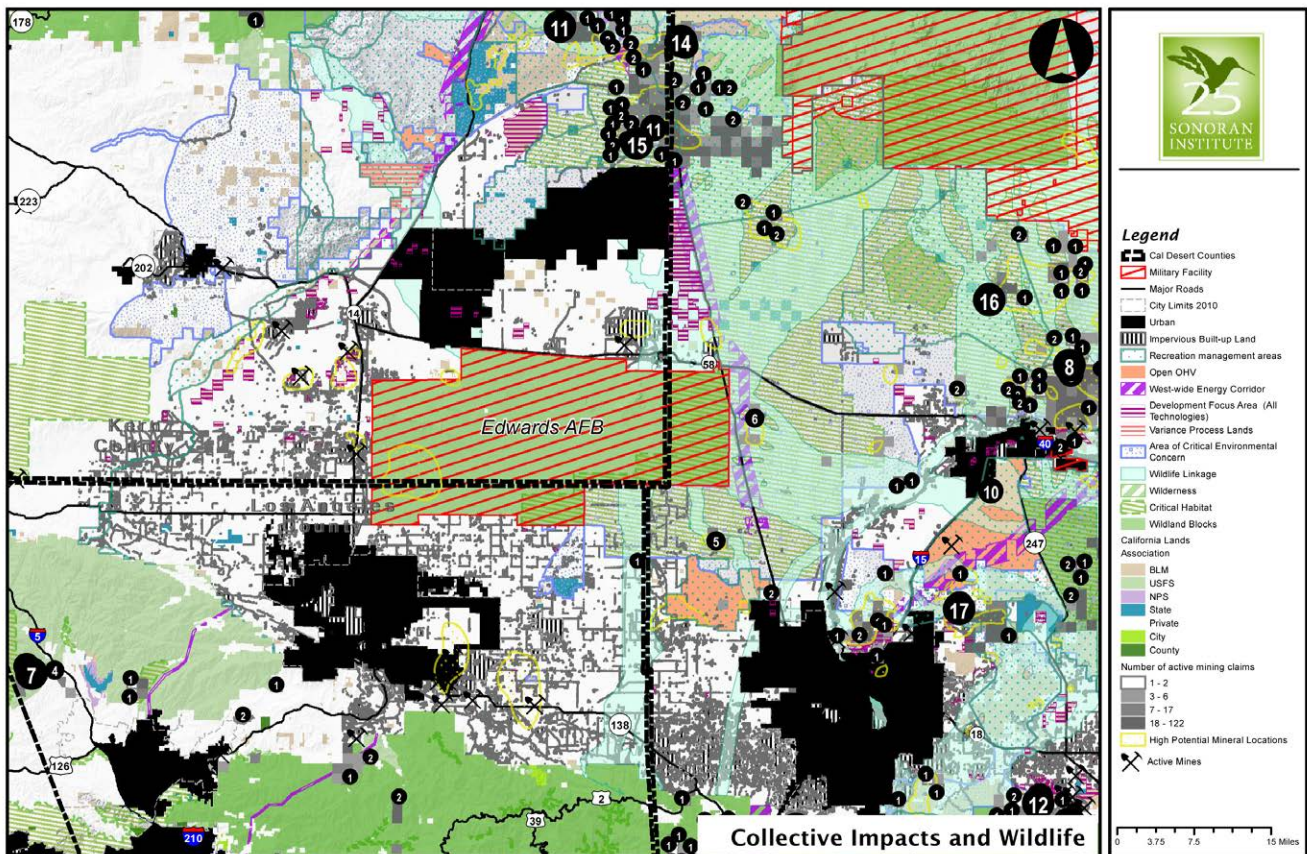


Figure 65. Collective impacts around Edwards AFB that could divide habitat.

**FORT IRWIN NATIONAL TRAINING CENTER**

Fort Irwin NTC is sheltered in a wide expanse of public lands. To the northeast is Death Valley National Park, a massive, protected landscape that shelters a variety of arid species. In the immediate vicinity, to the west, south, and east, a significant amount of unprotected federal land sits as a resource for Mojave Desert species and as a resource to provide opportunity to recreationists, tourists, and other users of the land. An additional benefit of this landscape is as an unencumbered and open area for military activities to occur. This landscape is covered with airspace designated for military use, including many MTRs and SUAs with a variety of dedicated activities within them.

Figure 67 identifies all of the anticipated areas where development activities may occur in the immediate area around Fort Irwin NTC. It appears that these activities could present, over time, both direct and indirect pressures to ongoing military activities. Of particular interest is a WWEC and mining activity to the south and east that could present challenges to preserving the military missions that rely on this landscape.

