# Integrated Natural Resources Management Plan

# Fiscal Years 2018 through 2022

Marine Air Ground Task Force Training Command
Marine Corps Air Ground Combat Center
Twentynine Palms, California

2018

Marine Air Ground Task Force Training Command
Marine Corps Air Ground Combat Center

Twentynine Palms, California

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

FISCAL YEARS 2018-2022

---

**Approval**

This Integrated Natural Resources Management Plan meets the requirements of the Sikes Act (16 USC 670a *et seq.*) as amended.

**Commanding General**
**Marine Air Ground Task Force Training Command**
**Marine Corps Air Ground Combat Center**

Marine Air Ground Task Force Training Command
Marine Corps Air Ground Combat Center

Twentynine Palms, California

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

FISCAL YEARS 2018-2022

---

## Endorsement

This Integrated Natural Resources Management Plan meets the requirements of the Sikes Act (16 USC 670a *et seq*.) as amended.

---

**G. Mendel Stewart**
**Field Supervisor, Palm Springs Fish and Wildlife Office**
**United States Fish and Wildlife Service**

Marine Air Ground Task Force Training Command
Marine Corps Air Ground Combat Center

Twentynine Palms, California

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

FISCAL YEARS 2018-2022

---

## Endorsement

This Integrated Natural Resources Management Plan meets the requirements of the Sikes Act (16 USC 670a *et seq*.) as amended.

---

**Leslie MacNair,**
**Regional Manager, Inland Desert Regions**
**California Department of Fish and Wildlife**

# EXECUTIVE SUMMARY

## Purpose

The purpose of this Integrated Natural Resources Management Plan (INRMP) is to prescribe targeted natural resources management strategies that sustain military mission readiness at the Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center (MAGTFTC MCAGCC, herein referred to as the "Combat Center" or the "installation"). The INRMP provides a strategy for Natural Resources Management across both the legacy lands and expansion areas of the Combat Center for Fiscal Years 2018 – 2022. Implementation of this INRMP ensures military mission readiness by maintaining compliance with all applicable natural resources laws, sustaining the quality of training lands over time, and facilitating natural resources management in a manner that is consistent with Marine Corps federal stewardship requirements. Use of this INRMP fulfills statutory requirements under the Sikes Act Improvement Act (SAIA), Public Law 105-85, Div. B Title XXIX, Nov. 18, 1997, 111 Stat 2017-2019, 2020-2033, which requires the Secretaries of the Army, Air Force, and Navy to prepare and implement INRMPs for each military installation. This INRMP also meets requirements under Marine Corps Order 5090.2A and Combat Center Order 5090.1F to maintain installation compliance with environmental law.

The SAIA requires wildlife regulators, sovereign Native American Nations, and the public be engaged in the development of this INRMP. The Combat Center has cooperated with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW) throughout the development of this Plan and agency signatures reflect the mutual agreement of these parties that the identified actions fulfill requirements concerning the conservation, protection, and management of natural resources on the Combat Center. The Combat Center also consulted with seven regional Native American Tribes, as well as a variety of public interest groups. As a public document, the INRMP provides an opportunity to foster goodwill for the Combat Center, the U.S. Marine Corps, and the Department of Defense (DoD) throughout the Mojave Desert.

## Goals and Management Initiatives

The 2018 – 2022 INRMP presents a streamlined version of the goal-driven framework of the Natural Resources Program, integrating management initiatives under the programmatic Elements and Objectives and updating ongoing and planned activities to meet current priorities. Programmatic Goals and initiatives are summarized below, described in Chapter 4, and scheduled in the 5-Year WorkPlan.

### Goals

1. Strengthen the Combat Center's operational capabilities;
2. Support natural systems on the landscape;
3. Manage federally protected species;
4. Support other uses and engagement.

**Initiatives**

- Protect sensitive natural resources areas;
- Manage and monitor desert tortoises to ensure compliance with the Endangered Species Act;
- Manage and monitor Migratory Birds to ensure compliance with the Migratory Bird Treaty Act;
- Manage and monitor for Golden Eagles to ensure compliance with the Bald and Golden Eagle Act;
- Use science-based monitoring to inform the management of floral and faunal resources;
- Inform Marines and others in the Combat Center's community about the value of natural resources and the various means to conserve them;
- Support Mojave Desert regional initiatives;
- Use remote sensing and Geographic Information Systems to facilitate natural resources management;
- Implement an ecosystem management philosophy that conserves biodiversity;
- Regularly assess the need for a Wildfire Management Plan and invasive species management priorities;
- Use National Environmental Policy Act (NEPA) to inform conservation decisions pertaining to natural resources;
- Protect cultural resources while managing natural resources.

## Document Organization

The INRMP is organized as follows:

- Chapter 1 describes the purpose and need for the INRMP, lists compliance requirements, details the management philosophy, describes regional programs, details the interagency and public review and endorsement process, and summarizes the program structure and reporting process.
- Chapter 2 details area land use, the formation and growth of the installation, the military mission, and key relationships between the military mission and the Natural Resources Program.
- Chapters 3 describes the physical environment of the installation and natural features that may be impacted by the military mission.
- Chapter 4 reviews the Natural Resources Management Program including specific goals, elements, and objectives, as well as resources available to implement the program.
- Appendix A presents a 5-Year Workplan summarizing all actions necessary to achieve the Natural Resources Program mission. The workplan assigns priority levels to tasks, identifies implementation leads, and presents a tentative implementation schedule. Since not all of the actions require funding, a separate summary of anticipated budget requests is also included.
- Appendix B presents the Environmental Assessment performed to ensure NEPA compliance.
- Appendix C presents all plant species documented aboard the installation.
- Appendix D presents all wildlife species documented aboard the installation.
- Appendix E presents Desert Tortoise Contact Flowcharts that outline what Marines should do when a tortoise is encountered in the field.

- Appendix F presents the Bird Nest Response Matrix that outlines what authorized staff can do with bird nests on buildings and vehicles.
- Appendix G presents the Department of the Marine Corps Letter of Instruction on Depredation of Predators.

## Implementation Monitoring

INRMP implementation will be evaluated in five ways:

- Annual progress reporting to Headquarters Marine Corps (HQMC), USFWS, and CDFW;
- Annual updates to the 5-Year Workplan in coordination with USFWS and CDFW;
- Interim Environmental Compliance Evaluations (ECE) by Combat Center;
- Formal ECE by Headquarters Marine Corps every three years;
- Formal INRMP revisions every 5 years.

## Costs and Benefits

The cost to implement this INRMP is estimated at $37,426,291 for Fiscal Years (FY) 2018-2022. Funding will be primarily from Operations and Maintenance Marine Corps Funds. Budgets will be adjusted annually, as needed. Not included in the estimate are costs specific to water and air quality management, pest management, pollution prevention, range maintenance activities, and in-house salaries. The Natural Resources Management Program ensures compliance with environmental law, provides prudent stewardship of natural resources, and is unlikely to be a significant financial burden the military mission.

**TABLE 4-2 Summary Budget Request for Natural Resources Across FYs 2018-2022**

| | FY 18 | FY 19 | FY 20 | FY 21 | FY 22 |
|---|---|---|---|---|---|
| **COLS 3 Totals** | $ 9,832,048 | $ 9,000,194 | $ 8,413,924 | $ 4,155,280 | $ 4,622,445 |
| **COLS 2 Totals** | $ 599,600 | $ 243,500 | $ 109,000 | $ 337,100 | $ 113,200 |
| **COLS 1 Totals** | $ - | $ - | $ - | $ - | $ - |
| ***Total Request*** | ***$ 10,431,648*** | ***$ 9,243,694*** | ***$ 8,522,924*** | ***$ 4,492,380*** | ***$ 4,735,645*** |

The budget is skewed towards COLS 3 and 2 priorities due to funding limitations. Costs for most but not all projects have been estimated; five projects are outstanding and shall be costed closer to the date of scheduled implementation.

### Military Mission Benefits

Implementation of this INRMP will maintain quality training lands, enhancing mission realism. The prescribed planning process used to develop the strategy presented for natural resources conservation will maintain further reduce maintenance costs, improve the capability for long-range planning, and reduce or avoid encroachment on the military mission from potential natural resources conflicts.

### Environmental Benefits

This INRMP provides the basis for the conservation of natural resources through various tasks that help reduce vegetation loss and soil erosion caused by military activities. Projects will conserve biodiversity and reduce the potential for environmental pollution. Plan implementation will increase overall knowledge of the environment of the Combat Center as well as the regional ecosystem through surveys, monitoring and research.

### Other Benefits

The Combat Center environmental image, both internal and external to DoD, will be enhanced. Environmental awareness of individual Marines will be increased while training at the Combat Center. INRMP implementation will decrease long-term environmental costs and reduce personal and installation liabilities from environmental noncompliance.

# TABLE OF CONTENTS

1.0 OVERVIEW ..... 1-1
1.1 Purpose and Need ..... 1-1
1.2 Scope ..... 1-11
1.3 Authority ..... 1-2
1.4 Responsibilities ..... 1-4
1.4.1 Internal Stakeholders ..... 1-4
1.4.2 External Stakeholders ..... 1-7
1.5 Management Strategy ..... 1-10
1.6 Stewardship and Compliance ..... 1-111
1.7 Integration of Internal and External Plans ..... 1-12
1.7.1 Combat Center Master Plan ..... 1-122
1.7.2 Combat Center Order 3500.4K - Range, Training Area, and Airspace Programs .. 1-122
1.7.3 Programmatic Agreement and Integrated Cultural Resources Management Plan .... 1-122
1.7.4 Desert Tortoise Recovery Plan ..... 1-13
1.7.5 California Desert Conservation Area Plan ..... 1-13
1.7.6 Northern and Eastern Mojave Planning Effort (NEMO) ..... 1-134
1.7.7 Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) .... 1-14
1.7.8 West Mojave Plan ..... 1-14
1.7.9 California State Wildlife Action Plan ..... 1-14
1.7.10 Desert Managers Group ..... 1-144
1.8 Program Summary ..... 1-144
1.8.1 Program Drivers ..... 1-15
1.8.2 Program Organization ..... 1-155
1.8.3 Project Prioritization ..... 1-16
1.9 Review and Revisions Process ..... 1-177
1.9.1 INRMP and NEPA Integration ..... 1-18
1.9.2 Tribal Consultation and Collaboration ..... 1-188
1.10 Tracking and Reporting ..... 1-19
2.0 LAND USE AND THE MILITARY MISSION ..... 2-1
2.1 Installation Location and Neighboring Land Use ..... 2-1

2.2 Pre-Military Land Use ..... 2-1
2.3 Installation History ..... 2-3
2.4 Natural Resources Program History ..... 2-4
2.5 Military Mission ..... 2-4
2.5.1 Military Population ..... 2-4
2.5.2 Land Management Units ..... 2-5
2.5.3 Training Lands Management ..... 2-1313
2.5.4 Primary Training Activities ..... 2-2020
2.5.5 Other Training Activities ..... 2-2424
2.6 Natural Resources Management and the Military Mission ..... 2-26
2.6.1 Impact Minimization Strategies ..... 2-26
2.6.2 Benefits from the Military Mission ..... 2-277
2.7 Anticipated Changes to Military Tempo ..... 2-277
2.8 Support Facilities and the Built Environment ..... 2-277
2.8.1 Transportation ..... 2-288
2.8.2 Potable, Storm, and Waste Water Management ..... 2-288
2.8.3 Projected Changes in Facilities and the Built Environment ..... 2-299
3.0 PHYSICAL ENVIRONMENT ..... 3-1
3.1 Topography and Geology ..... 3-1
3.2 Soils ..... 3-33
3.2.1 Formation ..... 3-33
3.2.2 Composition ..... 3-33
3.3 Water Resources ..... 3-55
3.3.1 Surface Water ..... 3-55
3.3.2 Ground Water ..... 3-66
3.4 Climate ..... 3-111
3.5 Ecosystems ..... 3-122
3.5.1 Ecosystem Classification ..... 3-122
3.5.2 Ecological Sites ..... 3-144
3.6 Flora ..... 3-155
3.6.1 Flora Inventory ..... 3-155
3.6.2 Plant Communities ..... 3-155
3.6.3 Special Status Flora ..... 3-1818

3.7 Fauna ..... 3-200
3.7.1 Invertebrates ..... 3-211
3.7.2 Fish ..... 3-211
3.7.3 Amphibians and Reptiles ..... 3-211
3.7.4 Birds ..... 3-222
3.7.5 Mammals ..... 3-222
3.7.6 Agassiz Desert Tortoise (*Gopherus agassizii*) ..... 3-222
3.7.7 Migratory Birds ..... 3-2929
3.7.8 Other Special Status Fauna ..... 3-300
4.0 NATURAL RESOURCES MANAGEMENT ..... 4-1
4.1 Introduction ..... 4-1
4.2 Program Description ..... 4-1
4.2.1 Goal 1: Strengthen the Combat Center's Operational Capabilities ..... 4-1
4.2.2 Goal 2: Support Natural Systems on the Landscape ..... 4-9
4.2.3 Goal 3: Manage Federally Protected Species ..... 4-20
4.2.4 Goal 4: Support Other Uses and Engagement ..... 4-30
4.3 Implementation ..... 4-35
4.3.1 Staffing ..... 4-35
4.3.2 Funding Sources ..... 4-36
4.3.3 Command Support ..... 4-36
5.0 REFERENCES ..... 5-1
6.0 LIST OF PREPARERS ..... 6-1
7.0 LIST OF ACRONYMS ..... 7-1
APPENDIX A Workplan and Budget ..... A-1
APPENDIX B Environmental Assessment ..... B-1
APPENDIX C Plant Species ..... C-1
APPENDIX D Wildlife Species ..... D-1
APPENDIX E Desert Tortoise Contact Flowcharts ..... E-1
APPENDIX F Bird Nest Response Matrix ..... F-1
APPENDIX G Letter of Instruction on Depredation ..... G-1

# LIST OF FIGURES

Figure 2-1: Combat Center Location ..... 2-2
Figure 2-2: Combat Center Training Areas ..... 2-66
Figure 2-3: Combat Center SUAs and Fixed Ranges ..... 2-1212
Figure 3-1: Combat Center Topography ..... 3-22
Figure 3-2: Combat Center Soils ..... 3-44
Figure 3-3: Combat Center Groundwater Basins and Fault Lines ..... 3-77
Figure 3-4: Combat Center Plant Communities - 2016 Dataset ..... 3-1717
Figure 3-5: Combat Center Desert Tortoise Densities ..... 3-2828
Figure 4-1: Translocation Recipient and Control Sites ..... 4-24

# LIST OF TABLES

Table 1-1 Natural Resources Management Laws and Regulations ..... 1-3
Table 2-1 Aircraft Activities ..... 2-1414
Table 2-2 List of Aircraft ..... 2-1515
Table 3-1 Ecological Sites ..... 3-155
Table 3-2 Plant Communities ..... 3-166
Table 3-3 Sensitive Status Plants Present ..... 3-18
Table 3-4 Sensitive Status Plants Potentially Present ..... 3-1919
Table 3-5 Tortoise Densities and Abundance at the Combat Center ..... 3-255
Table 3-6 Tortoise Density in the Western Expansion Area ..... 3-266
Table 3-7 Tortoise Density in the Southern Expansion Area ..... 3-277
Table 3-8 Sensitive Status Fauna Present ..... 3-311
Table 4-1 Recipient Sites Post-Translocation Densities ..... 4-23
Table 4-2 Summary of the 5-Year Combat Center Budget Request ..... 4-35
Table A-1 Natural Resources Program 5-Year Workplan ..... A-1
Table A-2 Summary of the 5-Year Combat Center Budget Request..... A-**Error! Bookmark not defined.**

# 1.0 OVERVIEW

## 1.1 Purpose and Need

The purpose of this Integrated Natural Resources Management Plan (INRMP) is to prescribe targeted natural resources management strategies to sustain military mission readiness at the Marine Air Ground Task Force Training Command (MAGTFTC) Marine Corps Air Ground Combat Center (MCAGCC), in Twentynine Palms, California (herein referred to as the Combat Center or the installation). This INRMP is a statutory requirement under the Sikes Act Improvement Act (SAIA), Public Law 105-85, Div. B Title XXIX, Nov. 18, 1997, 111 Stat 2017-2019, 2020-2033.

This INRMP guides implementation of the Combat Center's Natural Resources Program across federal fiscal years 2018 – 2022. The program:

1) Conserves Combat Center land and natural resources;
2) Ensures compliance with applicable federal and state environmental laws and regulations;
3) Maintains quality training lands necessary to accomplish the Combat Center's critical military mission on a sustained basis;
4) Ensures natural resources conservation measures and Marine Corps activities are integrated and consistent with federal stewardship requirements.

This INRMP also serves as the Endangered Species Management Plan for the desert tortoise (*Gopherus agassizii*), avian species protected by the Migratory Bird Treaty Act (MBTA), and bald (*Haliaeetus leucocephalus*) and golden (*Aquila chrysaetos*) eagles protected under the Bald and Golden Eagle Protection Act (BGEPA). Preparation and implementation of this INRMP are required by the Sikes Act Improvement Act, Department of Defense Instruction 4715.3 (*Environmental Conservation Program)*, and Marine Corps Order P50902.A (*Environmental Compliance and Protection Manual*).

Under the SAIA, wildlife regulators, sovereign Native American Nations and the public must be engaged in the development of this INRMP. The Combat Center has cooperated with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW) on the development of this plan and agency signatures reflect the mutual agreement of these parties that the identified actions fulfill requirements concerning the conservation, protection, and management of natural resources on the Combat Center. The Combat Center consulted with seven regional Native American Tribes on this document. As a public document, this INRMP also presents an opportunity to foster goodwill for the Combat Center, the U.S. Marine Corps, and the Department of Defense (DoD) throughout the Mojave Desert.

## 1.2 Scope

This INRMP applies to all lands associated with the Combat Center. The Combat Center is the Marine Corps largest combined-arms, live-fire training facility and recently underwent a land expansion that increased the total size from approximately 932 square miles to 1,102 square

miles. The Combat Center is divided into 27 range training areas, each of which may contain training areas, landing fields, targetry, main supply routes, fixed ranges, support areas, expeditionary areas, and safety buffer zones. Armed forces use the Combat Center to train Marines and test equipment to practice and perfect the principles of engagement for tomorrow's armed conflicts. The Combat Center annually provides training to one-third of the Fleet Marine Force and Reserves Units through Marine Air Ground Task Force (MAGTF) Exercises and numerous other training exercises. The Combat Center training mission is expected to evolve with the development of new weapons systems and tactics, therefore the impacts to natural resources are likely to change over time. This INRMP reviews anticipated impacts of training activities on natural resources aboard the installation during federal fiscal years 2018 – 2022 and discusses natural resources management solutions to offset anticipated impacts to protect and preserve the Mojave Desert ecosystem. This Plan does not evaluate the military mission, nor does it replace any requirement for environmental documentation of the military mission at the Combat Center.