Figure 66 identifies the broad ecological landscape around Fort Irwin NTC and points to various areas of future or current fragmentation that could, over time, contribute to the loss of ecosystem function in the area. These areas of concern are largely to the south and east due to transmission line development and mining activity.

*Natural Resource Management Encroachment Grade for Fort Irwin*

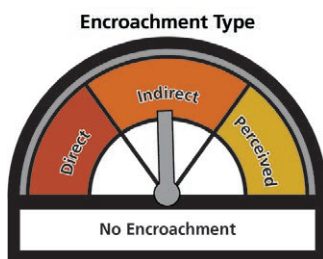
Though Fort Irwin National Training Center is among the most naturally protected military facilities in the California Desert region with federal lands on four sides, there are several concerns that have been discussed in this report (Figure 66). These include activities like OHV use, renewable energy development, and mining, which could cause indirect impacts to the military mission primarily by contributing to the loss of ecosystem function and connectivity of the broader landscape as shown in Figure 67. In general, however, these impacts remain slight and will likely not present any immediate concern due to the presence of protected lands at Death Valley National Park.

By using tools like JLUS and INRMPS, Fort Irwin NTC can engage in a dialogue with land managers and municipalities within the area of military operations. These activities will promote compatible management practices and reduce the likelihood of development activities that may be in conflict with military interests.

It may be that the real challenge, like with other facilities in this region, lies in protecting against encroachment pressures from afar. In the past, water use in the southern California cities has presented a serious concern to interests in this part of the California Desert Region. With the continuing concern around the Colorado River water resources, and the possibility of less surface water moving to urban areas in the Southwest, groundwater in remote areas could become a source of a new threat to military missions. Recent adjudications in this area have been promising, as Edwards AFB was able to secure an adequate amount of water to meet foreseeable need—however not all installations will be as successful, nor is it possible to predict whether future actions will preserve these water resources. It is imperative that Fort Irwin NTC remain vigilant in preserving its resources.

*Natural Resource Management Recommendations*

1. Fort Irwin NTC should continually monitor natural resource management activities and policies around the installation and keep the INRMPS up to date. The approved DRECP presents new policy positions that may not be currently aligned with the installation’s management policies.
2. Management of the Mojave desert tortoise is a regional challenge shared by all installations in the California Desert. Fort Irwin NTC should continue to participate in planning and activities that serve to protect this important species.
3. As shown in Figure 67, connectivity to Fort Irwin NTC is somewhat hampered by a range of development activities. The installation should be considered and even integrated by the BLM as an important regional stakeholder in the preservation and connectivity of flora and fauna to the broader region, as current management policies may be insufficient to achieve this goal.
4. Fort Irwin NTC should remain active in the Desert Managers Group, a regular convening of regional military facilities and other interested parties around natural resource issues. These meetings should serve to identify areas of alignment and opportunities to collaborate toward mutually beneficial objectives.
5. Fort Irwin NTC should pay close attention to water resource issues in order to preserve water-reliant ecosystem function and the supplies needed to achieve military missions.





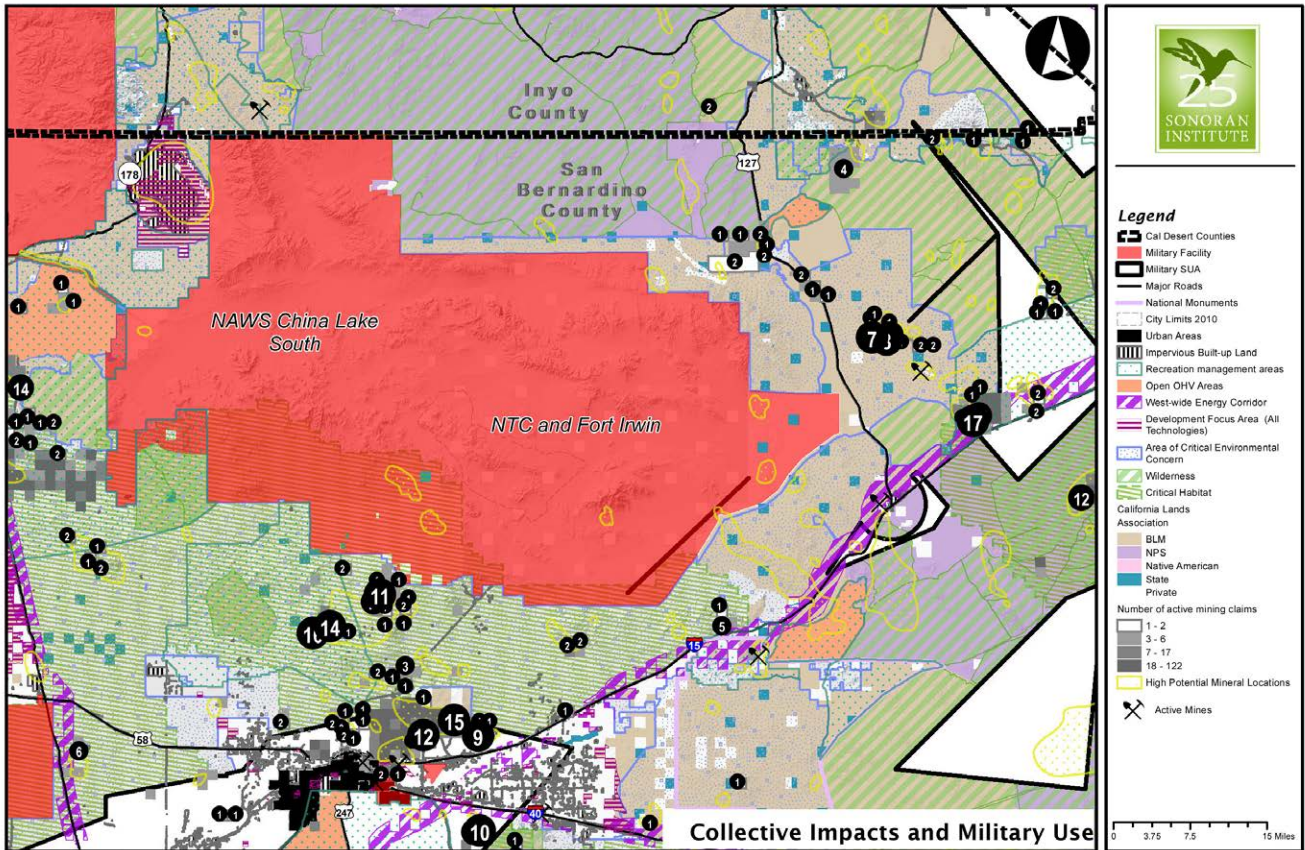


Figure 66. The range of activities around Fort Irwin NTC that could contribute to encroachment concerns within military use areas.