The Combat Center's INRMP applies to organizations internal and external to the Combat Center that are involved with, or interested in, the management or use of the installations natural resources and lands. This includes active duty units, reserve components, directorates, state, county and local governments, non-governmental organizations, tribal groups, private groups, and individuals. This INRMP also defines the level of management and vehicles by which the Combat Center participates in regional planning efforts with entities such as (but not limited to) the Desert Managers Group and the Bureau of Land Management's West Mojave Habitat Conservation Plan (formerly West Mojave Coordinated Management Plan). The INRMP is also an integral part of the Combat Center Master Plan and coordinates with the Integrated Pest Management Plan (IPMP), Wildland Fire Management Plan (WFMP), and Invasive Species Management Plan (ISMP). The INRMP is also consistent with Integrated Cultural Resources Management Plan (ICRMP) and together they serve as the cornerstones of the Combat Center's resources management program.

## 1.3 Authority

The SAIA, as amended, was enacted to "promote effectual planning, development, maintenance, and coordination of wildlife, fish, and game conservation and rehabilitation in military reservations". It requires the Secretaries of the military departments to prepare and implement INRMPs for each military installation unless exempted due to the absence of significant natural resources. This INRMP includes all elements of natural resources management applicable to the installation and fulfills the statutory requirements under the SAIA, as amended. Marine Corps Order (MCO) P5090.2 also describes United States Marine Corps (USMC) policies on environmental protection and identifies relevant federal environmental statutes, regulations, executive orders (EOs), and military mandates required for environmental compliance. Pertinent laws and regulations applicable to natural resources management actions aboard the Combat Center are listed below in Table 1-1.

| Table 1-1 Natural Resources Management Laws and Regulations | |
|---|---|
| 7 USC 136-136y | Federal Insecticide, Fungicide, and Rodenticide Act |
| 16 USC 668 *et. seq*. | Bald and Golden Eagle Protection Act of 1940, as amended |
| Public Law 93-452 | Conservation and Rehabilitation Program on Military and Public Lands |
| 16 USC 1531-1544 | Endangered Species Act of 1973, as amended |
| 43 USC 1701 *et. seq*. | Federal Land Policy and Management Act of 1976 |
| 7 USC 2801 *et. seq.* | Federal Noxious Weed Act of 1973 |
| 33 USC 1251 *et. seq.* | Federal Water Pollution Control Act Amendments of 1972 |
| 16 USC 670a-670o | Fish and Wildlife Conservation and Natural Resources Management Program on Military Reservations: Amends Public Law 86-797 (Sikes Act) |
| 16 USC 2901-2911 | Fish and Wildlife Conservation Act |
| 16 USC 661-667 | Fish and Wildlife Coordination Act |
| Title 10 USC2667 | Leased, non-excess Property |
| 42 USC 4321-4347 | National Environmental Policy Act of 1969 |
| 42 USC 6901-6992k | Resource Conservation and Recovery Act |
| 43 USC 4901 *et. seq.* | Noxious Plant Control Act |
| 43 USC 9601-9675 | Comprehensive Environmental Response, Compensation, and Liability Act |
| 16 USC 703-712 | Migratory Bird Treaty Act |
| 10 USC 2671 | Military Reservations and Facilities |
| 16 USC 5901 *et. seq.* | Soil Conservation Act of 1935 |
| Executive Order 11989 | Off-Road Vehicles on Public Lands |
| Executive Order 11991 | Protection and Enhancement of Environmental Quality: amends Executive Order 11514. |
| Executive Order 12608 | Protection of Wetlands: amends Executive Order 11990 |
| Executive Order 13045 | Protection of Children from Environmental Health Risks and Safety Risks |
| Executive Order 13751 | Safeguarding the Nation from the Impacts of Invasive Species |
| Executive Order 13186 | Responsibilities of Federal Agencies to Protect Migratory Birds |
| Executive Order 13834 | Efficient Federal Operations |
| Executive Order 13783 | Promoting Energy Independence and Promoting Economic Growth |
| DoD Instruction 4715.03 | Natural Resources Conservation Program |
| DoD Manual 4715.03 | Integrated Natural Resources Management Plan (INRMP) Implementation Manual |
| DoD Directive 6050.2 | Use of Off-Road Vehicles on DoD Lands |
| Marine Corps Order P5090.2A | Environmental Compliance and Protection Manual |
| Combat Center Order 5090.1D | Environmental Protection |
| Combat Center Order 5090.4B | National Environmental Policy Act Compliance |
| USC=U.S. Code, Department of Defense = DoD | |

## 1.4 Responsibilities

Numerous internal and external stakeholders support various aspects of natural resources management, ensuring the military training mission and environmental management at the Combat Center are compatible and mutually supportive. In this section, internal and external stakeholders are identified, and their roles and responsibilities briefly discussed. The term Stakeholder is used to describe only parties that are directly involved with implementing the Natural Resources Program including planning, operation, and implementation monitoring of INRMP tasks. Non-mandatory, mutually beneficial partnerships are not identified.

### 1.4.1 Internal Stakeholders

In accordance with MCO P5090.2A, all USMC personnel at the Combat Center must be informed of and comply with the environmental rules and regulations that apply to their duties, and shall:

1. "Maintain a general awareness of all applicable USMC environmental policies and goals
2. Apply the principles of Total Quality Leadership to incorporate environmentally safe practices and procedures into daily operations
3. Take advantage of pollution prevention opportunities in everything we do
4. Emphasize environmental awareness and incorporate environmental compliance into every aspect of operation practices
5. Promote pollution prevention as the primary means of achieving and maintain compliance with environmental requirements
6. Address environmental problems, rather than ignore them."

Roles and responsibilities of Department of Defense (DoD) administrators for natural resources protection are also identified and discussed below.

**Headquarters Marine Corps**

The Headquarters Marine Corps (HQMC), located in Washington, D.C., is responsible for developing general policy and providing Marine Corps Orders as well as funding to implement Natural Resources Program at the Combat Center. HQMC conducts onsite Environmental Compliance Evaluations of the Combat Center Natural Resources Program at least once every three years.

**MAGTFTC, Twentynine Palms**

***Commanding General***

The MAGTFTC Commanding General is directly responsible for accomplishing the MAGTFTC mission, including the administration and conduct of military training programs, and is also responsible for all property, facilities, and assigned personnel aboard the Combat Center. The Commanding General also has the overall responsibility for ensuring that installation land management and law enforcement policies, regulations, and activities are consistent and compliant with the federal environmental laws, policies, and standards, and that natural resources quality is sustained for the continued benefit of the military mission. The Commanding General is personally responsible for complying with all environmental laws and regulations and executes

these responsibilities through a combination of operational and administrative controls and technical direction.

### *Marine Air Ground Task Force Training Directorate*

The MAGTF Training Directorate (MTD) Range Management Division maintains administrative and operational control of the training ranges, manages the MAGTFTC TP, conducts service-level MAGTF combined arms training in order to enhance the combat readiness of the operating forces and supports the Commandant of the Marine Corps responsibilities to national security.

**Range Management Division** (RMD) within the MTD is responsible for all range operations excluding rifle and pistol ranges. The Director of the Range Management Division runs the division and is ultimately responsible for all range training functions, including day-to-day operations, scheduling, safe validation, and real-time management of unit and service level readiness training. This section also maintains data on actual range use, maintains Range Training Area and Airspace (RTAA) control of all communications, enforces safety and inspection standards and regulations throughout the RTAA, provides all safety briefs, has the authority to halt all training and direct any required corrective action before the resumption of live fire, supervises exercise-police cleanup of the training areas, provides target construction and emplacement, and coordinates and designs new ranges and enhancements to current ranges and processes including all necessary NEPA documentation in conjunction Environmental Affairs. The Range Management Division is also responsible for the preparation, administration and coordination of the MAGTFTC 5-year Range Management Plan, including ensuring compatibility with the Combat Center's 5-year INRMP.

### *Installation Support Directorate*

The Installation Support Directorate (ISD) is overseen by the Assistant Chief of Staff (AC/S) and is responsible for planning, controlling and coordinates the essential Combat Center functions of supply, motor transport, billeting, food services, purchasing and contracting, public works and facilities management, construction of new facilities and major repairs to existing facilities, and support of the Assistant Chief of Staff (AC/S), MAGTF Training, operational exercises. The directorate is subdivided into several divisions, two of which are particularly involved with INRMP implementation and are discussed further, below.

The **Environmental Affairs** (EA) within the Installation Support Directorate is responsible for natural and cultural resources management aboard the Combat Center, as well as conservation law enforcement, pollution prevention, installation and environmental restoration, environmental compliance, management of solid waste, hazardous wastes and range related waste, monitoring ground water and air quality, and encroachment issues. The EA Division is the Combat Center liaison for these matters with HQMC, other DoD agencies, federal, state and local regulatory agencies, non-governmental agencies, and scientific and academic communities.

The Natural and Cultural Resources Branch (NCRB), under the direction of the Natural and Cultural Resources Officer, is the branch of EA responsible for the day-to-day operations and long-term management of natural and cultural resources within the Combat Center boundaries. Specific focuses of NCRB management include soils, vegetation, wildlife, paleontological, archaeological, historic resources and conservation law enforcement. The Natural and Cultural

Resources Branch provides a liaison between the Combat Center and other Federal landholders and consults with state and Federal regulatory agencies regarding threatened and endangered species, and cultural resources. This branch also holds the primary responsibility for the planning and implementation of the INRMP, ensures that the Combat Center land use is monitored and that the best scientific practices for resources management are implemented to sustain the Marine Corps training mission.

The **Public Works Division (PWD)** is managed by the Public Works Officer (PWO), who is the head of PWD and the principal staff assistant to the AC/S at ISD. The PWO controls all planning, coordination and supervision of facilities acquisition management, sustainment, restoration and modernization, and provision of all utility services to facilities. All space planning, construction, repair, alterations, site approvals and dig permits must be approved by PWD prior to the start of work. PWD is divided into five distinct branches, including:

- The Asset Management Branch (AMB), which is comprised of Planning, Geospatial Information & Services, and Requirements;
- The Facilities Maintenance Branch, which is comprised of Roads and Grounds, Facilities Services, HVAC, and Electrical shop;
- Utilities (UTL), which are comprised of Utilities/Energy Management (UEM), heat plant, cogeneration (COGEN) plant, potable/non-potable water wells, natural gas, water and wastewater treatment plants;
- The Facilities Engineering & Acquisition Division (FEAD), which is comprised of the Project Management and Engineering, Facilities Support Contracts (FSC), and Acquisition sections;
- The Resource Management Branch (RMB), which is comprised of PWD's funds management programs, the Supply Officer, allocation and obligation plans, and manage to payroll.

PWD's purview is broad and complexly interwoven with the Natural Resources (NR) Program. Planning sections are responsible for siting facilities in accordance with land use, and general construction, maintenance, repairs, alterations, site approvals, dig permits, and all work that affects land, buildings, utilities and infrastructure can have significant impacts on natural resources. Geospatial databases provide beneficial information support to the planning and coordination of NR Program activities. PWD Planning sections responsible for maintaining real property records indirectly assist Natural Resources with tracking ownership, easements, and historical information often of value in the Natural Resources planning process. Once work begins on government funded construction and facilities maintenance projects, FEAD provides quality control and ensures compliance with prescribed biological avoidance, minimization, and monitoring measures and special conservation measures required by the NR Program. Facilities sustainment, restoration, and modernization (FSRM) is performed by PWD or by contract and the Planning section incorporates various conservation initiatives of the NR Program while developing broader planning documents such as the installation facilities down to more specific operations such as the Pest Control Program and Base Exterior Architectural Plan. Utilities and energy related services support installation demands for power, potable water, non-potable water, natural gas, wastewater services, and hot and cold water by operating and maintaining

infrastructure for the generation/acquisition, treatment, storage, and distribution of these resources across large areas of the Combat Center.

**Mission Assurance**
This directorate provides programs for the protection of life and property, and restoration of resources affecting the Combat Center mission. They provide emergency services, an active security posture and mission assurance programs designed to deter, detect, delay, defend, and mitigate natural or man-made crisis events. Protection of this installation and supporting infrastructure preserves our capability to generate, project, and sustain combat power essential to execute the National Military Strategy. Some divisions within this directorate are directly involved with higher-priority or emergency management aspects of INRMP implementation, such as the development of a Wildland Fire Management Plan and Predator Management Plan.

### 1.4.2 External Stakeholders

***U.S. Army Corps of Engineers***

The U.S. Army Corps of Engineers infrequently assists the Combat Center with contracting activities and the preparation of natural resources studies. Past publications have included Identification and Characterization of Waters of the United States, Delineation of Deadman Dry Lake and Mesquite Dry Lake at the Marine Corps Air Ground Combat Center, Twentynine Palms, California, and the 1996 Biodiversity and Wildlife Management Plan.

***Other Military Installations***

The Combat Center coordinates and cooperates with other military installations within the Mojave Desert on various initiatives. Participating installations include Edwards Air Force Base, National Training Center (NTC) at Fort Irwin, Marine Corps Logistics Base Barstow, Marine Corps Air Station Yuma (including Chocolate Mountain Aerial Gunnery Range), and Naval Air Weapons Station China Lake. The California Desert Mangers Group is comprised of representatives from these installations along with representatives from the Department of Interior agencies, Department of Agriculture, state, county and local government agencies.

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

The USFWS is responsible for administering the Endangered Species Act (ESA) and all related components of the Act, such as compliance, permitting, and consultation. USFWS Endangered species permitting operations are conducted under the authority of the regional office in Sacramento, California with the exception of Section 10 (recovery) Permits, including the Combat Center - EA's permit (17730-3) for desert tortoises. Currently, the only resident, ESA-protected species aboard the Combat Center is the desert tortoise. The USFWS-Combat Center partnership in the management of the desert tortoise will continue to be critical during FY 2018-2022.

The USFWS is also responsible for administering the MBTA, the Bald and Golden Eagle Protection Act, and they regularly review candidate species for future ESA listing. The USFWS Migratory Bird Office is located at the Sacramento regional office and the Combat Center coordinates directly with the Region 8 Sacramento USFWS office for issues involving the

MBTA and BGEPA. The Combat Center also coordinates closely with USFWS when species known to reside on base are identified as candidates for ESA listing.

The USFWS, Pacific Southwest region (Region 8), field office at Palm Springs, California, provides technical advice and regulatory guidance for the management endangered and threatened species aboard the Combat Center. The USFWS is a signatory cooperator in implementation of this INRMP, in accordance with the SAIA, and the 2018-2022 INRMP contains specific items of agreement among the USFWS, CDFW, and the Combat Center. The USFWS is also a partner in regional initiatives and cooperative ventures with the Combat Center.

***National Park Service***

Joshua Tree National Park is located in the Morongo Basin and has many of the same natural and cultural resources issues as the Combat Center. The Park and EA personnel share information when possible and serve together on similar management groups such as the Mojave Weed Management Area and Desert Managers Group.

***Bureau of Land Management***

The Bureau of Land Management (BLM) administers much of the land surrounding the Combat Center. The agency is an important partner in the management of natural resources and the sharing of pertinent databases. BLM has the lead responsibility for the West Mojave Plan, and is a partner of other regional initiatives and cooperative ventures with the Combat Center.

The management of BLM lands adjacent to the Combat Center fall under two separate BLM offices. The Barstow Field Office manages land along the northwestern, western, and southern boundaries. The Needles Field Office manages land along the northeastern and eastern boundaries. Military units occasionally need to cross this land to access the training ranges.

***California Department of Fish and Wildlife***

The California Department of Fish and Wildlife is the primary state agency responsible for the management of fish and wildlife in the state of California. In 1992, CDFW and the Combat Center worked together to relocate a herd of 20 bighorn sheep (*Ovis canadensis nelsoni*) to the Combat Center. The sheep were relocated to the Bullion Mountains as a part of a reintroduction program. CDFW, the Society for the Conservation of Bighorn Sheep, and the Combat Center have formed a partnership for the monitoring of bighorn sheep and the maintenance of water guzzlers on the Combat Center. The role of the CDFW in this project has evolved from the primary action agency to project oversight. The CDFW also maintains a list of state-sensitive species, and a California Natural Diversity Database, both of which are useful for management of bighorn sheep and other natural resources at the Combat Center.

CDFW is a signatory/cooperator in the implementation of this INRMP. The 2018-2022 INRMP contains specific items of agreement among the CDFW, USFWS, and the Combat Center, as required by the SAIA. The Combat Center EA also holds a CDFW scientific collecting permit (#SCP-10112) to research the desert tortoise.

### *Native American Tribes*

The United States has a unique legal relationship with Indian tribal governments as set forth in the Constitution of the United States, treaties, statutes, executive orders, and court decisions. Since the formation of the Union, the United States has recognized Indian tribes as domestic dependent nations under its protection (*Cherokee Nation v. Georgia*, 30 U.S. (5 Pet.) 1 (1831). DoDI 4710.02: DOD Interactions with Federally recognized Tribes, SECNAVINST 11010.14: Department of the Navy Policy for Consultation with Federally Recognized Indian Tribes, and Executive Order 13175, American Indian and Alaska Native Policy require regular and meaningful consultation and collaboration with Indian tribal governments.

The Combat Center follows a process established by Department of Defense policy, pursuant to Section 106 of the National Historic Preservation Act (NHPA) as amended that permits elected officials and other representatives of Indian tribal governments to provide meaningful and timely input on actions or policies that might be of tribal interest. These interests may be those that affect Indian sacred sites or traditional cultural properties (TCPs). In addition, tribes consult as necessary under NEPA, the Native American Graves Protection and Repatriation Act (NAGPRA), and other laws and situations implicating concerns of the Native American community. During consultation regarding the development of a Programmatic Agreement (PA) local Tribes have expressed a desire to have surveys conducted to locate plant species that are of religious and cultural significance to the Tribes and to be granted access to collect these plants.