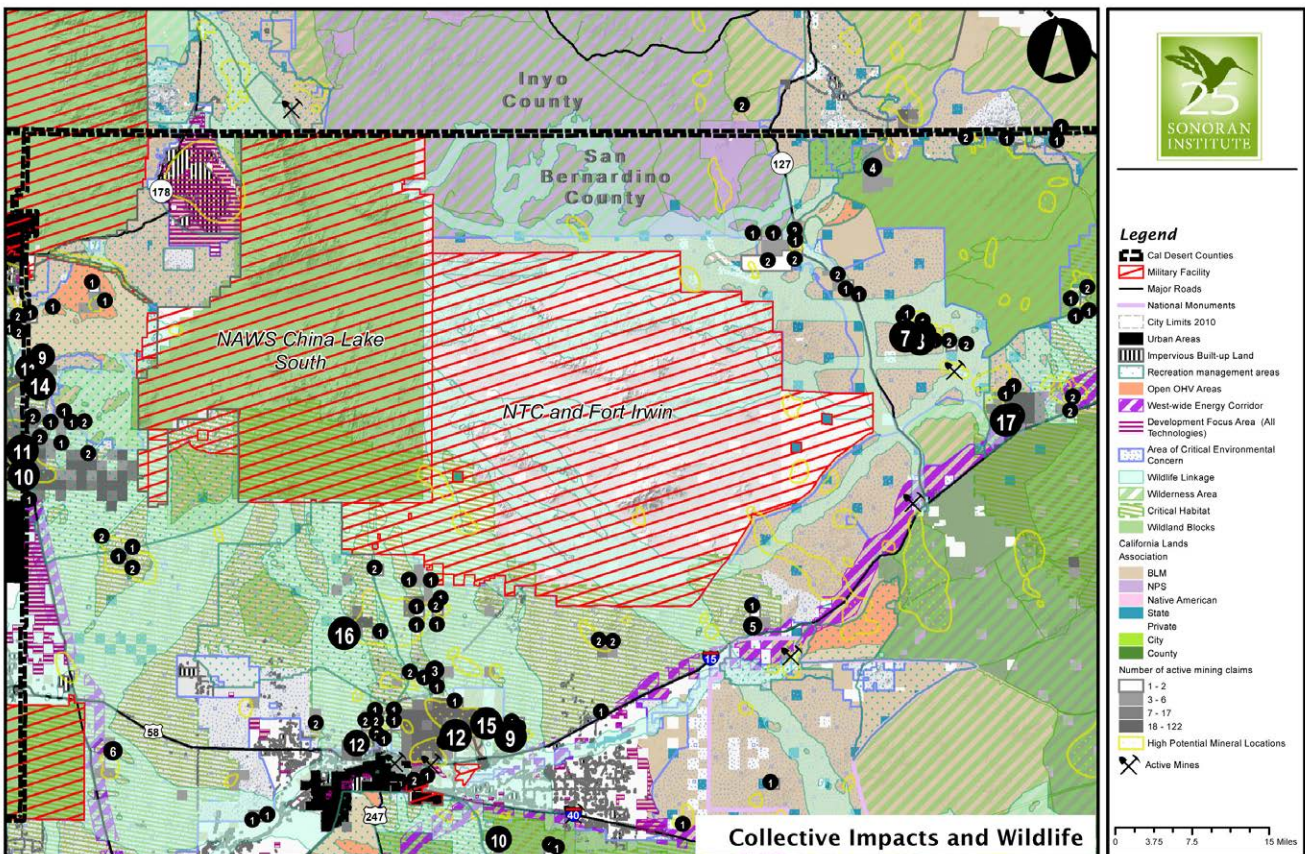


Figure 67. Wildlife connectivity and conservation areas around Fort Irwin NTC have limited expected impact from development activities.

**MARINE CORPS AIR GROUND COMBAT CENTER  
TWENTYNINE PALMS**

On MCAGCC 29 Palms, the facility takes special care of the Mojave desert tortoise which is protected by the Endangered Species Act. At the installation, an on-site Tortoise Research and Captive Rearing Site (TRACRS) has been established to enhance the population size and health of this key California Desert species. Figure 68 identifies the collective impacts of potential future development actions and their association with military uses. Figure 69 demonstrates that these activities conflict with many connectivity areas around MCAGCC 29 Palms.

*Natural Resource Management Encroachment Grade for the MCAGCC 29 Palms*

MCAGCC 29 Palms has exercised leadership in the region with their participation in conservation actions, including a Mojave desert tortoise breeding program and preservation of wildlife corridors through the Morongo Basin Conservation Priorities Group. In order to preserve ecological integrity and prevent additional encroachment risks, MCAGCC 29 Palms has been successful in securing funds from the REPI program to purchase high-priority conservation lands within wildlife corridors as a way to prevent continued development into connectivity lands for the Mojave desert tortoise and other key species. While this action is ongoing, conservation of wildlife corridors on private lands south of the installation is very tedious and complicated, since the rights of private landowners must be respected, and purchases are very expensive. Wildlife connectivity around MCAGCC 29 Palms is essential to the long-term viability of the installation and should remain a significant focus of long-term encroachment management planning.

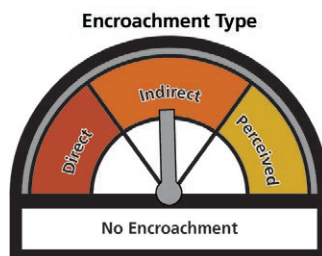
Wildlife connectivity occurs all around MCAGCC 29 Palms facility. Unfortunately, some of these corridors are at risk due to development pressures that are foreseeable in the region. Figure 69 identifies the location and type of these impacts, demonstrating that much of the connectivity for important Mojave Desert plants and wildlife is threatened to some degree. In many areas around the installation, mining activity occurs and there are areas of significant mining claims. On the southwest edge of the facility are two designated OHV areas that could impair connectivity and propagate invasive species into key ecological corridors. To the north of MCAGCC 29 Palms there is mining activity and a West-Wide Energy Corridor that could impair the viability of connections to the Mojave National Preserve. With all of these concerns, the recent designation of the Mojave Trails and Sand to Snow National Monuments provides some assurance that natural resources in the area will be protected into the foreseeable future.