Local Tribes consulted in regards to Native American cultural issues and for input into the development of this INRMP for the Combat Center include:

- **Agua Caliente Band of Cahuilla Indians,** Palm Springs, CA.
- **Augustine Band of Cahuilla Indians,** Coachella, CA.
- **Cabazon Band of Mission Indians,** Indio, CA.
- **Cahuilla Band of Mission Indians of the Cahuilla Reservation,** Anza, CA.
- **Chemehuevi Indian Tribe,** Havasu Lake, CA.
- **Colorado River Indian Tribes,** Parker, AZ.
- **Fort Mojave Indian Tribe,** Needles, CA.
- **Morongo Band of Mission Indians,** Banning, CA.
- **Twenty-Nine Palms Band of Mission Indians,** Coachella, CA.
- **San Manuel Band of Mission Indians,** Highland, CA.

### *Universities*

Military installations cover vast acreages that are conducive to large research endeavors. The Combat Center commissions or otherwise supports the research projects of numerous universities focusing on desert flora and fauna via contracts and agreements, and these studies frequently inform and otherwise guide various aspects of INRMP implementation. Most notably, the University of California, Los Angeles (UCLA) operates the Desert Tortoise Head Start Project, holds the permit for the Tortoise Research and Captive Rearing Site (TRACRS) and operates the facility with UCLA personnel. A Cooperative Agreement with the University of California, Riverside, facilitated species niche modeling for the Combat Center's desert tortoises, common chuckwallas, Mojave fringe-toed lizards and burrowing owls. The results from this work indicate the need to provide habitat refugia in the face of climate change, to

preserve ecosystem processes and these associated indicator animal species. The EA Division also collaborates with the University of Ontario and Royal Ontario Museum to analyze tortoise paternity genetics, landscape genetics, and diversity of headstarted animals, and works with the local Copper Mountain College to facilitate regional genetic, disease and health assessment evaluations. The use of universities to assist the Combat Center in researching and conducting natural resources management will continue under this INRMP.

***Other Interested Parties***

Non-Governmental Organizations (NGO) that are involved in natural resources often take an interest in natural resources management aboard the Combat Center, including (but not limited to) the California Native Plant Society, Society for the Conservation of Bighorn Sheep, Desert Protection Council, Desert Tortoise Council, and Bat Conservation International. NGOs can often offer valuable insights on resources management and are given the opportunity to review and comment on this INRMP during the public comment period.

## 1.5 Management Strategy

The management strategy employed in this INRMP prioritizes biological diversity using ecosystem management principles and an adaptive management framework to target responsive, natural resources management efforts that ensure no let loss in the capability of military lands to support military mission readiness.

Biological diversity (biodiversity) is defined as the variety of life and the processes that occur to sustain it. Biodiversity includes the variety of living organisms, their genetic differences, the communities and ecosystems in which they occur, and the ecological and evolutionary processes that allow them to continue functioning (DoD Instruction 4715.03).

Biodiversity is found at all levels, including landscapes, community assemblages of various species, and genetic variability within individual species populations. The Department of Defense has developed *A Department of Defense (DoD) Biodiversity Management Strategy (*Keystone Center 1996) which identifies five reasons to conserve biodiversity on military lands:

1) Sustain natural landscapes required for the training and testing necessary to maintain military readiness
2) Provide the greatest return on the defense investment to preserve and protect the environment
3) Expedite the compliance process and help avoid conflicts
4) Encourage public support for the military mission
5) Improve the quality of life for military personnel

The Keystone Center strategy report (1996) notes that the challenge is "*to manage for biodiversity in a way that supports the military mission.*" This strategy identifies the INRMP as the primary vehicle to implement biodiversity protection on military installations. The model process developed within the strategy includes the following principles:

- Support the military mission
- Use joint planning between natural resources managers and military personnel
- Integrate biodiversity conservation into INRMP and other planning protocols

- Involve internal and external stakeholders
- Emphasize the regional (ecosystem) context
- Use adaptive management
- Involve scientists and use the best science available
- Concentrate on results

Ecosystem management is a goal-driven approach to managing natural and cultural resources that considers the environment as a complex system functioning as a whole, not as a collection of parts, and that recognizes that people and their social and economic needs are a part of that whole. The DoD describes the importance of ecosystem management on military lands as a means "to support present and future training and testing requirements while preserving, improving, and enhancing ecosystem integrity. Over the long term, this approach maintains and improves the sustainability and biological diversity of terrestrial and aquatic ecosystems while supporting sustainable economies, human use, and the environments required for realistic military training operation (DoD 2013). The guiding principles of ecosystem management are as follows (DoD Instruction 4715.03):

- Maintain and Improve the Sustainability and Native Biodiversity of Ecosystems.
- Administer with Consideration of Ecological Units and Timeframes.
- Support Sustainable Human Activities.
- Develop a Vision of Ecosystem Health.
- Develop Priorities and Reconcile Conflicts.
- Develop Coordinated Approaches to Work Toward Ecosystem Health.
- Rely on the Best Science and Data Available.
- Use Benchmarks to Monitor and Evaluate Outcomes.
- Use Adaptive Management.
- Implement Through Installation Plans and Programs.

This INRMP employs ecosystem management principles and an adaptive management framework to guide the Natural Resources Program. Adaptive management is an interactive process which evaluates current management practices deployed on the landscape, identifies any limitations or unaddressed problems resulting from these practices, develops alternative recommendations for improving management actions, and these recommendations are then included in new management plans and implemented on the landscape for further review and analysis. The adaptive management feedback loop ensures natural resources management is flexible and responsive, improving activities through the integration of new information under changing military needs.

## 1.6 Stewardship and Compliance

***Environmental stewardship*** is the management of natural resources to protect the intrinsic value of those resources to meet the needs of present and future generations. Environmental stewardship is critical for range sustainability because when properly implemented, it provides a means to meet ongoing training requirements through the sustainment of environmental quality over time. DoD Instruction 4715.03 and MCO P5090.2A require an environmental stewardship ethic be incorporated into natural resources management plans by integrating environmental

considerations with DoD decision-making processes. Conducting required training operations while meeting regulatory requirements and effecting good stewardship practices was an underlying theme in the development of this INRMP.

***Environmental compliance*** is the management of installation operations to meet all applicable federal and state environmental laws, most notably those associated with environmental documentation, water quality, endangered species, and general management of wildlife. The INRMP maintains environmental compliance of the Combat Center and is required by the SAIA, Department of Defense Instruction 4715.03 (*Natural Resources Conservation Program, March 2011*), and Marine Corps Order P50902.A (*Environmental Compliance and Protection Manual, July 1998 revised August 2013*).

## 1.7 Integration of Internal and External Plans

Effective planning for the sustainable management of natural resources on any property must involve a variety of considerations to be effective. These include considerations such as the landowner's purpose for the land (including past, present, and future uses), impacts these uses may have on the resources base, the historical and current conditions of the resources base as well as any notable trends, conditions on lands immediately adjacent to the property, applicable laws and legal agreements, any future opportunities and concerns stemming from proposed neighboring land uses, regional/watershed scale factors interconnected with conditions on the property, and the support available to affect the desired endpoint (such as levels of funding, staff, and potential partnerships). This INRMP takes into account many of these planning considerations via direct coordination with a variety of internal and regional partners, and by aligning with internal and external plans in order to select the most practical and effective strategies for implementation. Planning documents that have helped shape this INRMP revision are identified below.

### 1.7.1 Combat Center Master Plan

This master plan was last updated in 2009 and provides the Combat Center with a framework for facility and infrastructure planning for a five to ten-year period. The Master Plan charts the course of appropriate reuse and responsible new construction within Mainside and Camp Wilson, to ensure the Base is able to accomplish its mission well into the future.

### 1.7.2 Combat Center Order 3500.4K - Range, Training Area, and Airspace Programs

This order provides instruction and procedures for all agencies and units operating within the Combat Center RTAA Programs including descriptions of available training ranges, scheduling of ranges, safety regulations, consequences for violations, and in particular, all environmental procedures that must be adhered to when in a range training area.

### 1.7.3 Programmatic Agreement and Integrated Cultural Resources Management Plan

The PA is a formal and legal agreement between the United States Marine Air Ground Training Command, Marine Corps Air Ground Combat Center, the California State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation. The PA establishes a process for consultation, review, and compliance with the NHPA and applies to all entities conducting activities that could affect those properties. The ICRMP establishes procedures for

compliance with Federal laws, regulations, and executive orders requiring the protection and/or management of cultural resources with the least possible effect on military training and mission support activities.

The ICRMP primarily contains Standard Operating Procedures (SOPs) for cultural resource management activities conducted on the Combat Center and outlines the legal foundation and methodology on how to implement the plan, ensuring compliance with cultural resource laws. The EA Division, NCRB, maintains the PA and ICRMP documents.

### 1.7.4 Desert Tortoise Recovery Plan

The desert tortoise was Federally-listed as a threatened species in April 1990. An interagency team led by USFWS and comprised of land managers from the Mojave Desert prepared a plan outlining actions needed to recover and protect the species. This report, finalized in 1994 (USFWS 1994), was developed with input from CDFW, BLM, National Park Service (NPS), and DoD personnel from NTC at Fort Irwin and Naval Air Weapons Station China Lake. A comprehensive assessment of this Plan was completed in 2004 and the assessment identified the need for plan revision and update in 2006. The revised Recovery Plan was approved and released in 2011.

### 1.7.5 California Desert Conservation Area Plan

Section 601 of the Federal Land Policy and Management Act of 1976 required the BLM to develop a plan, entitled the California Desert Conservation Area Plan, for long-term protection and administration of public lands in the California desert. The California Desert Conservation Plan was finalized in 1980 and establishes general guidelines for management of all BLM-administered lands in the California desert (BLM 1997). Though the Combat Center is not BLM-administered, the California Desert Conservation Area Plan is important because it prescribes BLM management in the Mojave. The INRMP is, however, the DoD natural resources planning and implementation program document.

### 1.7.6 Northern and Eastern Mojave Planning Effort (NEMO)

The Northern and Eastern Mojave Planning Effort (NEMO) provides a regional perspective for the management of federal lands. It also updates agency-specific management plans to reflect changes made by the California Desert Protection Act of 1994. The planning areas southwestern boundary follows old Route 66, which is close to the Combat Center northern boundary and therefore is of interest to the installation. The Northern and Eastern Mojave interagency planning team consists of representatives from the NPS, BLM, and USFWS. Cooperating Federal agencies include the Bureau of Indian Affairs (BIA), Army Corps of Engineers, Environmental Protection Agency, as well as (NTC at Fort Irwin and Naval Air Weapons Station China Lake. State agencies include CDFW, California State Parks, California Department of Transportation, California and Nevada State Historic Preservation Office, Counties of San Bernardino, Inyo and Mono in California and Clark, Nye and Esmeralda counties in Nevada. Three Native American Tribal Councils are also involved.

### 1.7.7 Northern and Eastern Colorado Desert Coordinated Management Plan (NECO)

The Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) is a regional landscape-scale planning effort for most of the California portion of the Sonoran Desert. The planning area encompasses over five million acres. The major driving force of the NECO plan is the need to promote desert tortoise conservation and recovery, and the planning area includes two desert tortoise recovery units. The plan includes the same agencies as the NEMO. The area covered by NECO is proximal to the Combat Center on the eastern boundary along Amboy Road; therefore, this plan is also of interest to the installation.

### 1.7.8 West Mojave Plan

The purpose of the West Mojave Plan is to develop management strategies for the desert tortoise, Mohave ground squirrel and over 100 other sensitive plants and animals that would conserve those species throughout the western Mojave Desert, while at the same time establish a streamlined program for compliance with the regulatory requirements of the Federal ESA and the California ESA. Agencies, local jurisdictions and others with a stake in the future of the western Mojave Desert have collaborated in the development of the West Mojave Plan.

### 1.7.9 California State Wildlife Action Plan

The State Wildlife Action Plan (SWAP) examines the health of wildlife and prescribes actions to conserve wildlife and vital habitat before their rarity increases and they become costlier to protect. The plan also promotes wildlife conservation while furthering responsible development and addressing the needs of a growing human population. The SWAP may influence natural resources management on the Combat Center.

### 1.7.10 Desert Managers Group

The Desert Managers Group (DMG) was established to provide a forum for government agencies to work together to conserve and enhance the California desert. The DMG originated as a Department of Interior initiative to implement the 1994 California Desert Protection Act. The DoD Coordinator is the co-chair and a voting member of the Group. The EA Division Head represents the Combat Center at DMG meetings, which are held twice each year. Other members of EA participate in various working groups and ad-hoc committees

## 1.8 Program Summary

Military installations are entrusted by the federal government to provide good stewardship of their natural lands, and sound natural resources management directly benefits the military mission by providing high-quality realistic training conditions. However, managing for natural resources opens installations to potential spatial, temporal, and/or residual/indirect conflicts with military needs. The mission of the Natural Resources Management Program at the Combat Center is:

"*To ensure that the Combat Center mission and support activities are compliant with environmental regulatory requirements and that all training lands are effectively managed to meet existing and future training demands*".

Sound planning is critical to identifying and offsetting conflicts between resources and military management needs and realizing this mission. As described in section 2.4 History of the Natural Resources Management Program, the Combat Center employed a comprehensive planning process and produced the first Integrated Natural Resources Management Plan for the installation in the late 1990s, which is now formally updated on a 5-year cycle. INRMPs review how soil, air, water, plant and animal resources are managed in concert with the military mission for the mutual benefit of both interests, as feasible.

### 1.8.1 Program Drivers

Military training generates the majority of impacts to natural resources at the Combat Center, although support facilities and infrastructure contribute as well. Program "drivers" present the fundamental needs which must be satisfied for the military mission to continue without disruption. Drivers are defined by the military mission, land use requirements, and natural resource impacts (USMC 1999), and provide the guidance from which management goals can be developed. The following drivers were identified for the Combat Center's Natural Resources Management Program:

- Maintain compliance with federal laws, such as the SAIA, ESA, Clean Water Act, and Clean Air Act, in such a fashion as to not impede mission activities
- Maintain ability of the Combat Center to support its military mission (SAIA) and ensure that lands are continuously available for military training
- Manage the Combat Center natural resources consistent with DoD and the Combat Center policies
- Participate in regional ecosystem initiatives
- Provide stewardship of public lands

These drivers were used to develop the goals and supporting elements, objectives and tasks identified in the 5 Year Workplan of this document.

### 1.8.2 Program Organization

Under the INRMP's formal revision, the goal-driven framework of the Natural Resources Program was reorganized into a more streamlined format which more clearly addresses the drivers necessitating the program's existence. With this framework, four overarching goals are used to group an assortment of critical program Elements required to manage natural resources across the Combat Center. Most but not all of these Elements were retained from the previous program structure but some were removed or merged together, and a few new Elements were created. A full accounting of this transition is available in a programmatic crosswalk and can be requested from the Natural Resources staff at EA if desired.

As previously, the Elements of the Natural Resources Program are the pillars under which the program operates. The various Elements identified address different critical aspects of the Program operations and they include but are not limited to things such as minimizing and containing degradation of training lands, landscape level planning, supporting grounds maintenance, having a desert tortoise management plan, managing habitat and non-listed wildlife, and having a conservation law enforcement program. Under each Element, one or more Objectives are presented to fully address all aspects of each Element. These Objectives also

serve to guide the development of projects and tasks. The new framework may be summarized with the following outline:

- Goal 1
  - Element 1.1
    - Objective 1.1.1
      - Task 1.1.1-A
    - Objective 1.1.2
      - Task 1.1.2-A

Future adjustments are anticipated in coming years to improve program flexibility, project justifications, and reduce burdens associated with budgeting and reporting. This INRMP identifies compliance requirements mandated by federal laws; regulations, and policies, and some projects and programs within it are used to mitigate various military activities. The 1997 Sikes Act requires implementation of INRMPs, and therefore they are a priority for funding. Biological Opinion (BO) implementation and sustainment funds are critical to support BO and conservation of the desert tortoise. Environmental Management Funds are important for the implementation of INRMPs.

### 1.8.3 Project Prioritization

Budget development and INRMP implementation are continuing, interrelated processes. Natural resources funding requests should support INRMP planned actions and vice versa. While not all natural resources-related expenditures are identified within the INRMP, all planned actions within the INRMP that require funding should be incorporated into budget planning documentation such as the Program Objectives Memorandum and biannual budgets. As budgets are re-evaluated and funding allocations change, so must INRMP planned actions, prioritization, and implementation years be adjusted, re-evaluated, and possibly reprioritized. The 5-year workplan will be informally revised annually in consultation with USFWS, CDFW and HQMC to ensure accurate tracking, progress monitoring, application of adaptive management strategies, and corresponding budget request updates.

Not all projects under this INRMP require funding. When funding is required a project is classified into COLS 1, 2 or 3 funding priorities. These budget classes may be described as follows:

**COLS 3:** Recurring natural resource conservation management requirements activities needed to cover the recurring administrative, personnel, and other costs associated with managing DoDs conservation programs that are necessary to meet applicable compliance requirements (federal and state laws, regulations, Presidential Executive Orders, and DoD policies) or that are in direct support of the military mission.

**COLS 2:** Current Compliance projects and activities needed because an installation is currently out of compliance and has received an enforcement action from a Federal or state agency. COLS 2 also includes projects and activities needed that are not currently out of compliance.

**COLS 1:** Maintenance Requirements projects and activities needed that are not currently out of compliance, but deadlines have not passed, or requirements are not in force, but will be out of compliance if projects or activities are not implemented in time to meet established deadlines.

The Combat Center will seek appropriate levels of project funding and will set final priorities based on the amount of funds actually received. COLS 3 projects within this INRMP are those actions that the Combat Center commits to implementing within the duration of the plan. COLS 3 projects must be funded in the current fiscal year in order to maintain compliance with compliance agreement or put the installation back into a compliance status after becoming noncompliant. COLS 2 projects include those projects needed that are not currently out of compliance and the deadlines for compliance either have not passed or are not established. COLS 1 projects are those above compliance and not explicitly required by law but support natural resources management goals and objectives. Only a portion of all Natural resources funding requests are received each year. Therefore, in addition to the COLS classification, an additional ranking scheme is also applied at the beginning of each fiscal year by the collective branches within Environmental Affairs. Once a year, the branch heads gather and rank their combined COLS 3 projects by individual priority (in ordinal priority), then rank COLS 2, then COLS 1, and the received funding is applied to the project list in descending order of priority.

The Marine Corps budgetary process requires funding projection for a seven-year period. Thus, the Combat Center budget requests for natural resources management through the 2018-2022 are already in the system. However, budget requests are periodically updated and often are sufficiently flexible to meet emergent requirements and needs.