In order to address this challenge, action needs to be taken to ensure the permanent connectivity

of MCAGCC 29 Palms to the broader ecological network. Table 5 identifies tools that can be used for this purpose, and recently, members of Congress, including Senator Feinstein and Congressman Cook, have proposed conservation protections for land near the facility that could provide an essential buffer area for wildlife while preventing the planned development of some likely impacts. Some of these proposed actions were implemented when President Barack Obama, under the Antiquities Act of 1906, established three national monuments on February 12, 2016, as shown on Figures 68 and 69. These actions should provide additional buffer spaces, especially the Mojave Trails National Monument which preserves the wildlife connectivity from MCAGCC 29 Palms to the Mojave National Preserve to the northeast.

*Natural Resource Management Recommendations*

1. MCAGCC 29 Palms should update the INRMP in association with the BLM's development of Range Management Plans (RMPs) for the new Sand to Snow and Mojave Trails National Monuments. The INRMP update will support the long-term protection of natural resources both on and off MCAGCC 29 Palms.
2. Management of the Mojave desert tortoise has presented a significant challenge for MCAGCC 29 Palms in the recent past, including significant public scrutiny and expense. While the protection of additional habitat in the recently designated national monuments should provide support for the ongoing conservation of this species, MCAGCC 29 Palms should continue to be a leader in the desert tortoise's conservation, including through identifying additional mitigation measures that serve to increase the population of breeding adults in the wild. The success of the Desert Tortoise Natural Area near California City could be replicated on lands owned and managed by the Department of Defense. Underutilized DoD land that is suitable habitat for the desert tortoise could be set aside for a natural preserve and managed for the sustainability of this important species.
3. The RMP for the Mojave Trails National Monument needs to be developed as soon as possible. MCAGCC 29 Palms and surrounding communities should support the BLM as they develop the RMP in order to prevent additional degradation and incompatible uses in the area.
4. MCAGCC 29 Palms should remain active in the Desert Managers Group, a regular convening of regional military facilities and other interested parties around natural resource issues. These meetings should serve to identify areas of alignment and opportunities to collaborate toward mutually beneficial objectives.



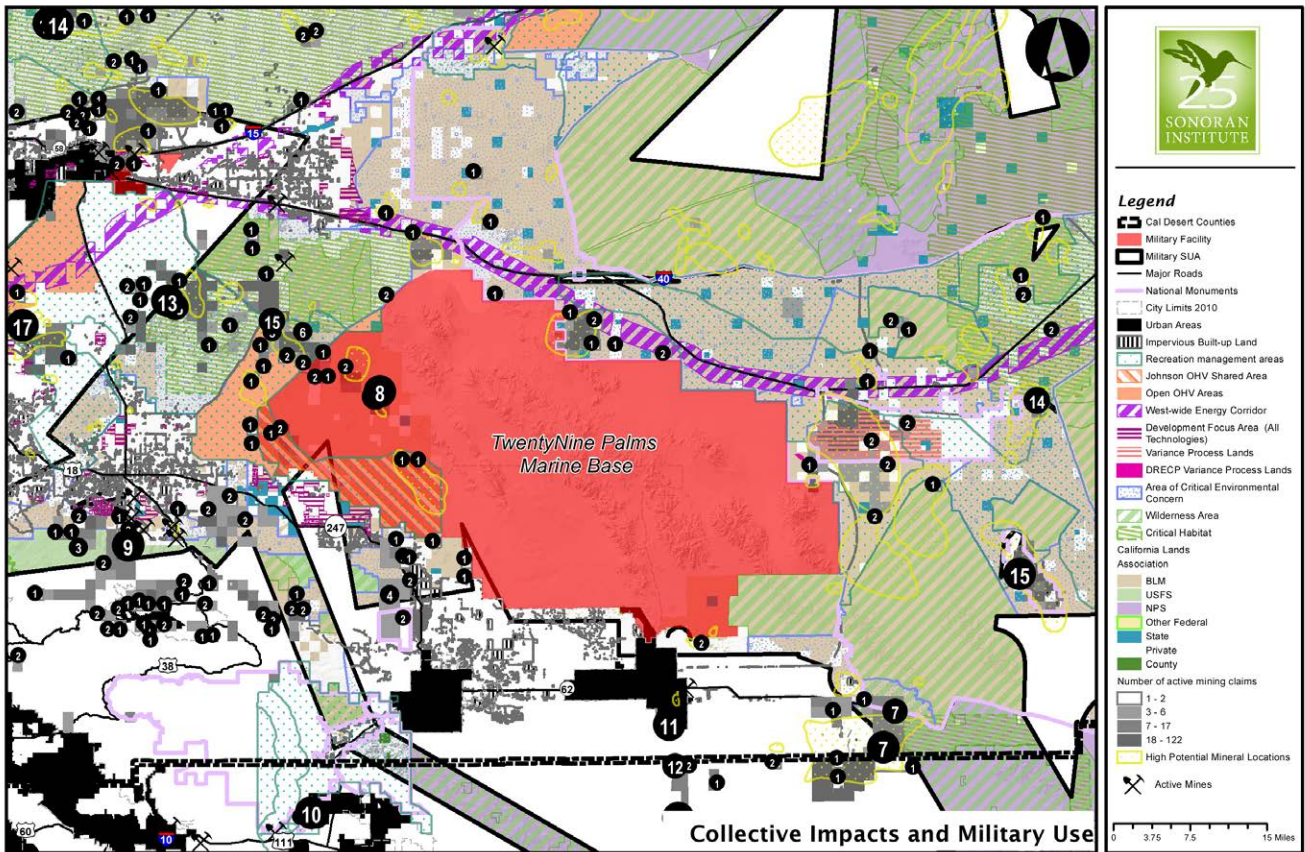


Figure 68. The range of activities around the MCAGCC 29 Palms that could contribute to encroachment concerns within military use areas.

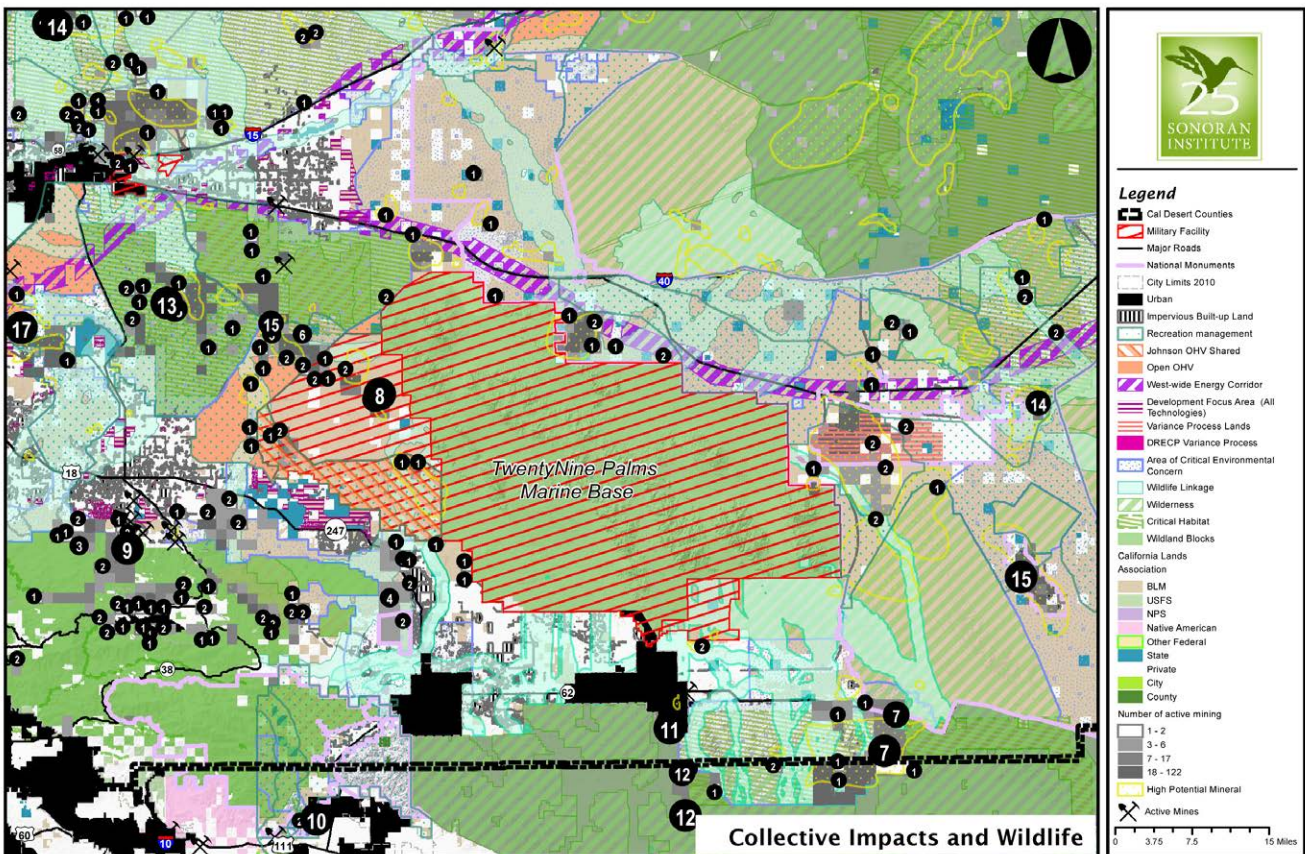


Figure 69. Collective impacts around the MCAGCC 29 Palms that could divide habitat.