Under the scope of this INRMP, projects currently funded with prior year budgets and with ongoing activities are identified in the 5-year Workplan.

## 1.9 Review and Revisions Process

The preparation of this INRMP was guided by the *Handbook for Preparing, Revising, and Implementing Integrated Natural Resources Management Plans for Marine Corps Installations* (October 2007) and the Department of Defense Manual 4715.03 (*Integrated Natural Resources Management Plan (INRMP) Implementation Manual, November* 2013). This INRMP is intended to replace the 2011-2016 Plan and fulfills the minimum 5-year review requirement for INRMP documents, identified in Section 101(b)(2) of the Sikes Act.

The revisions process involves the DoD Components, USFWS, and appropriate State fish and wildlife agencies. Parties collectively determined the existing INRMP required a formal revision, due to the expiration of the previous document and realignment of the base boundaries, which significantly increased the installation acreage. Once the initial revision to the expired INRMP is made, consultation will be initiated with USFWS and CDFW. Their feedback on the early draft will inform the development of a revision to the Plan, as well as a new or supplemental environmental impact analysis for the proposed action to ensure NEPA compliance.

### 1.9.1 INRMP and NEPA Integration

INRMP and NEPA integration will be required. NEPA is a federal law that mandates federal agencies consider the environmental consequences of their actions before committing to their actions. It is a procedural planning tool which requires a clear evaluation of all federal decisions potentially affecting the human and natural environment. Environmental Quality Implementing Guidelines for NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508) require environmental analyses and documentation be integrated as much as practicable with other environmental reviews, laws, and executive orders. In past years, the INRMP was determined compliant with NEPA by integrating the Fiscal Year (FY) 2002-2006 INRMP with the associated Environmental Assessment, producing a single document. The FY 2012-2016 INRMP was a review of limited scope and was based off the previous INRMP, therefore a lower threshold of NEPA compliance was required. However, the FY 2018-2022 INRMP requires an Environmental Assessment as additional lands have been added to the installation (Appendix B).

The purpose of the Environmental Assessment in the FY 2002-2006 INRMP was to identify and evaluate environmental consequences of implementing the proposed plan, in accordance with NEPA, the Council on Environmental Quality regulations, Marine Corps Order P5090.2A, and Combat Center Order 5090.4, *Environmental Impact Review Procedures.* The purpose of the FY 2018-2022 Environmental Assessment (Appendix B) is to analyze potential impacts associated with implementation of the revised INRMP, which addresses legacy lands as well as expansion areas of the installation, streamlines and diversifies the NR Program at the Combat Center, reduces encroachment of natural resources management on the military mission, and ensures high-quality natural resources are sustained aboard Marine Corps training lands.

The revised INRMP and resulting environmental assessment were made available for public review and comment, and comments were directly solicited from seven regional Native American Tribes, the Bureau of Land Management, and relevant NGOs across the region. After the commenting period closed, the installation afforded USFWS and CDFW the opportunity to review all comments received before the Combat Center incorporates and finalizes the Plan, and Environmental Assessment. The INRMP is considered final once the relevant installation(s), USFWS, and CDFW have signed the document, or provided signed record of coordination.

### 1.9.2 Tribal Consultation and Collaboration

All federally recognized Indian Tribes identified in the external stakeholder section have known traditional interests in the lands managed by the Combat Center. These Tribes have a government-to-government relationship with the Combat Center and formally consult on this level (SECNACINST 4000.35A). During the consultation process for this INRMP, the Chemehuevi identified those desert plant species traditionally used for medicine, ceremonial, and ritual practices, many of which may be found aboard the Combat Center and are commonly used by the Serrano, Cahuilla and Mojave cultures as well. The Chemehuevi have also expressed an interest in collaborating with the Combat Center to survey and locate plant species that are of religious and/or cultural significance, and the San Manuel Band of Mission Indians (Serrano culture) have expressed a desire to gather Mesquite (*Prosopis juliflora*) and possibly additional plants that have religious or cultural significance if locations are known and shared.

## 1.10 Tracking and Reporting

Implementation of this INRMP shall be monitored annually, with a Progress Report delivered to the USFWS, CDFW by January 1st of every calendar year of INRMP coverage. The Progress Report will be in adobe acrobat format and shall include information about the previous year's activities, as well as all work to be performed during the upcoming year. The Progress Report shall be developed in coordination with USFWS and CDFW and adopted by the Natural and Cultural Resources Branch of Environmental Affairs prior to finalization. Coordination with USFWS and CDFW is intended to include face-to-face meetings and discussions of activities, lessons learned, and provide opportunities for questions and input into the upcoming year's work. Progress Reports were not submitted to USFWS and CDFW prior to the 2018-2022 INRMP therefore a format will be developed and agreed upon with CDFW and USFWS for fiscal year 2018. General information to be included in the Progress Report is provided below:

1) A minimum 1-paragraph summary of each task that was performed during the previous year. The paragraph shall include but not be limited to summary information such as the intent of the task, associated costs and timeframe for implementation, lead entity, and any measurable benefits received if completed;

2) A minimum 1-paragraph discussion of any tasks scheduled but not performed during the previous year, including a review of why the task wasn't accomplished, and recommendation on how to direct further effort (i.e. should the task be removed from the workplan? Should a new strategy be pursued? Etc…).

3) A minimum 1-paragraph discussion of any necessary changes to management and monitoring priorities resulting from information learned during the previous year, or from changing installation priorities;

4) An annual workplan revision with any modifications to the work proposed for the upcoming year of coverage (by fiscal year). This shall include an update to the tabular summary table from the 5-Year Workplan presented in Appendix A, as well as a minimum 1-paragraph summary of each of the tasks proposed for the year.

5) An appendix (or appendices) including all final survey reports and/or raw data and photographs from work performed during the reporting timeframe, if and only if the information was not submitted to the agency points of contact earlier in the year. USFWS and CDFW should receive copies of all reports produced by contractors for species monitoring and management activities performed throughout the year.

***This page is left intentionally blank.***

# 2.0 LAND USE AND THE MILITARY MISSION

## 2.1 Installation Location and Neighboring Land Use

The Combat Center is located in the Mojave Desert of San Bernardino County, California. The base is approximately five miles north of the city of Twentynine Palms, 54 miles northeast of Palm Springs, and 150 miles east of Los Angeles. Surrounding the installation are large extents of undeveloped public land, several unincorporated rural communities, small towns, and commercial mining operations. Communities are mostly heavily focused in the Morongo Basin which lays south and west of the base and include Twentynine Palms, Joshua Tree, Yucca Valley, Morongo Valley, and Landers. The Combat Center's northern boundary lies three miles south of Interstate 40; the southern boundary is six miles north of Highway 62 (Figure 2-1).

## 2.2 Pre-Military Land Use

The land that is currently occupied by the Combat Center has a long history of human presence dating back some 13,000 years BP. This desert environment was once lush with vegetation, playas were filled with water, and fauna was abound for hunting by the ancestral peoples of the Serrano, the Cahuilla, the Chemehuevi, and the Mojave cultures. For thousands of years, these Uto-Aztecan - Takic and Numic language speaking peoples hunted and foraged in this region. The Cultural Resources branch of EA researches, monitors, and at times archives these materials aboard the Base, and the most notable artifact discovered to date includes a Clovis projectile point found in the northeast section of Noble Pass in 2013.

Post-western contact, the Morongo Basin was relatively unexplored by the Spanish colonials as the California Mission System was established mainly along the coast (1769-1823). In 1776 the Spanish did establish a trail through the Mojave Desert called the “Old Spanish Trail” or the “Mojave Road” later used by other explorers in the early 1800’s that crossed-country to California.

By the time of the California Gold Rush (1848-1852), an influx of newcomers into the state demanded a greater food supply. As a result, cattle and other livestock were driven into California from the east. Some ranching is evidenced through material culture and historical records in the area the Combat Center occupies today, including the Surprise Springs and Sunshine Peak areas. However, from a regional perspective, most ranching activities were predominately located at Warren’s Ranch in what is present day Morongo Valley.

The California Gold Rush not only indirectly bolstered the level of ranching activity in California, it also triggered a significant migration of miners into this region. These miners were primarily looking for silver. By the 1880’s mining exploration and production in the Mojave Desert intensified and the construction of the Southern Pacific Railroad- Mojave to Needles rail line expanded their reach. The earliest mining in the area of the Combat Center began in November 1882; with the most productive mining claims filed in the Lava Bed Mountains and the Bullion Mountains between 1884 and 1901. The Combat Center’s earliest mining district was the Lava Beds Mining District, organized in 1884. Mining peaked and lulled in the region over the decades but operations closed in 1952 after the establishment of the Marine base.

**Figure 2-1: Combat Center Location**

## 2.3 Installation History

The Combat Center has grown over time to reach the approximately 761,247 acres, or 1,102 square miles of land it encompasses today. Major acquisition and growth events are identified below:

- Public Land Order (PLO) No. 985, 26 July 1954, withdrew 200 acres of public land for the Department of Navy to use as "an artillery and anti-aircraft weapons training area" (thought to be the area now occupied by Mainside).
- PLO No. 1860, 25 May 1959, withdrew more land (PLO and subsequent documents disagree at either 443,000 or 472,000 acres) for use as "an artillery range and Fleet Marine force support training area in connection with the Marine Corps Training Center at Twentynine Palms."
- 112,970 acres were acquired from the Southern Pacific Railroad.
- 10,633 acres were acquired from other private landowners.
- The Navy tried to annex the America Mine Training Area (approximately 8,000 acres) back to BLM, but they refused to take possession due to clean-up costs and safety hazard posed by range residue.
- 1,920 acres were acquired from Catellus Corporation to become part of the Lavic Lake Training Area.
- The National Defense Authorization Act of Fiscal Year 2014 established 107,489 acres acquired west and south of the traditional boundary, comprised of 88,130 acres west and 19,359 acres south of the previous boundary. The acreage was acquired from BLM, private property owners, and State of California.

The U.S. Army first used the lands now associated with the Combat Center in 1941 as a glider training base known as Condor Field. Over the next 10 years, control and use of the facility was transferred several times and included a seven-year period of no use. However, by the early 50s the development and production of larger and more sophisticated weaponry warranted the reactivation of the military facility as Headquarters Detachment. The installation was named Camp Detachment Marine Corps Training Center, and a total of 120 Marines were stationed there by early 1953.

The installation became the world's largest Marine Corps base on 1 February 1957, which is a distinction it still maintains, and it has continued to grow in capacity and size since then. The Communications-Electronic School was relocated from San Diego in September 1967 and renamed as the Marine Corps Communications Electronics School (MCCES) three years later. The Training Center was redesignated as the Marine Corps Air Ground Combat Training Center on 1 October 1978, and formally renamed as the Marine Corps Air Ground Combat Center on 16 February 1979. In April 1980, the Combined Arms Command was activated, in 1990 the 7th Marine Regiment moved their Regimental Colors from Camp Pendleton to the Combat Center, and in October 2000, the Combat Center was designated home of the Marine Air Ground Task Force Training Command. In 2013, the installation once again expanded its boundary to support the increased need for training lands.

## 2.4 Natural Resources Program History

The Marine Corps commitment to natural resources management is long and steadfast. Land management planning is referenced to go as far back as 1956 at the Combat Center, although the oldest hardcopy Plan known to exist is the 1962 *Land Management Plan for Marine Corps Base Twentynine Palms, California* report. This 1962 Plan was prepared by the Soil Conservation Service (now Natural Resources Conservation Service), in cooperation with Naval Facilities Engineering Command (NAVFAC) Southwest Division. Since this time, there has always been coverage and guidance from a Natural Resources Management Plan for the installation. Over time these Plans evolved with the addition of new authorities, responsibilities and internal and external stakeholders. Wildlife agency participation and concurrence became a standard requirement, internal environmental oversight committees and boards were formed, and external partnerships with neighboring federal, state and local agencies were formalized to better implement sustainable natural resources management to best support the military mission.

In 2000, the Marine Corps Installations Campaign Plan (USMC 2000) formally reaffirmed its commitment to natural resources management, promising the continuance of Natural Resources Program, by stating "*We will enhance our environmental and encroachment prevention programs because these programs serve as tools for installation and operating force commanders to meet federal, state and local laws and preclude downgrading or loss of training or operational opportunities. We will enhance our 'good neighbor' policy with surrounding communities to ensure mutual support of both our needs and concerns."*

## 2.5 Military Mission

The Combat Center is comprised of both the Marine Air Ground Task Force Training Command, and the Marine Corp Air Ground Combat Center. While separate, both entities work together to effect training exercises and operations to support the battle-readiness of United States Marines.

The MAGTFTC mission is *"To manage the Marine Air Ground Task Force Training Program (TP) and conduct service-level MAGTF combined arms training in order to enhance the combat readiness of the operating forces and support the Marine Corps responsibilities to Geographic Combatant Commanders."*

The MCAGCC mission is *"To provide and manage facilities, services, and support to forces and families permanently assigned or participating in training aboard the Combat Center in order to ensure readiness of the MAGTFTC as well as the welfare of personnel and families."*

### 2.5.1 Military Population

Active duty military personnel currently assigned to the Combat Center include 15,000 Marines supported by 1,627 civilian personnel. There are 7,492 military dependents. About 35,000-50,000 Department of Defense military personnel annually train during integrated training, MAGTF Training and other exercises at the Combat Center, and an additional 7,000 Marines train at the MCCES.

The Combat Center has both Fleet Marine Forces (FMF) and Tenant Units. Additional transient units that schedule training at the Combat Center include Marine Corps, Air Force, Army, and Navy units (Snover and Kellogg 1999).

### 2.5.2 Land Management Units

Land use on the Combat Center includes infrastructure in support of Marine Corps live fire training in 27 range training areas (TA) plus "Mainside", which is the developed range training area that supports administration, maintenance, housing areas, and community support facilities. Land use on the Combat Center is presented in Figure 2-2 and described in more detail, below.

#### Mainside

Mainside, encompassing 5,260 acres, is located in the southernmost part of the Combat Center. It is the developed portion of the base that houses administrative, maintenance, housing areas, and community support facilities.

#### Training Areas

The Combat Center is currently divided into 27 training areas plus Mainside. In 1998, these training areas were realigned to alleviate scheduling problems, with 23 range training areas used up until 2017 when four additional ranges were added during the expansion of the Combat Center. Today in most cases, training area boundaries are defined by natural topographic features, which reduce the risk of stray fire. Each training area varies by size, use, terrain type and training restrictions (Figure 2-2). Descriptions below are taken from Snover and Kellogg (1999) with acreages from the EA Geographical Information System (GIS) database.

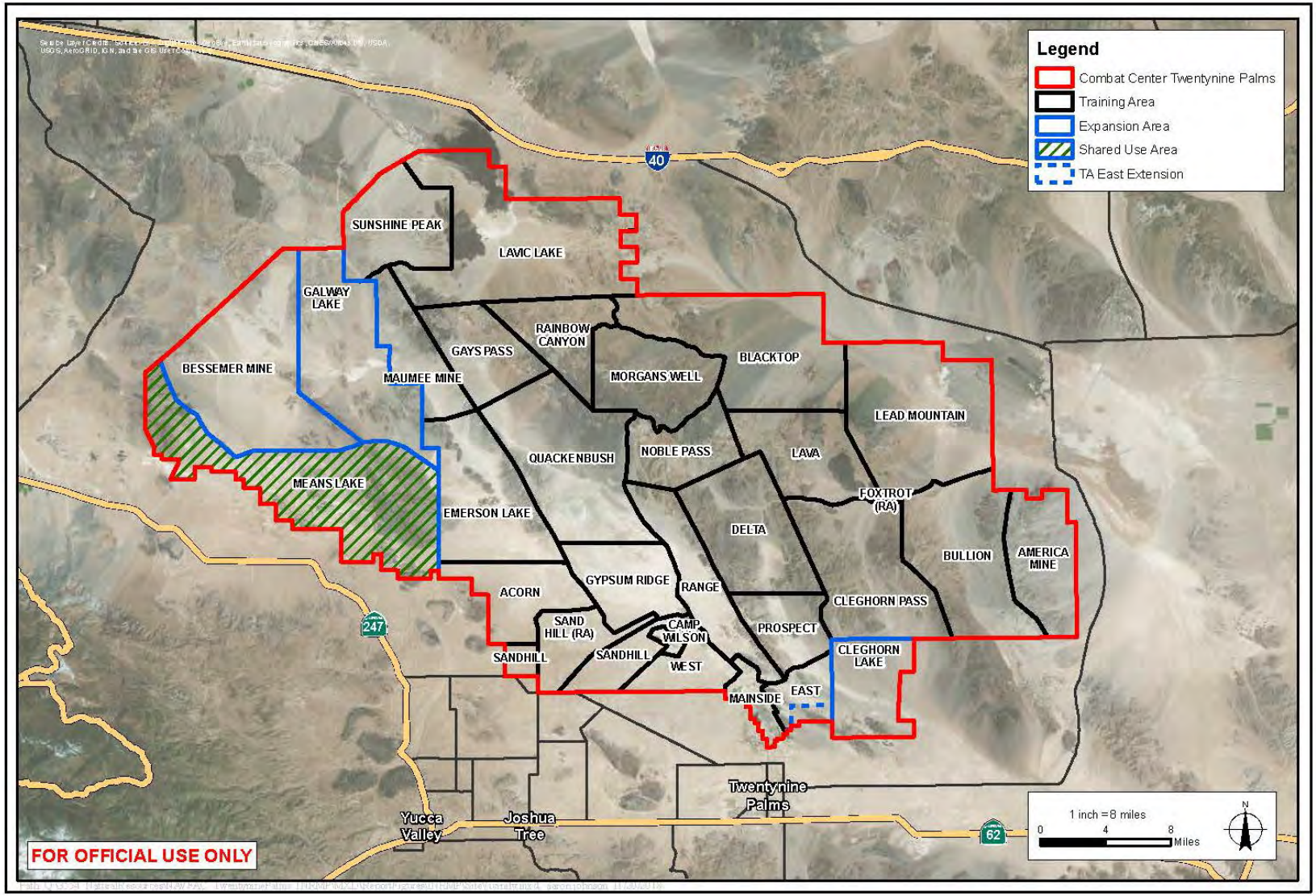
***Acorn*** Training Area (17,369 acres) is in the western portion of the installation. This area is currently used as a non-live-fire maneuver area.

***America Mine*** Training Area (20,808 acres) is located on the eastern boundary of the Combat Center. America Mine is primarily used for patrolling, mortar firing, infantry training, and light armored vehicle training. Use is limited mainly due to lack of direct ground access. Its physical character is a combination of mountainous (37%) and rolling terrain.

***Bessemer Mine*** Training Area (49,818 acres) is located in the northwestern portion of the Combat Center. This training area is used for aviation, artillery, live fire and maneuver exercises involving tanks and heavy wheeled vehicles in support of unit and major exercises. Primary use occurs during large scale exercises.

***Black Top*** Training Area (44,014 acres) is located on the northern boundary of the Combat Center. It is a live-fire and/or maneuver area. Topography is gently sloping (13% mountainous or rough). Black Top is mainly used for tank gunnery, artillery, and small arms training and major exercises.

**Figure 2-2: Combat Center Training Areas**



***Bullion*** Training Area (35,681 acres), in the eastern portion, is non-accessible from the south due to the Cleghorn Lakes Wilderness Area and the Bullion Mountain Range to the southwest. About 44% of the area is mountainous. It is used for aviation bombing and strafing, gunnery practice, artillery firing, and infantry maneuvers. Fixed Ranges 603, 605, and 607 are located here and Range 210 Military Operations in Urban Terrain (MOUT) facility is also located in this RTAA.

***Cleghorn Lake*** Training Area (17,646 acres) is located in the southeastern portion of the Combat Center, is non-live fire, and used primarily for staging and marshaling by units taking part in large scale exercises.

***Cleghorn Pass*** Training Area (36,338 acres) consists of mountains surrounding a valley (40% mountainous or rough terrain). The 400 series and Range 500 are located here. Cleghorn Pass is used primarily for small arms, tank gunnery, light armored vehicle live-fire, and maneuvers. Off-road vehicle transit is not permitted, and the only area authorized for bivouacking is west of Universal Transverse Mercator (UTM) Grid UTM 11 S 0599000E and south of UTM Grid UTM 11 S 3797000N. Range 500 is the Armor Multi-Purpose Range Complex (MPRC). The MPRC conducts live-fire tank gunnery qualifications up to Table VIII. Light armored vehicles also conduct live-fire training at Range 500.

***Delta*** Training Area (29,791 acres) is used for live-fire maneuver and major exercises. OP Crampton and Prospect Hill (also known as VIP Hill) are located here. The training area is 48% gently sloping land and 52% mountainous. It is essentially a narrow valley with the Bullion Mountains defining both sides of the corridor. Delta is heavily used for transit to other training areas, and 2 main supply routes (MSRs) form the Delta T in the northern portion of the training area.

***East*** Training Area (8,263) is gently sloping (12% mountainous or rough) and currently used for staging for major exercises, MOUT operations, non-live fire activities, and live-fire activities that impact in Prospect and Delta training Areas. This area is limited to these uses due to its proximity to Mainside. Range 100 is located in East Training Area.

***Emerson Lake*** Training Area (32,287 acres) is located on the western boundary of the Combat Center with 70 percent of the land being gently sloping and the remaining comprised of low rolling terrain (13% mountainous or rough). This area is mainly used for tank maneuvers, aviation bombardment, and aerial targetry.

***Galway Lake*** Training Area (38,582 acres) is located in the northwestern portion of the Combat Center. This training area is used for aviation, artillery, live fire and maneuver exercises involving tanks and heavy wheeled vehicles in support of unit and major exercises. Primary use occurs during large scale exercises. The majority of Galway Lake is gently sloping with 23% of this area being mountainous.

***Gays Pass*** Training Area (18,320 acres) is used for ground-based, live-fire exercises and artillery. Its physical characteristics are denoted with the pass as gently sloping land with mountains (44%) straddling each side.

***Gypsum Ridge*** Training Area (18,265 acres) is mostly low rolling terrain and contains the northern part of Deadman Lake. The essentially non-live fire training is used for bivouac, artillery fire out of Gypsum Ridge, wheeled vehicle maneuvers and occasionally live-fire demonstrations are allowed in this area.

***Lava*** Training Area (22,925 acres) is in the northern portion of the Combat Center. The area, as its name indicates, has exposed lava rock with 26% mountainous or rough terrain. Lava is used primarily for battalion tactical training (including both ground-based and combined ground/air live-fire) and artillery.

***Lavic Lake*** Training Area (56,985 acres, the largest training area) is the primary training area for aviation training exercises and is also used for live-fire maneuvers with major exercises. Most of the area is gently sloping and is made up of lava rock (17% mountainous or rough).

***Lead Mountain*** Training Area (45,792 acres) is located at the northeastern boundary of the Combat Center. Lead Mountain is composed of mostly gently sloping land (only 8% rough), lava flows from Amboy Crater, and Dry Lake. Its training exercises consist of aviation, artillery, and ground-based live-fire. A dummy airfield is located in the southern portion of the training area.

***Maumee Mine*** Training Area (16,141 acres) is located on the western boundary of the Combat Center. It is 19% mountainous or rough and is mainly used for artillery and maneuver training exercises.

***Means Lake*** Training Area (56,058) is located on the southwestern boundary of the Combat Center. This training area is classified as a "Shared Use Area". Means Lake will only belong to the USMC for (2) periods per year and for 24 days each period. The primary use for Means Lake is to support full scale Marine Expeditionary Brigade (MEB) Exercises conducted twice per year for 24 continuous days each. All live fire conducted within Means Lake Training Area must be from direct fire weapons and non-dud producing ordnance. All fires must impact on company designated Company Objectives.

***Morgans Well*** Training Area (23,361 acres) in the center of the Combat Center, is composed mostly of mountains. This area is commonly used for aviation and/or ground-based live-fire, tank maneuvers, infantry training, and artillery. Due to the mountainous terrain, there is limited vehicle cross-country mobility.

***Noble Pass*** Training Area (16,834 acres), in the center of the Combat Center, is composed mostly of mountains. This area is commonly used for aviation and/or ground-based live-fire, tank maneuvers, infantry training, and artillery. Due to the mountainous terrain (59%), there is limited vehicle cross-country mobility.

***Prospect*** Training Area (13,188 acres) was the southern one-third of Delta before the 1998 realignment. Prospect is 22% mountainous or rough terrain and is used primarily for battalion- and company-level training.

***Quackenbush*** Training Area (41,814 acres) has low, slightly rolling terrain (13% mountainous or rough terrain). Ground-based live-fire, artillery, aviation, and maneuvers are the most common training exercises for this area. Also, Range 220 Combine Arms Military Operations in Urban Terrain (CAMOUT) facility is located in this range training area.

***Rainbow Canyon*** Training Area (16,569 acres) is used as a live-fire maneuver area. It is 63% mountainous terrain and 37% maneuver area. The Bullion Mountains run through the southern portion of the area. It is used for maneuvers and artillery. Located within the Rainbow Canyon Training Area is Range 601 (Sensitive Fuse Impact Area), an abandoned air-to-ground range. Range 601 is a no-maneuver area in which neither personnel nor vehicles are authorized at this time.

***Range*** Training Area (20,161 acres) is located in the central part of the Combat Center, directly north of Mainside. The training area is most gently sloping and rolling terrain with 19% being mountainous or rough terrain. The majority of the fixed ranges are located in Range Training Area.

***Sandhill*** Training Area (11,904 acres) is off-limits to live-fire due to its proximity to Mainside and surrounding communities. It is used for maneuvers, and the Exercise Support Base and Expeditionary Air Field are partially located here along with the Assault Landing Zone Sandhill.

***Sunshine Peak*** Training Area (22,860 acres) is 38% mountainous. This training area is one of the least used due to its location in the upper northwestern boundary of the Combat Center. Its primary use is as an emergency ordnance drop zone.

***West*** Training Area (9,966 acres) is generally gently sloping and contains Drop Zone Sandhill, portions of the Expeditionary Air Field and Exercise Support Base, and the Assault Landing Zone. West is used for non-live fire maneuvers and major exercise staging. West also has the Range 225, Range 705 and the Range 800 training facilities.

**Special Use Areas**

The Combat Center designates Special Use Areas (SUAs) in training lands to meet a variety of military or conservation objectives. All SUA designations are made within the military range training area system to avoid the need for military personnel to use a dual set of land units. Within SUAs, military training activities are either completely restricted or specific limitations are prescribed, depending on the resource(s) present and site-specific conditions. SUAs designated primarily for the protection of natural resources are sometimes referred to unofficially as Natural Resources Management Areas but typically Natural Resources Management Areas are grouped together and presented with those SUAs established for cultural resources protection, since the disciplines are closely interconnected with one resource almost always benefitting from the protection of the other. Combat Center Order (CCO) 3500.4k and CCO 5090.1F identify two levels of natural/cultural SUAs, including Category 1 Restricted Use Areas, and Category 2 Environmentally Sensitive Areas.

***Category 1 SUAs - Restricted Use Areas***

Restricted Use Areas (also known as Category 1 Special Use Areas) are no impact zones where mechanized maneuvers, bivouacs, off-road vehicles, and training involving vehicle activity is prohibited at all times. Transit on authorized Supply Routes is authorized, so long as established speed limits are followed. The oldest and most well-recognized restricted area established for natural resources protection currently covers 11,801 acres in the Sandhill TA and protects the installations water supply, archeological resources, and the desert tortoise, where tortoise densities are predominately 21-50 animals per square mile (as per Woodman *et al.* 2001). A full list of Restricted Areas established for conservation purposes is provided below and may be viewed in Figure 2-3:

- Delta/Prospect *(1,022.3 acres)*
- Lavic Lake *(2,319.3 acres)*
- Delta *(18.4 acres)*
- Emerson/Quackenbush *(23.4 acres)*
- War Eagle *(75.1 acres)*
- Sunshine Peak (*1,314.6 acres)*
- Lead Mountain *(249.7 acres)*
- America Mine *(37.8 acres)*
- Lavic/Sunshine *(8,901.5 acres)*
- Emerson Lake *(2,049.2 acres)*
- Lava (*265.3 acres)*
- Foxtrot *(965.9 acres)*
- Bess/Galway *(6.983.9 acres)*
- Deadman *(2,830.2 acres)*
- Crystal *(2.1 acres)*
- Sunshine Peak *(1,987.0 acres)*
- Sandhill *(11,801.2 acres)*
- Cleghorn Lakes *(2,934.9 acres)*
- Bullion *(25,482.6 acres)*

***Category 2 SUAs - Environmentally Sensitive Areas***

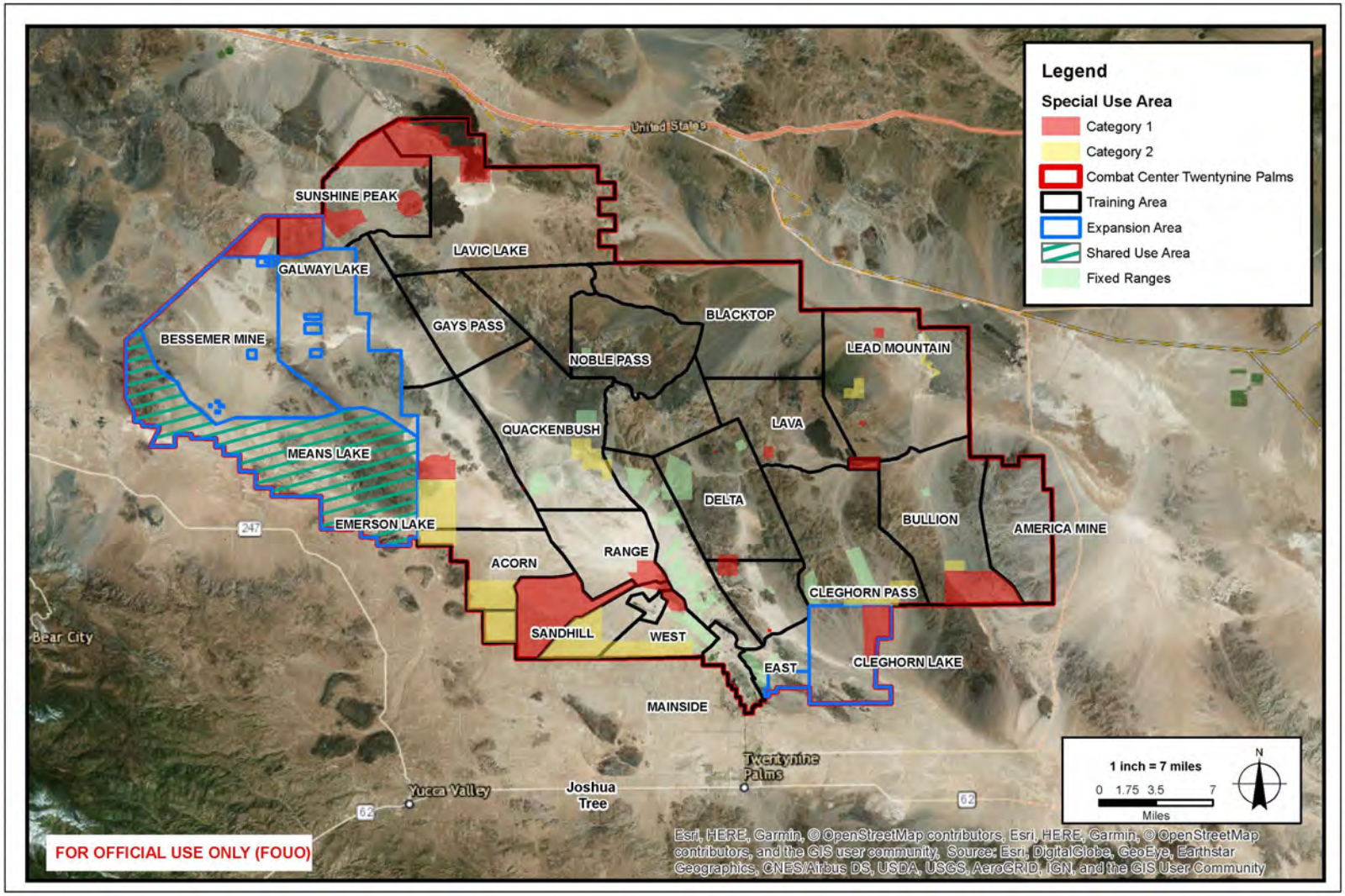
Environmentally Sensitive Areas do not limit training, however military units are cautioned to be aware of sensitive natural and cultural resources present. The CCO 5090.1F discusses SUAs in detail and cautions that improper use may result in future environmental constraints. A full list of Environmentally Sensitive or Category 2 SUAs is provided below and may be viewed in Figure 2-3:

- Wood Canyon SUA (*2,212.1 acres*)
- Cleghorn *(1,934.3 acres)*
- Lead Mountain *(738.6 acres)*
- Acorn/Emerson *(6,082.1 acres)*
- Amboy Crater *(591.4 acres)*
- Sandhill/West *(8,341.7 acres)*
- Acorn *(3,465.6 acres)*

- Sandhill *(2,550.4 acres)*
- Bullion *(491.8 acres)*

As discussed earlier in this section, the management of natural resources is an integrated and interrelated process with cultural resources management. Figure 2-3 shows the locations of all Special Use Areas established for the conservation of natural or cultural resources, as well as all fixed-range facilities aboard the Combat Center.

**Figure 2-3: Combat Center SUAs and Fixed Ranges**



### 2.5.3 Training Lands Management

This section is intended to help identify the impacts of training and operations on natural resources by reviewing the various aspects of marine training and support functions necessary to achieve the military mission at the Combat Center. Training activities are defined as individual physical actions conducted by Marines or machines. An operation consists of a combination of individual physical actions and activities. Activities common to many operations and training exercises at the Combat Center fall into the vehicular, dismounted, and aircraft activities, and use ordnance, earthmoving, weaponry, targetry and permanent and expeditionary facilities to achieve their objectives. The primary military training exercises conducted at the Combat Center are listed below and discussed in detail later in this section. These exercises do not necessarily take place each year, but their typical frequencies are identified.

- Integrated Training Exercise (6 annually)
- MAGTFTC level Training (up to 10 annually)
- Fire Support Coordination Application Course (annually)
- Steel Knight exercise (annually)
- Desert Fire Exercise (twice annually)
- Desert Scimitar (as required)
- Tactical Air Control Party training (10 annually)
- Fallbrook and Barstow shoot
- Annual tank gunnery qualifications
- Independent air support training flights by Marine, Navy, Army, and Air Force aircraft
- Low altitude air defense firing exercises
- Air schools proficiency training
- Joint airborne-air transportability training and aerial delivery missions
- Additional training needs and requirements of Marine Expeditionary Force tenant units located aboard the base
- Large Scale Exercise (MEB) conducted several times annually

Prior to discussing specific functions of each exercise, a review of the basic components of training exercises is given below.

**Vehicular Activities**

Vehicle use is a crucial element in training and operations. Discussions of military training exercises will focus only on vehicles that are used off of primary and secondary paved roads, and off of designated tracked vehicle crossings. All vehicles are capable of producing noise, dust, and altering native soil structure. As a result, vehicular use does impact natural resources at the Combat Center. The type and level of impacts are dependent on many factors including location, time of year and frequency of use. The types of vehicles using training ranges include:

- Tracked vehicles, which have non-rubber wheels (e.g., tanks, amphibious assault vehicles [AAVs], expeditionary fighting vehicles [EFVs], multiple launch rocket systems [MLRSs] or self-propelled artillery;
- Heavy-wheeled vehicles, which have multiple axles and more than four rubber tires (e.g., light armored vehicles [LAVs], amphibious combat vehicles [ACVs], 5- and 7-ton trucks

and personnel carriers, and the entire series of Mine Resistant Ambush Protected [MRAP] vehicles); and

- Light-wheeled vehicles, which have four rubber tires (e.g., utility vehicles, high mobility multi-purpose wheeled vehicles [HMMWVs], joint light tactical vehicles [JLTVs], and small trucks).

**Dismounted Activities**

Dismounted activities are classified into two categories: *individual*, with seven or fewer people on foot, and *group*, with eight or more people on foot. Movement associated with a group of people generally creates greater noise levels and has more physical impacts (trampling effects) on the land than movement of individuals. Movement is often extensive in combat training situations, and training exercises typically involve accessing by foot and by vehicle.