## RECOMMENDATIONS

The enduring viability of the missions of military facilities in the California Desert Region is dependent upon the vigilance of the military and the timely responsiveness of the surrounding community in identifying and resolving threats to military operations and effectiveness. In this report, we have highlighted areas where attention should be prioritized in order to proactively address potential conflicts at the earliest possible opportunity. The following recommendations respond to the findings of this report and should be used to advise the military and interested stakeholders in addressing and resolving encroachment pressures.

### CREATE AND IMPLEMENT COLLABORATIVE LAND USE PLANS

Planning processes such as JLUS and INRMPs are great collaborative tools to help protect military facilities and missions from encroachment. A JLUS is a collaborative planning document that connects military training needs and facilities with the planning efforts of nearby municipalities to reduce the risk of unforeseen encroachment pressures. INRMPs work with government land managers and natural resource agencies to ensure alignment with management objectives across federal and state programs. These plans are, however, merely exercises in futility if they do not result in actions on the ground that proactively remove encroachment pressures. Recognizing this, some military facilities are working to go beyond planning by strategizing action plans that seek to implement the recommendations of the planning processes. A good example is the Kirtland Air Force Base JLUS Study Implementation Project which identified the actions that were recommended by the JLUS and held the appropriate agencies accountable to put the plan into action. By using Memorandums of Understanding and other tools, many of the recommendations were implemented.

*Recommendation 1: Establish a collaborative planning process to create a JLUS and keep the INRMP up to date:*

Generally, military facilities have a strong collaborative relationship with surrounding communities, and demonstrate the integration of planning activities and proactive attention to encroachment identification and resolution. A JLUS would be helpful in ensuring that land use policy and development practices support the long-term viability of installations. Additionally, the INRMPs should remain up to date and responsive to the changing boundaries of the facility and the changing dynamics of management policy surrounding facilities. With the designation of national monuments nearby, the INRMPs need to respond to the change in resource management strategies that will result from this conservation action.

In the event that an INRMP is in place, the military should be considered an important stakeholder and partner in these processes. In other cases, such as the development of the RMP for the Mojave Trails and Sand to Snow National Monuments, the military was actively engaged as a cooperating agency. As an additional opportunity, the California Desert Biological Conservation Framework (CDBCF) was published in 2016 that provides a framework in which private lands can be considered for conservation in pursuit of regional goals.

*Recommendation 2. Create and implement action plans:*

Action plans should be developed for management objectives under a JLUS and/or INRMP. Without action and/or implementation timelines, results may not occur in a timely way. The Kirtland AFB in New Mexico, in cooperation with the regional planning authority, has created a model implementation report that could act as a framework for this approach. It is available at [http://www.mrcog-nm.gov/images/stories/pdf/land/Kirtland\\_Study/JLUS-Implementation\\_Report-Closeout.pdf](http://www.mrcog-nm.gov/images/stories/pdf/land/Kirtland_Study/JLUS-Implementation_Report-Closeout.pdf).

### BE VIGILANT

In many cases, development plans occur without notice to military officials who seek to preserve the viability of an installation or mission. Though federal and some state agencies are required to coordinate when actions occur in certain areas, many encroachment pressures have occurred where municipalities did not provide adequate notice or solicit input from the affected military installation.

*Recommendation 3. Installation liaisons should establish relations with appropriate land use jurisdictions and communicate concerns effectively:*

Each military facility should maintain a liaison to communicate with incorporated cities and towns, counties, and government agencies responsible for reviewing and approving actions that could create encroachment pressures. The liaison should communicate regularly with these agencies, consider the pursuit of planning materials like JLUS documents, and should be prepared to provide input on proposed actions that could occur at a moment's notice. Likewise, land use authoritative agencies and natural resource management agencies should incorporate relevant information into their planning maps to ensure that compatibility is considered when projects are reviewed.

If deemed prudent, independent advocacy groups should be established for each facility in order to support policies and actions that will address encroachment concerns. These groups can act to protect the facility in ways that are prohibited by enlisted personnel and employees of the military.

*Recommendation 4. Train decision makers:*

Decision makers in communities around military installations, along with the relevant military community, should be trained to identify the full extent of the military operating areas and have a thorough understanding of the concepts of direct, indirect, and perceived encroachment. These training activities are essential in order to promptly and accurately identify pressures that could impact a military facility. Training may be accomplished by reviewing plans, discussing possible concerns, and ensuring a direct line of communication.