**Aircraft Activities**

The following aircraft activities are conducted in Restricted Airspace R2501, as compiled from Restricted Area / Military Operations Area Utilization Reports (USMC 1990, 1991, and 1993):

**Table 2-1 Aircraft Activities**

| | |
|---|---|
| • Alpha Strikes | • Rocket launching |
| • Close Air Support | • Air Combat Maneuvers |
| • Parachute Operations | • Target Marking |
| • Electronic Warfare | • Aerobatic Flights |
| • Tactical Air Control Party | • Troop Lifts |
| • Low Altitude Training | • Spotter Training and / or Air Strikes |
| • Low Level Bombing | • Strafing |
| • Limited Ground Controlled Intercepts | • Dissimilar Air Combat Training |
| • Close-in Fire Support | • Forward Air Controller |
| • Visual Reconnaissance | • Troop Inserts |
| • Medical Evacuation Support | • Re-supply Missions |
| • Night Vision Goggle Training | • Photo and Photoflash Runs |
| • Rotary-Wing Operations | • Small Caliber-Direct Fire Weapons Systems |
| • Low Altitude Refueling Operations | • Fixed-Wing Tactical Operations |
| • Airborne Refueling Operations | • Flight Activities Associated with MEB Exercises |
| • High-Altitude Indirect Fire Systems | • Remotely controlled aircraft (Unmanned Aerial Vehicle [UAV]) operations |

The following aircraft are currently or shortly projected to train at the Combat Center (USMC 2017):

| Table 2-2 List of Aircraft | | |
|---|---|---|
| **Designation** | **Name** | **Aircraft Type** |
| A-10 | Warthog | Fixed Wing |
| AV-8B | Harrier II | Fixed Wing |
| B-1 | Lancer | Fixed Wing |
| C-130 (KC-130) | Hercules | Fixed Wing |
| F-5E | Tiger 2 | Fixed Wing |
| F-15 | Eagle | Fixed Wing |
| F-16 | Falcon | Fixed Wing |
| F-22 | Raptor | Fixed Wing |
| F/A-18 C/D | Hornet | Fixed Wing |
| F35 | JSF | Fixed Wing |
| AH-1 | Cobra | Rotor Wing |
| CH-46 | Sea Knight | Rotor Wing |
| CH-53 | Sea Stallion | Rotor Wing |
| MV-22 | Osprey | Tilt Rotor |
| UAV - Various | n/a | n/a |

Aircraft over flights generally have little direct impact on natural resources. Air ordnance delivery operations are conducted by both fixed- and rotary-wing aircraft. Some aircraft flights originate and / or terminate at the Strategic Expeditionary Landing Field (SELF). Unmanned Aerial Vehicles operate from a facility near Assault Landing Zone Sandhill. Parachute drops of personnel and cargo may occur in all training areas with prior coordination.

### Ordnance Use

Ordnance use is prohibited within 1,000 meters of the Combat Center boundary. The use of air-to-ground ordnance (bombing and strafing) is a characteristic and integral part of training at the Combat Center. The manner of aerial ordnance delivery varies due to differences in aircraft, weapons systems, and missions. Live-fire is strictly prohibited in Mainside and Camp Wilson. The East training area is a non-impact area, and Acorn, West, Sandhill and East may only be used for blanks and pyrotechnics.

### Digging and Earthmoving

When in a stationary position for an extended period of time, such as in defense or in preparation for an enemy attack or ambush, vehicles must be dug into the ground. “Digging in” is the act of constructing a fighting position below the surface of the ground to provide the vehicle and crew

protection against direct and indirect enemy fire and to conceal their position from the enemy forces. This critical skill typically utilizes engineering equipment or other heavy machinery to prepare the fighting positions. To reduce environmental impacts, all disturbed areas are returned to their natural grade at the end of each training event.

Digging in is normally done during defensive operations and takes place in numerous training areas aboard the Combat Center. Digging in also involves building obstacles to channelize, slow down, or stop the forward movement of enemy forces. There are various types of natural and mechanical obstacles that can be constructed, the most common of which is a tank ditch. A tank ditch is a large berm-and-trench system that extends across the entire front of the defensive position. Tank ditch berms can be from 3,280 feet (1,000 33 meters) to 11,480 feet (3,500 meters) in length; the chosen size and placement is based on the Commander's current tactical situation.

**Targetry**

There are three general types of targets used for military training exercises aboard the Combat Center. These include permanent targets, laser targets, and small arms remote target systems, and are discussed below.

***Permanent Targets*** include non-automated and automated systems. Non-automated targets consist of either stationary plywood (presenting a tank or other military target silhouette), stacks of tires, or old military vehicles. Two types of automated target systems include the Infantry Remote Engagement Target System (pop-up Stationary Infantry Targets and pop-up Moving Infantry Targets attached to aluminum rails), and the MAGTF Target System, located throughout training areas.

The MAGTFTC Target Systems are automated target systems consisting of stationary pop-up armor targets (Target Holding Mechanism-Tank Gunnery). There are 172 stationary pop-up armor targets throughout the training areas and at three ranges. The MAGTFTC Target Systems are designed to support training of tank gunnery personnel and anti-tank Marines in identifying and firing on hostile targets. The MAGTFTC Target Systems are expected to increase dramatically with an increase of approximately 243 new Target Holding Mechanisms in seven training areas.

***Laser Targets*** are found in 15 training areas and consist of the Simulated Laser Target and the Mobile Independent Target System. The Simulated Laser Target provides a laser splash when aimed at an object or point on the ground; aircraft and other instruments capable of identifying laser targets register the splash to complete their warfare exercises. The Mobile Independent Target System uses a strobe light system to determine hits and misses on vehicular targets and is used for laser ground-to-ground and air-to-ground firing.

***Small Arms Remote Target Systems*** are portable, remote, radio-controlled marksmanship trainers designed for outdoors, live-fire ranges. Their main purpose is for honing battle skills, reaction times, and small arms firing techniques in all weather, day and night exercises.

**Permanent and Expeditionary Facilities**

The following is a review of the various temporary and permanent training facilities, and fixed and laser ranges, which are used in Marine Corps training aboard the installation. The majority of the Combat Center training facilities are expeditionary and temporary in nature, to provide a realistic replication of a combat situation.

The ***SELF (Strategic Expeditionary Landing Field)*** is a temporary support base for the aviation combat element of Marine units engaged in MTD Training. The SELF is approximately eight miles northwest of Mainside, has an 8,000-foot aluminum matting runway, aircraft parking area, tactical airfield dispensing system, expeditionary control tower, weather facilities, and crash/fire/rescue services.

The ***Exercise Logistical Coordination Center (ELCC)*** supports deployed units during MAGTF training operations. The Exercise Support Base is northeast of the ELCC and lies partially within both Sandhill and West training areas. Permanent facilities include a fire station, a field kitchen, an all-ranks club, an exchange, shower facilities, a fitness center, a telephone center, laundry, and chapel. K-Spans are on-site fabricated metal buildings constructed by military engineers as part of their training performance standards. The K-Spans are used for berthing, administration, maintenance, and warehousing. There is typically a high level of foot and vehicle traffic within Camp Wilson.

The ***Field Ammunition Supply Point*** is near Camp Wilson. It is used by individual units to stage ammunition for field exercises.

***Pre-Designated Range Training Support Sites (PRTSS)*** are permanent combat support sites permanently authorized for uses such as bivouacking, berm construction, trenching, field mess, field showers, Forward Ammunition Resupply Point (FARP) and Forward Logistics Base (FLB). PRTSSs were established as a means to reduce environmental burden on training units, ensure environmental compliance, and extend the use of valuable training land. PRTSSs range from 3 to 595 acres and encourage military units to concentrate ground-disturbing activities to the same area. Fourteen PRTSSs currently exist in the following training areas:

- Cleghorn Pass (1)
- Camp Wilson (1)
- East (1)
- Emerson (1)
- Gypsum Ridge (2)
- Lavic Lake (1)
- Noble Pass (1)
- Lead Mountain (2)
- Prospect (1)
- Quackenbush (2)
- West (1)

The ***Assault Landing Zone***, an unimproved dirt airfield, is located in the Sandhill Training Area. The airfield runway length is 5,000 feet and qualifies for Air Force C-130 aircraft.

***Drop Zone Sandhill***, approximately one kilometer southeast of Assault Landing Zone Sandhill, is a designated drop zone for personnel and cargo parachute drops. Parachute drops are permitted in other parts of the training areas.

***Helicopter Landing Pads*** exist at 96 locations across the Combat Center. Ninety-two landing zones are scattered throughout the Training Range with four at Mainside. Another 54 tilt-rotor landing sites were developed and surveyed. Four Landing Zones in the Lavic Lake and Lead Mountain Range Training Areas were constructed and covered with road base.

**Observation Posts** are located on strategic high points throughout the training areas; there are 15 in total. They are used by Tactical Training Exercise Control Group, communication units, and command units during training exercises. These areas are designated as no fire and / or maneuver areas.

***Range Control*** (call sign BEARMAT) consists of a building for personnel and antennas, and a control tower at Mainside. Range Control's mission is to monitor radio frequencies to maintain positive control and management of the Combat Center range / training areas and restricted air space. This includes R-2501 and the two Military Operation Areas, which are Special Use Airspace under Federal Aviation Administration (FAA) control that may be activated by the Combat Center for military use. Range Control is responsible for ensuring that maneuvering units are not in another unit's impact area. It coordinates with the Federal Aviation Administration and the Expeditionary Airfield (EAF) Control Tower; advises all unit activities, monitors activities, notifies appropriate authorities in case of a medical evacuation, and gives clearance to arrivals and departures of aircraft using landing zones at Mainside.

***Repeater Towers*** support radio communications and there are 7 located on various mountaintops throughout the training range. These repeater towers are built within fiberglass shelters and are powered by solar and / or battery energy.

***Fixed Ranges*** are numbered, permanent ranges covering approximately 16,000 acres (Figure 2-3). There are 39 fixed ranges in the Combat Center, with some overlap between boundaries. These ranges are described below (EDAW 1994), however greater detail and modifications may be found in Snover and Kellogg (1999):

***Range 051***, Explosive Ordnance Device (EOD) Range.
***Range 100***, Squad Maneuver Range is a land navigation range.
***Range 101***, Small Arms Battle Sight Zero (BZO) Range.
***Range 102***, Squad Maneuver Range is a land navigation range.
***Range 103***, Squad Defensive Fire Range is designed to improve squad defensive tactics by incorporating changing deployment requirements and scenarios.
***Range 104***, Anti-Mechanized / Grenade Range is designed to develop confidence of unit members in their abilities to use grenades and special weapons.
***Range 105***, Gas Chamber is designed to train units in the use of CS gas and develop confidence of unit members in the use of gas masks.
***Range 105A,*** Small Arms BZO Range.
***Range 106***, Multi-Purpose range complex consisting of a Combat Marksmanship range & Mortar Range

***Range 106A,*** Light, Medium and Heavy machinegun range.
***Range 107***, Infantry Squad Battle Course, is a live-fire range that incorporates quick reaction scenarios, such as ambushes, raids, and reconnaissance.
***Range 108***, Infantry Squad Assault Range, is designed to improve offensive tactics during changing deployment requirements and scenarios.
***Range 109***, Anti-Armor Live-Fire Tracking Range is designed primarily for use by JAVALINE or TOW weapons systems.
***Range 110***, MK-19 Range is designed to train use of the MK-19 machine gun.
***Range 110A***, M-203 Qualification Course.
***Range 111***, MOUT Assault Course train units for MOUT operations and features automated stationary and moving targets, three story Sniper Tower.
***Range 112***, EOD Demolition Range.
***Range 113***, Multi-Purpose Machine Gun Range is designed to train units in the offensive and defensive use of all machine guns systems in the Marine Corps arsenal also has a four story Sniper Tower which provides Snipers and Designated Marksman an environment to engage targets in an Urban Setting.
***Range 113A,*** Small Arms BZO Range.
***Range 114***, Combat Engineer Demolition Range is designed to accommodate mine and countermine operations at the company level and can be used for demonstrating protective, tactical, point, interdictions, and simulated mine fields.
***Range 200,*** MOUT Town simulates urban warfare in a town or city setting.
***Range 205***, Convoy Course allows Marines to practice both offensive and defensive maneuvers during convoy operations.
***Range 205A***, Training for MOUT operations and features automated stationary and moving targets.
***Range 210***, MOUT Live Fire allows Marines to practice warfare in an urban setting using live ammunition.
***Range 215***, MOUT Town simulates urban warfare in a town or city setting.
***Range 215A***, Tactical Exploitation Site to train small groups in battlefield intelligence skills in an urban environment.
***Range 220***, CAMOUT Combined arms town simulates urban warfare in a city setting
***Range 225***, Non-Live Fire MOUT used for urban warfare in a city setting and K-9 patrols
***Range 230***, MOUT Live Fire allows Marines to practice warfare in an urban setting using live fire ammunition.
***Range 400***, Company Live-Fire and Maneuver Range is designed to provide a rifle company with the opportunity to conduct a live-fire attack on enemy strongholds.
***Range 401***, Company Live-Fire and maneuver range for rifle companies conduct live fire attack on enemy strongholds.
***Range 410***, Platoon Live-Fire and Maneuver Range is designed to provide the opportunity for a rifle platoon to attack enemy positions and practice wire breaching and trench clearing procedures.
***Range 410A***, Rifle Platoon Attack is designed to provide the opportunity for a rifle platoon to conduct a minefield breach, and a dismounted, live attack against a hastily defending enemy squad.
***Range 500***, Armored Live Fire and Maneuver Range provide the site and supporting facilities for armor and anti-armor training.

***Range 601***, Super Sensitive Fuse Impact Range, is restricted to only critical fuse ordnance that can be delivered by indirect fire weapons or aircraft.
***Range 630***, Indirect Range specifically designed to allow the release of inert GBU-31, 33, and 35 Joint Directed Attack Munitions (JDAM) as well as other inert aviation delivered ordnance
***Range 700***, Helicopter suspension and Rappelling tower
***Range 705***, Combat Vehicle Operator Training Course (CVOT) consists of 11 miles of varied road conditions from improved roads to soft sand to develop driving skills for combat vehicle operators.
***Range 705A,*** CVOT Intermediate/Advanced.
***Range 706,*** CVOT
***Range 800***, Improvised Explosive Device (IED) Range provides MOUT facilities for tactical engagement simulations involving the use of IEDs.

***Laser Ranges***

Fifteen training areas contain ***Laser Target Areas***, which are used for laser ground-to-ground and air-to-ground firing. Strict regulations and guidelines are enforced to prevent exposure to hazardous levels of laser radiation.

There are various ***Training /Low Power Laser Systems***. A few examples include the Multiple Integrated Laser Engagement System, Air-to-Ground Engagement System / Air Defense, and the Near Infrared Pointers and Signaling Devices. A brief description of each system is described below:

- The ***Multiple Integrated Laser Engagement System*** is a scoring system for tactical exercises that emits infrared beams from each weapon that are then detected by target sensors fixed upon a person or a vehicle. These devices do not present a hazard at normal operational (engagement) distances.
- ***Air to Ground Engagement System/Air Defense*** emits an infrared laser beam to simulate various air defense and airborne weapons systems to increase realism during training. Air-to-ground laser firing also utilizes land features as its backstop.

The ***Laser Evaluator System*** is used by air or ground units. When illuminated by laser beams, the system emits a low power signal back to the pilot or unit, verifying that it was struck by a laser.

### 2.5.4 Primary Training Activities

Training exercises combine individual and group training activities into events that test unit capabilities under real-world scenarios. Various live-fire exercises are conducted at the Combat Center each year, including Integrated Training Exercises (ITX), MAGTF Training, MEB Training, Steel Knight, Desert Fire Exercise (DESFIREX), and Desert scimitar. Major exercises occur for approximately 90 percent of the year. Many other types of smaller exercises are also scheduled, separately and sometimes simultaneously, throughout the year. This section reviews the typical training exercises aboard the installation.

**Integrated Training Exercise**

The primary function of the Combat Center is to develop, conduct, administer, and evaluate the ITX Program. The ITX program, formerly known as the Combined Arms Exercise (CAX) Program and Enhanced Mojave Viper, is the longest-lasting activity that occurs at the Combat Center and takes priority over all other types of training exercises. This live-fire training exercise trains units to synchronize air / ground live fire operations in desert and urban environments. Each ITX lasts approximately 30 days and is controlled by the Tactical Training Exercise Control Group (TTECG) using a building block approach. Training begins at the unit level and culminates with a Final Exercise (FINEX) in which the entire battalion participates, operating in an urban setting for a 72-hour period.

A general sequence of events for an Integrated Training Exercise follows:

- The ITX Force arrives at the Combat Center and conducts unit level training involving live fire and maneuvers in the "100-series" ranges.
- The ITX Force then receives an orientation including a program overview, general procedures, and briefings on range safety and environmental regulations.
- The battalion (800 marines) commences field training on the Range 400 series. Infantry squads, platoons, and companies practice attacking enemy defenses using organic weapons (*e.g.*, mortars, machine guns, etc.); no air or artillery support is provided.
- Fire Support Coordination Exercises are conducted simultaneously with the Range 400 series infantry troop training. During Fire Support Coordination Exercises, Forward Air Controllers and Artillery Forward Observers work together to bring coordinated aircraft and artillery fire on enemy targets.
- Convoy Operations, Combat Patrolling, Mobile Assault and Helicopter Assault complete the training received during the Combined Arms portion of the ITX. Based on the units proposed mission, the exercise force chooses "packages" of training that will best prepare them for their deployment. Each package combines movement – either mechanized or via helicopter – with live fire in a desert environment. An infantry battalion will receive a slightly different package from a Service Support unit or a Provisional Military Police battalion, but all units are trained to collective skill sets that are tailored to individual battalion needs.
- The unit next conducts Urban Warfare Training. Located primarily in Range 200, 205, 210, 215 and 220 in the Training Areas, this package is a ten-day evolution that encompasses Cordon and Knock, Vehicle Checkpoint, Urban Patrol and Urban Assault training. A FINEX is conducted during the last three days, during which time the entire battalion participates in a free-flowing series of events that are predicated and driven by a presiding intelligence picture. Three hundred role players, many of them native Arabic speakers, provide credence to the exercise by interacting directly with the Marines during the FINEX.

**MAGTF Level Training**

This exercise includes live-fire training that combines ground, air, and support elements of a Marine Air Ground Task Force, referred to as the exercise force. The MAGTF exercise force involved in ITX include a Command Element, Ground Combat Element, Aviation Combat Element and a Logistical Command Element:

- The Command Element is normally made up of an Infantry Regiment.
- Ground Combat Element normally consists of two infantry battalions (approximately 2,000 Marines) reinforced by a tank/LAR platoon (14 M1A1/15 LAVs and 2 M-88 tanks) and an artillery battalion (12-18 howitzers and support trucks).
- The Air Combat Element consists of a fixed-wing squadron (approximately 12 F/A-18s, 18 AV-8Bs or F35 JSF), an attack helicopter squadron (6-8 AH-1 Cobras), and a composite helicopter/tilt rotor squadron (CH-46s/CH-53s/MV-22s) for transportation and heavy lift
- The Logistical Command Element includes approximately 320 Marines and provides supplies and repair services to the Ground and Air Combat Elements

The TTECG, based at the Combat Center, coordinates all ITX Combined Arms Live Fire Training. TTECG sets up various situations that require an exercise force to effectively coordinate a combined arms response. The MAGTF Level Training can last approximately 30 days and is controlled by the TTECG using a building block approach. An additional ITX program is also conducted each year for reserve units that last 15 days. Training begins at the staff and unit level and culminates with a FINEX in which the entire MAGTF participates, operating in the field for a 72-hour period.

A general sequence of events for MAGTF Training is presented below:

- The Exercise Force receives an orientation including a program overview, general procedures, and briefings on range safety and environmental regulations.
- The Ground Combat Element commences field training on the Range 400 series. Infantry squads, platoons, and companies practice attacking enemy defenses using their organic weapons (*e.g.*, mortars, machine guns, etc.); there is no air or artillery support provided at this time.
- Air Support Coordination Exercises are conducted simultaneously with the Range 400 series infantry troop training. During Air Support Coordination Exercises, Forward Air Controllers and Artillery Forward Observers work together to bring coordinated aircraft and artillery fire on enemy targets.
- Maneuver complexity increases during Mobile Assault Course exercises, during which a company-level attack and defense is performed using infantry Marines and mechanized equipment. Armor, artillery and motors, fixed-wing aircraft and attack helicopters support the attack. The Mobile Assault Course incorporates movement under fire, with battle drills including breaching an anti-armor obstacle, mounted and dismounted attacks through an objective, synchronized planning, and employment of all assets (infantry, armor, artillery, and air fire).
- Before conducting the final exercise, the exercise staff rehearses operations and refines tactical plans in the Combined Arms Staff Trainer, an indoor, electronic system that includes three-dimensional terrain boards of the various Combat Center exercise areas, a laser light system to simulate impacts on the boards, and communications / electronic warfare systems simulators.
- The Fire Support Coordination Exercises (FSCEXs) involve maneuver commanders using Forward Air Controllers and mortar and artillery Forward Observers for live air and artillery fire. FSCEX-1 is a company-level tactical exercise. The team attacks an enemy

defense utilizing artillery, fixed-wing aircraft, and attack helicopter support. FSCEX-2 is a battalion movement-to-contact, live-fire tactical exercise. FSCEX-3 is a battalion delay-and-defend live-fire exercise that emphasizes continuous fire support during rearward movements. FSCEX-4 and FSCEX-5 are conducted only during Enhanced MAGTF Training when a regiment (two or three battalions) acts as the Ground Combat Element.

- The FINEX is the culmination of the MAGTF Training. It is an exercise that brings together the tactics, techniques, and procedures developed during the previous training period. During the three-day FINEX, the Ground Combat Element, supported by the Air Combat element and the Combat Service Support Element, execute numerous missions (attack, defend, delay) in a live-fire environment.
- Upon completion of the FINEX, the Tactical Training Exercise Control Group conducts occupational specialty debriefs and a comprehensive debrief covering all aspects of the exercise force's performance.

**Marine Expeditionary Brigade Exercise Training Program**

Also known as the "MEB" exercise, this program uses targeting, intelligence, and electronic warfare operations to develop and implement a comprehensive plan to achieve the training objectives. The MEB training exercises use a framework of progressively larger and more challenging training events that build in successive evolutions designed to reinforce learning through assessment of established levels of performance. Training events are driven by mission essential tasks that incorporate the command, ground, aviation, and logistics combat elements.

**Steel Knight**

The Steel Knight training exercise is a two-week, Division-level training event. Steel Knight training scenarios change but exercise events include: deliberate attack, counterattack, day / night deliberate defense, withdrawal, battlefield interdiction, direct air support, close air support, and night tactical withdrawal not-under-enemy-fire. Exercises also include aerial reconnaissance / surveillance and long-range artillery missions. Most training areas at the Combat Center are employed for Steel Knight.

**DESFIREX**

This primarily artillery training exercise at the Regimental level involves 2,000 Marines for 7-14 days twice per year. It normally consists of a Regimental Headquarters, two M777A2 cannon battalions, and one high mobility artillery rocket system (HIMARS) battalion. HIMARS units range from a battery (9 launchers) to a battalion (27 launchers). DESFIREX is sometimes combined with Mission Rehearsal Exercise. When HIMARS are incorporated into DESFIREX, the HIMARS batteries routinely fire the MLRS M28A1 practice rocket.

Other DESFIREX training scenarios can include an EXCALIBER Shoot, Helicopter-borne raids, and Unmanned Aerial Vehicle operations. The scenario for a DESFIREX is variable and can encompass most of the training areas. The heaviest artillery use occurs in Quackenbush, Gays Pass, Lavic Lake, Blacktop, Lava, and Lead Mountain, with moderate artillery firing into Emerson Lake, Maumee Mine, Prospect, Delta, Noble Pass, Cleghorn Pass, Bullion and America Mine.

**Desert Scimitar**

Primarily a Division-level training exercise (7,000 Marines), Desert Scimitar emphasizes artillery maneuvers with infantry and tanks that are supported by air and rotary-wing live-fire. It is conducted once each year for 1-2 weeks.

Desert Scimitar normally consists of the following units: Division Headquarters, Regimental Headquarters, two M777A2 cannon battalions, and one HIMARS battery (9 launchers) or battalion (27 launchers). Desert Scimitar is sometimes combined with a Mission Rehearsal Exercise. When HIMARS are incorporated into Desert Scimitar, the HIMARS batteries routinely fire the MLRS M28A1 practice rocket. In addition, one firing battery will also take part in an EXCALIBER shoot. Similar to Steel Knight, Division-level forces involved in a Desert Scimitar can encompass a wide array of forces, including Division Headquarters, two 1 Regimental Headquarters, Artillery Regimental Headquarters, three infantry battalions, a tank battalion, 2 two LAR battalions, one AAV battalion, and a Logistical Command Element.

Other Desert Scimitar training scenarios can include helicopter-borne raids and Unmanned Aerial Vehicle (UAV) operations. The scenario for a Desert Scimitar is variable and can encompass most of the training areas. The heaviest artillery use occurs in Quackenbush, Gays Pass, Lavic Lake, Blacktop, Lava, and Lead Mountain, with moderate artillery firing into Emerson Lake, Maumee Mine, Prospect, Delta, Noble Pass, Cleghorn Pass, Bullion, and America Mine.

### 2.5.5 Other Training Activities

**Allied Forces**

Forces from various allied nations occasionally train at the Combat center; two regularly-occurring exercises involving the United Arab Emirates and United Kingdom are provided as examples.

A United Arab Emirates (UAE) exercise occurs four times each year. This training is conducted by 500 personnel from the UAE and is designed to provide them the opportunity to sharpen their skills in the art of live-fire and maneuvers involving ground infantry and mechanized forces. These exercises typically last 20 days and can occur in any Training Area.

Black Alligator is a company level exercise conducted once each year and is executed by 180 personnel from the United Kingdom (Commando Units). This exercise normally last 42 days, can occur in any Training Area, and involves the employment of air, artillery, mortars and ground maneuver.

**Formal Schools**

Many different types of training exercises regularly occur at the Combat Center to support formal school training activities; some these exercises (not all inclusive) are described below.

The ***Fire Support Coordination Application Course*** (FSCAC) occurs four times per year for 12-14 days and involves 100 Marines. This exercise involves live-fire, most of which is aircraft-

delivered ordnance in the Delta, Quackenbush, Lead Mountain, and Prospect Training Areas, with non-live-fire activities occurring in the Gypsum Ridge Training Area.

The ***Tactical Air Control Party*** (TACP) live-fire evolutions are the primary means by which the Marine Corps is able to provide Marines the requisite qualifications to be a Forward Air Controller (FAC). TACP training occurs over a 4-5 day period, is held 10 times per year, and involves 150 Marines. TACP training involves an 81mm mortar platoon, an artillery battery, and one section of aircraft support. This training normally takes place in, but is not limited to, the Quackenbush, Lead Mountain, and Bullion Training Areas.

The Infantry Officer Course consists of approximately 95 infantry officers and a supporting staff of 25 Marines. Training events occur four times per year to train infantry officers in the operations and employment of all crew-served weapons in both offensive and defensive situations. In addition, infantry officers also learn the art of calling in and adjusting mortars, artillery, and aircraft-delivered ordnance. This training lasts approximately 18 days and usually takes place in the following Training Areas: America Mine, Bullion, Lead Mountain, Delta, Prospect, and Quackenbush. In addition, building block training also takes place on the following fixed ranges: R400/401 series, R220, and R104 –R113.

**Weapons/Equipment Testing**

The ***Fallbrook Shoot*** is a highly valuable exercise that typically involves 150 Marines that occurs when the Naval Ordnance Center, Pacific Division, Fallbrook, brings sample lots of ammunition, fuses, or propellants in order to verify the integrity and performance of each lot and to ensure that the lots are capable of meeting manufacture's tolerances. These exercises occur as needed and only at select ranges that are suitable for these types of artillery. This type of exercise is normally conducted in, but not limited to, Quackenbush or Lead Mountain Training Areas.

The ***Barstow Shoot*** occurs periodically as needed to test fire Howitzers that have been rebuilt by the Marine Corps Logistical Base, Barstow, and also typically involves 150 Marines. The nature of this test requires the gun be fired horizontally into the side of a mountain. Tests like this are normally conducted in, but not limited to, the Delta Training Area.

**Unit Level Training**

Unit level training of active and reserve Marines consists of a building block process wherein units begin at the squad level and progress through a series of exercise scenarios, ending with a battalion-level exercise. Training at the squad through company level is continuous and takes place in all Training Areas throughout the year. Battalion-level exercises combine various units and attachments, normally take place four times per year, and involve anywhere from 1,500 to 2,000 Marines. Unit level training events can occur in any Area but typically occur in the following Training Areas: America Mine, Bullion, Morgans Well, Lead Mountain, Black Top, Delta, Prospect, Quackenbush, Gays Pass, Lavic Lake, Rainbow Canyon, Maumee Mine, and Noble Pass. Early stages of unit-level training normally will take place on the following 6 fixed ranges: Ranges 103-R113, R400/401 series, R210, R230, R220, R215, and the East and West Training Areas.

### Additional Exercises

Several other similar or ancillary training programs, exercises, and activities occur on an annual or semi-annual basis at the Combat Center. Transient commands (those not stationed permanently at the Combat Center) that schedule training at the Combat Center include numerous Marine Corps, Air Force, Army, and Navy Units.

## 2.6 Natural Resources Management and the Military Mission

### 2.6.1 Impact Minimization Strategies

The Combat Center is committed to managing natural resources for the benefit of both the installation as well as regional resources and communities. Krzysik and Trumbull's (1996) discussion on military training impacts on natural resources identified several key mechanisms of impact from military training operations on the environment, including direct disturbance to soils, vegetation, and wildlife, as well as secondary disturbances caused by noise and vibration, smoke and obscurants, and habitat fragmentation. Their study concluded that the military mission has potential to cause disturbance to natural resources aboard the Combat Center. Additional discussion of potential impacts from military training was provided in subsequent environmental analyses (USMC 2003; USMC 2012).

The Combat Center also recognizes military training aboard the installation precludes potential impacts to natural resources from other land uses. See, for example, discussion MCAGCC (2012) regarding expansion of the installation.

### Live-Fire and Maneuvers

Military training activities that employ live-fire and ground maneuvers represent two major sources of natural resource disturbance at the Combat Center. These activities could injure or kill wildlife, disturb or damage soil structure and vegetation, and generate considerable dust. Most of the measured disturbance at the Combat Center occurs in valley floors. Potential effects of the military mission on the desert vegetation of the Combat Center include a reduction in shrub densities; impaired growth, leaf and root injury; reduction in annual and perennial species, and increased mortality. Potential effects of the military mission on wildlife include possible death or injury from direct contact with vehicles or munitions.

Air-to-ground and ground-to-ground live-fire training and maneuvers will continue to cause most of the disturbance to natural resources on the Combat Center in those areas that are heavily disturbed. This disturbance is cumulative and is intensified with repeated long-term use. To manage for heavy, sustained impacts over time, the Combat Center employs a strict ground disturbance minimization strategy.

### Ground Disturbance

The Combat Center significantly limits ground impacts from military training. Most training operations occur within the same sites and corridors, even between different visiting units. Fixed ranges and Pre-Designated Range Training Support Sites provide for recurring, high-intensity activities, allowing other areas to remain relatively pristine and untouched. Sensitive high-value natural resource sites are also formally recognized, signed, and maintained as training-free zones, further protecting natural resources in those locations. Generally, valley floors and wide flat

areas are used more often for wheeled and tracked vehicular travel and maneuvers. More rugged areas may sometimes be disturbed by direct shell and bomb impacts. Areas minimally affected by military activities are usually inaccessible to vehicular traffic, are isolated, or are not critical to current training scenarios. These areas include most of the mountain ranges on the Combat Center, particularly in their higher reaches; the one-kilometer (km) buffer zone around the perimeter of the installation, and the Sunshine Peak Training Area which is off-limits to all personnel as it is used as a hung-ordnance delivery area.

**Ordnance Residue and Range Maintenance**

At the conclusion of all major training exercises, Explosive Ordnance personnel sweep ranges to neutralize unexploded ordnance and reduce safety risks. Residual wastes from training activities are also removed from the landscape and brought back to Mainside for recycling or disposal. Regular maintenance, repair and replacement of targets is done throughout the year, and typical maintenance activities include the upkeep of firing berms for tanks on Fixed Range 500, tank trap maintenance, and repair of other berms and trenches as required.

### 2.6.2 Benefits from the Military Mission

Military management of natural resources can have positive effects. The presence of the military excludes other land uses that could impact natural resources. Land put into military training is rendered unavailable for development, and military impacts are finite and contained within repetitive events, which establishes maximum disturbance levels to the landscape. Poaching and other illegal activities that potentially affect wildlife resources are relatively insignificant due to military training and military conservation law enforcement. Perhaps most significant, however, is that lands under military management retain most of the vast desert ecosystem as open space. By focusing disturbances, military management gives wildlife greater ranges across large tracts of land, especially when installations are adjacent to one another in undeveloped areas.

## 2.7 Anticipated Changes to Military Tempo

The Combat Center revises training exercise scenarios to better prepare Marines for changing world conditions and threats. Such changes in training scenarios can change the impact of training on the environment. The most recent evolution of the Combat Center was described in the 2012 Land Expansion Environmental Impact Statement (LandEx EIS). The Combat Center will continue to evolve and may increase in scope to meet increasingly complex, worldwide commitments of USMC forces.

## 2.8 Support Facilities and the Built Environment

The Mainside cantonment area is built out to contain a full range of facilities, infrastructure and services that support an almost completely self-reliant human development, with industrial, utility, housing, and commercial elements. Both utilities and roads have been expanded since the bases initial development. Utilities include distribution systems for non-potable water, potable water, sanitary sewer, sewer disposal, electricity, high temperature water, and natural gas. As new buildings are being constructed, sidewalks and xeriscaping are being incorporated. Recently completed construction in the “North Mainside” area included new Bachelor Enlisted Quarters (BEQ), chow halls, range management facilities, administrative buildings, warehouses,

maintenance facilities communications and electronic support facilities, parking areas, training and simulation facilities, new utilities and infrastructure (sewer, water, power, high-temperature hot water, chilled water, natural gas, communications, roads, and storm water management systems). No further construction is planned for "North Mainside", with the exception of possible road and/or sidewalk projects. The USMC's current facilities utilization climate is one of infrastructure reset, leaning on Maximum Utilization & Demolition projects for existing facilities.

### 2.8.1 Transportation

***Regional Access*** **-** Regional access to the Twentynine Palms area is provided by State Route 62 (Twentynine Palms Highway), a four-lane highway that connects to Interstate 10. The Main Gate at Adobe Road is the busiest access point. In addition to the Main Gate, there are two auxiliary gates, with limited access times, near the housing areas.

***Main Supply Routes (MSR)*** **-** The road system through the Training Areas is made up of MSRs and smaller unimproved roads, or jeep trails. MSRs average 32 feet wide, and are maintained by grading and laying down gravel. There are approximately 354 miles of MSRs. Improvements are on-going to prevent erosion and maintain the MSRs.

***Secondary Roads*** **-** There are about 665 miles of secondary unimproved roads on the Combat Center that average 16 feet in width and cover about 0.2% of the total land area. The secondary road system has developed over time to meet the needs of the evolving military mission (Snover and Kellogg 1999). Jeep trails are generally not graded or repaired after flooding and are only maintained through use by military units. Remnants of old jeep trails that are no longer used can be seen throughout the Combat Center. New trails are occasionally made if training objectives are changed. For the most part, the MSR and jeep trail system adequately serve training needs and military units tend to limit travel to these routes.

### 2.8.2 Potable, Storm, and Waste Water Management

***Potable water*** for the Combat Center is supplied via 11 wells in the Deadman Valley-Surprise Spring Basin, located in the southwestern part of the Combat Center. The Deadman Valley-Surprise Spring Basin is bounded by the Emerson and Copper Mountain Faults to the west and the Surprise Spring Fault on the east, which separates this subbasin from the Deadman Valley-Deadman Lake Basin. Most groundwater found in the basins underneath the Combat Center are fossil water (i.e., from previous geologic times) and very little recharge occurs within the Deadman Valley-Surprise Spring Basin; the only recharge source for this basin is the San Bernardino Mountains, located to the west of the Combat Center. Depth to groundwater in the Deadman Valley-Surprise Spring Basin ranges from 200 to over 400 feet (60-120 meters) below the surface (U.S. Geological Survey [USGS] 2003). Depths to groundwater typically range from 125 to 200 feet (38 to 61 m), although perched zones exist near Bristol Dry Lake and Dry Lake, where water levels range from 14 to 89 feet (4 to 27 meters). Recharge occurs via percolation of surface runoff through stream beds and washes.