### BROADEN THE ADVOCACY NETWORK

Certain advocacy efforts around the West have been very successful in developing a broad installation of proponents to preserve the military mission. Among the success stories are the Fighter Country Partnership and the broadly adopted "Luke Forward" campaign that have resulted in impressive proactive

measures to preserve Luke AFB in Glendale, Arizona. Similar actions are needed in California to address encroachment pressures that occur both near and far from urban areas. In particular, action is needed to promote threat reduction on federal lands where few businesses and city officials find alignment with their interests

### *Recommendation 5. Support the Desert Managers Group:*

In the California Desert Region, the Desert Managers Group (DMG) was established as a forum to proactively address natural resource issues that occur on and off of military facilities. We recommend that facilities strengthen their support and participation in this forum. Efforts to expand participation should occur, with emphasis toward regional conservation players who can share information, discuss emerging topics, and brainstorm solutions for long-term natural resource challenges. Within the Cal Desert region, the Desert Managers summit is an excellent best practice for collaboration across facilities, government entities, and with the conservation community. Care should be taken to ensure that all partners are finding value and are remaining engaged in the dialogue.

### *Recommendation 6. Allow creative tool implementation:*

Identified in this report are various tools to reduce the risk of encroachment on military facilities and missions. Some of these tools, including the use of land exchanges and federal land designations, are creative approaches that may spur controversy among stakeholders who are close to the issue. Though the military may not always be able to lead these efforts, this type of collaboration should be welcomed by the military community and supported to the extent that it provides value to the facility and can occur within the bounds of military policy. With matters where the military cannot participate, non-profit advocacy groups, among many others, can comfortably speak for the best interest of the mission and the personnel of the installation in support of mutually beneficial solutions. Examples include advocacy groups like Fighter Country Partnership (Luke AFB) and Huachuca 50 (Fort Huachuca).

As an example of a creative tool to address encroachment issues, the Arizona Sonoran Desert Heritage Act of 2015 began as an attempt to protect natural lands on the western edge of Phoenix to primarily preserve natural and cultural resources with conservation designations. Recognizing the value of the proposal for preservation of flight paths in and out of the Barry M. Goldwater Range, Fighter Country Partnership, along with other community leaders with military acumen, supported the plan. With similar collaboration across the diverse sectors of California, it is possible to see new approaches that will serve to preserve military facilities without significant time and energy needed from military officials

## CONCLUSION

Since the year 2000, the Sonoran Institute has pursued initiatives that recognize the economic significance of military installations in the West and the inherent challenges involved in managing secure defense operations in the desert environments. The U.S. military's indirect contributions to ensuring the protection of California's unique natural legacy for future generations are also laudable. In order to preserve the integrity and economic impact of the military missions within this region, management actions are urgently needed to preempt any adverse decisions that can affect the efficiency of future military operations in California.

This report evaluated various scenarios in which encroachments on military operations have occurred or could occur in the foreseeable future and how they can be resolved with the involvement of the diverse community of both military and civilian stakeholders. We also recognize that other public agencies could do more to facilitate the military's operations by reducing the amount of attention facilities must pay to natural resource management as a result of ecological mismanagement or degradation outside of their facility.

The three forms of intrusion to military operations are the following: (1) Direct Encroachment; (2) Indirect Encroachment, and (3) Perceived Encroachment. In future years, additional complexity is likely to contribute to impairment of military installations across the West. Creative tool application that involves all land owners and managers is necessary to resolve challenges across the military landscape. In many cases, encroachments involving issues that are unrelated to the military mission will occur. Under these circumstances, the broader community needs to be vigilant in considering actions that will resolve encroachment pressures proactively. Currently, practical tools to resolve all pressures may not exist, requiring creativity and the use of unlikely collaborations to develop mutual wins. Anticipating future impairments will allow the community to respond before threats become significant direct, indirect, or perceived encroachments and impair the military mission in the California Desert.

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## Evaluating Encroachment Pressures On The Military Mission In The California Desert Region

This report explores the encroachment analysis structure that was recently published in the Sonoran Institute report *Mutual Benefit: Preserving Arizona's \$9 Billion Military Mission and the Role of Publicly-Owned Lands (2015)* for Arizona, and how this framework and analysis can apply to California's military industry. In general, we conclude that effective natural resource management in this region is critical to preserving the military mission at five significant military facilities in the desert region of California.



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