Three other groundwater subbasins are known to exist beneath the southwestern part of the Combat Center. In the Ames Valley Basin, located west of the Deadman Valley-Surprise Spring Basin, groundwater is found at depths of 175 feet (53 meters) and greater. In the Deadman

Valley-Deadman Lake Subbasin, located east of the Deadman Valley-Surprise Spring Basin, groundwater has been measured at depths of 30 feet (9 meters) to 280 feet (85 meters). In the Twentynine Palms Basin, located to the east of the Mesquite Subbasin beneath the Mainside Area, groundwater has been encountered at 75 feet (23 meters) in one well but is more commonly found at more than 200 feet (60 meters) below ground surface (bgs) (USGS 2003). A new blended drinking water treatment facility is currently in the design/bid/build process to blend groundwater from Surprise Spring and Deadman Lake Subbasins. At the time of this INRMP revision, the associated Environmental Assessment for this project is being finalized.

***Stormwater*** management is vital for maintaining and lowering risks to human life, especially in desert regions which are prone to flash flood events. Although annual precipitation at the Combat Center averages approximately 4.1 inches (10 centimeter [cm]) a year, the majority of rainfall occurs during summer and early fall thunderstorms (Lato *et al.* 1999 and USMC 2001). Surface drainage systems at the Combat Center are internal, channeling runoff flows inward from all directions into natural dry lakebed playas (Lato *et al.* 1999). No naturally-occurring permanent water bodies exist at the Combat Center (USMC 2001) and runoff collected in these lake beds is slowly lost to evaporation and limited infiltration into the soil. However, since 1996 the Combat Center has been implementing a program to eliminate all industrial stormwater discharges to desert playas. This program uses a series of stormwater conveyance and retention systems that preclude the entry of potentially polluted stormwater to the environment by seeping into the ground. A natural clay barrier precludes contaminates from entering the aquifer (USMC 1997). All stormwater runoff, including industrial, goes into retention ponds. A primary storm-water retention pond contains civilian industrial runoff (*e.g.*, gas station, automobile hobby shop), and offers landscaping with native vegetation, a wildlife viewing area, and educational signage. Three other industrial stormwater retention ponds also exist for military-related runoff and are generally dry except after significant precipitation events. Finally, Camp Wilson also has a stormwater retention basin for facilities protection.

***Domestic wastewater*** generated by the Combat Center is required by the Regional Water Quality Control Board to be disposed of within the boundaries of the installation; wastewaters must therefore be disposed of through solar evaporation or irrigation. Wastewater from treatment facilities is collected in two specific retention pond systems. Two ponds service the Golf Course by storing recycled water (up to 12-million-gallon capacity) and waters are used primarily to irrigate the golf course. The Mainside Wastewater Treatment Plant uses three active retention ponds for receiving effluent; any overflow from these three ponds enters four storage ponds that retain water during the winter for summer use. The size of the seven ponds supporting the Wastewater Treatment Plant is approximately 135 acres. Retention ponds generally contribute to biodiversity of wildlife species at the Combat Center (Section 3.3.1) and are heavily used by migratory birds. Zones exist near Bristol Dry Lake and Dry Lake, where water levels range from 14 to 89 feet (4 to 27 meters). Recharge occurs via percolation of surface runoff through stream beds and washes.

### 2.8.3 Projected Changes in Facilities and the Built Environment

Mainside is continually changing to meet the needs of the Combat Center. Many buildings are approaching 50 years old and are slated to be modernized and or replaced with new buildings consistent with the facilities Master Plan. Facility changes are accomplished using a master

planning process through PWD. The current Master Plan projects out approximately 10 years and the master planning process identifies existing land use compatibilities and conflicts, and establishes a framework for future facility sitting and land development. The proposed land use plan is a synthesis of existing conditions, proposed projects, probable land area needs based on increased loading projections, and efficient, functional interrelationships between uses. All projects and activities identified in the Master Plan are required to undergo a NEPA review process at the time of their initiation.

# 3.0 PHYSICAL ENVIRONMENT

## 3.1 Topography and Geology

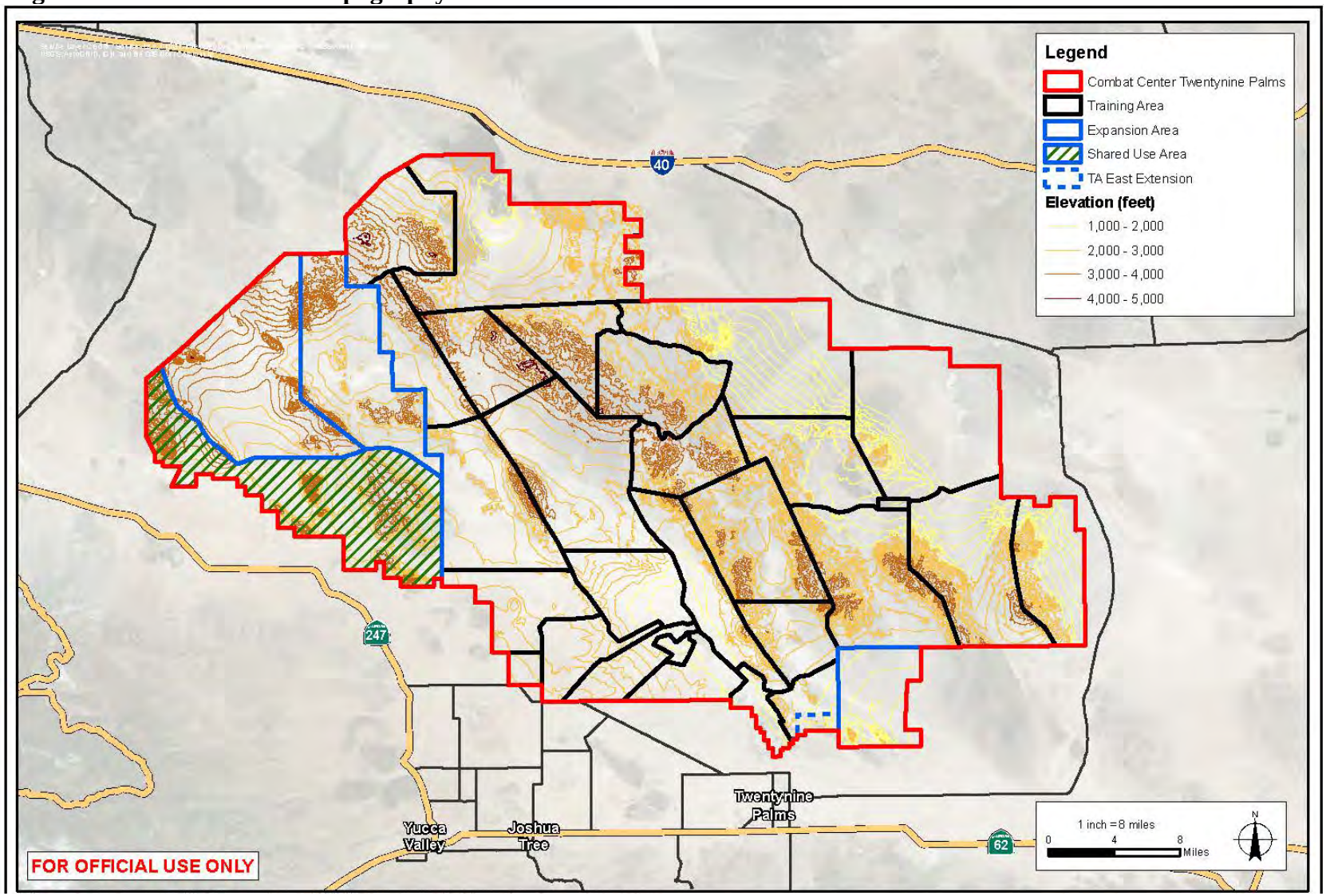
The Combat Center is located in the Mojave Desert, a part of the larger Basin and Range Physiographic Province. Terrain is characterized by alternating rocky uplands with slopes up to 90 percent, and low valleys with broad alluvial plains, washes, and dry lakebeds. Mountain ranges and valleys run mostly parallel along a northwest/southeast trending axis and most of the terrain lies on the intermountain basin between 1,500 and 3,000 feet above mean sea level (Figure 3-1). Ancient lava fields are significant features in some training areas. Several volcanic craters are in the general proximity of the Combat Center; Amboy Crater and Pisgah Crater (just outside of the Combat Center) are the most evident. Sunshine Peak Crater lies within the Sunshine Peak Training Area. The highest elevation in the Combat Center is 4,699 feet at OP Round in the Bullion Mountains, and the lowest is 604 feet at Dry Lake in the Lead Mountain Training Area.

Area geology is classified as Mojave Bedrock, and the oldest geological elements are the Bullion Mountains, which consist of primarily quartz monzonite and granite. Layers of blown sand, called sand ramps, contribute to lower elevation soils of mountains adjacent to Mainside. The Combat Center geological make-up consists of tertiary basement rock with overlying quaternary alluvial deposits. The basement rock is nearly impermeable except where it has been fractured or weathered.

***Seismicity*** - The Combat Center is located in a highly active seismic region. The San Andreas Fault is in close proximity to the southwest, the Pinto Mountains Fault lays to the south, the Garlock Fault to the north, and approximately 50 named and unnamed faults run within the Combat Center boundary. The most prominent active fault system is the Calico-Mesquite Lake Fault System. Mainside is situated between the Mesquite Lake and Bullion Mountain fault which is certified as potentially active by the US Geological Survey. Numerous small earthquakes have been recorded across the installation, as well as several larger ones, including the Lander's Earthquake (registering 7.5) and Hector Mine Earthquake (registering 7.1). Open fissures and surface ruptures from previous seismic events are well documented on the landscape.

***Petroleum and Minerals*** - There is a rich history of mining activity both on and adjacent to the Combat Center. Mineral deposits include lead, zinc, copper, silver, and gold and abandoned mines are present in Emerson Lake, Bullion, Delta, Prospect, Maumee Mine, Sunshine Peak, Lavic Lake, and Lead Mountain Training Areas. The Department of the Navy has the authority to reject mining claims with the exception of "certain hardrock minerals known as locatables" (DoD Directive 4700.3). "Locatables" include gold and silver. However, military reservations have historically not been open to any type of mining and the possibility of having to suspend or curtail the Combat Center training exercises due to mining activities is very unlikely. In recent years, military installations have been open to mining of certain minerals, most notable oil and gas but given the geology of the area, the possibility of oil and gas mining is extremely remote.

**Figure 3-1: Combat Center Topography**



***Geothermal Resources*** - The U.S. Geological Survey and Katzenstein and Whelan (1987) investigated the geothermal potential of steam trapped underground at the Combat Center and concluded that temperatures were not high enough to make development economically feasible. In 2009-10 the US Navy Geothermal Program Office sampled the Sandhill and West range training areas. The conclusion was that hydrothermal alteration suggests the resource temperature is not high enough for commercial grade power generation (DoN Geothermal Program Office 2011).

## 3.2 Soils

### 3.2.1 Formation

Soils are formed through the chemical and mechanical weathering of parent rock materials, and from biological processes. Soil materials originate from parent rock substrates often found on the strong to very steep upland slopes at the higher elevations of the Combat Center, where conditions are excessively drained, stony or rocky. Weathering generates cobbles, gravels, sands and sandy loams which are slowly flushed downslope and across the landscape during aeolian and alluvial events. Bajadas typically consist of coarse gravels grading into loamy sands, sandy loams, to finer loamy materials. Playas located at the bottom of the basins accumulate silts and clays and generally develop salt pans. Plant root systems (as well as lichens and fungi) also break down rocky substrates. Plants (and associated wildlife) deposit biomatter in the form of plant leaves and branches, and plants often attract animals which deposit animal waste, all of which facilitates the production of detritus and ultimately creates “islands” of enriched soil nutrients, improved water holding capacity, and amplified ecological functioning (productivity).

Compared to other soils found in other climates, desert soils are more fragile and form slowly, thus they are vulnerable to erosion from wind and water, and compaction and displacement from vehicles. The ecology of desert soils is also more sensitive to changes in bioavailable nutrient levels, which can be influenced by indirect anthropogenic activities. The time required for desert soils to develop is not well understood. Webb *et. al.* (1986) estimated it takes a minimum of 50 years for vegetation to recover from impacts of a vehicle pass, but 100 years for soil, and over 1,000 years for total recovery.

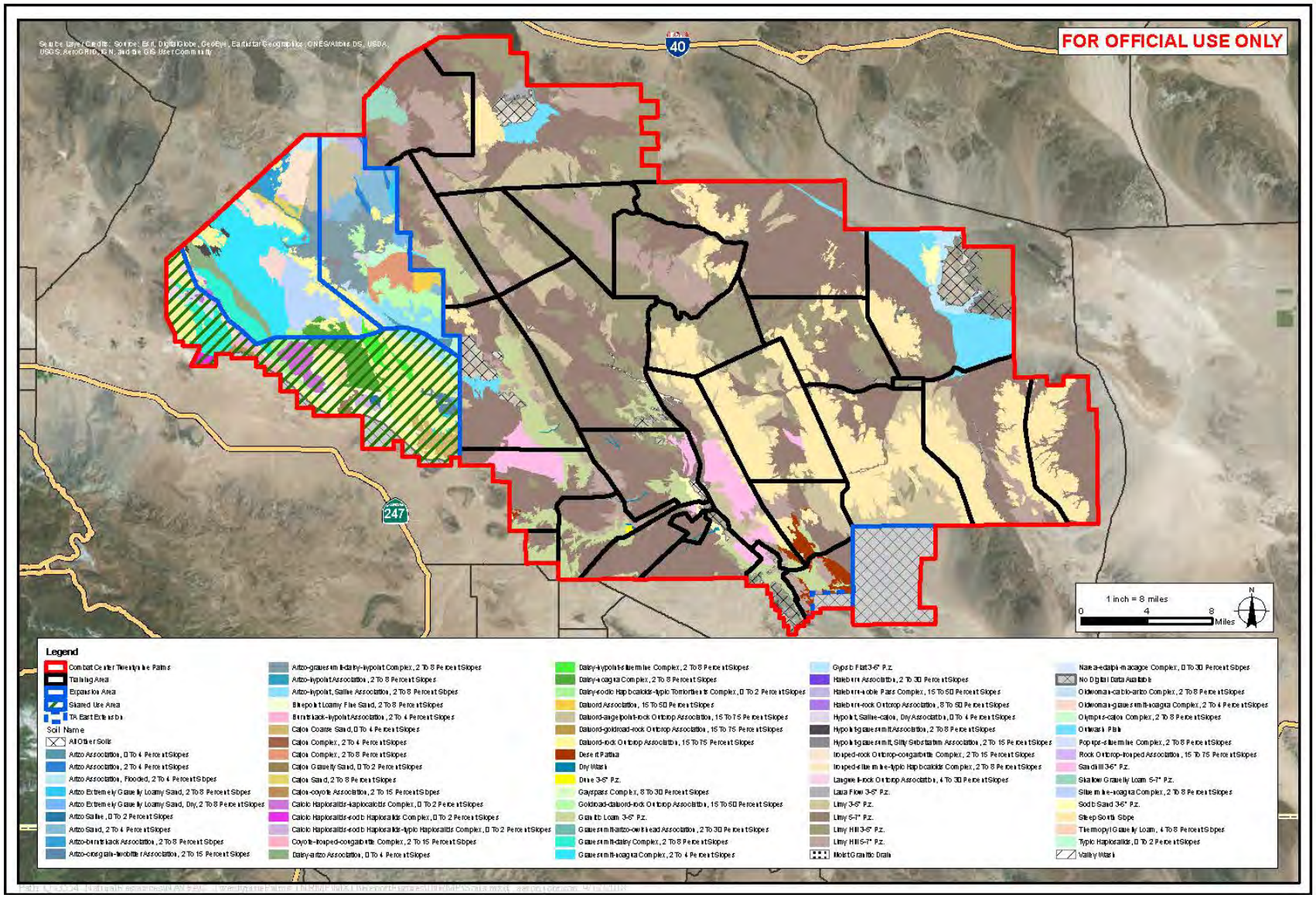
### 3.2.2 Composition

Soil data from the Natural Resources Conservation Service (NRCS 2018) was used to map soils occurring on the Combat Center, including the legacy lands as well as expansion areas of the installation, as available. Soils data is currently not available for the entire Combat Center, including the southern expansion area among a few other smaller areas. Major soil types identified include primarily alluvium and colluvium materials with some lacustrine deposits and residuum; Figure 3-2 shows the distribution of various soils types in the final Soils Map.

*Arizo* soils are very deep, sandy-skeletal soils formed in mixed alluvium. They occur in the northwestern, central, and southeastern parts of the Combat Center on recent fan piedmonts and occupy about 20% of the Combat Center.

*Carrizo* soils are very deep, sandy-skeletal soils formed in mixed alluvium. They are found in the northeast on recent fan piedmonts and occupy about 16% of the Combat Center.

**Figure 3-2: Combat Center Soils**



*Cajon-Blueprint* soils are very deep and formed in sandy materials. They occupy about 9% of the Combat Center and are found in the southwestern portion smooth granitic fan piedmonts.

*Dalvord-Goldroad-Rock-Outcrop* soils are very shallow to shallow, loamy-skeletal soils formed in residuum and colluvium from granitic and metamorphic sources. They are found mostly in the southeastern part of the Combat Center on granitic mountains and cover about 18% of the total area.

*Eastrange-Owlshead-Gayspass* soils are very shallow to very deep soils formed in alluvium from mixed sources. These soils are found throughout the Combat center on older fan piedmonts and occupy about 6% of the area.

*Edalph-Narea-Calico* soils are very deep, sandy soils formed in granitic alluvium. They are found in the southwestern portion of the Combat Center and occupy about 9% of the total land.

*Haleburu* soils are very shallow to shallow, loamy-skeletal soils formed in residuum and colluvium from mainly volcanic sources. They occur in the northwestern part of the Combat Center on volcanic mountains and comprise about 13% of the total land.

*Playa* soils are very deep, salt-effected soils formed in lacustrine deposits. These soils occur on basin floors and occupy about 3% of the Combat Center.

*Sunrock-Haleburu-Lava Flows* are very shallow to shallow, loamy-skeletal soils formed in residuum and colluvium from mainly volcanic sources. They are found in the northern areas and occupy about 6% of the Combat Center

***Cryptogamic soil crusts*** are a feature of some desert soils. They form when moisture is retained by soils long enough to foster bacteria, algae, and lichen growth. These organisms through their presence or through their exudates hold soil particles together in a crust form. Cryptogamic crusts stabilize the soil surface and improve resistance to wind and water erosion. Biologic activity associated with cryptogamic crust converts inorganic atmospheric nitrogen into biologically available forms, increasing nitrogen pools available to the ecosystem. Patches of cryptogamic crust are found in certain areas of the Combat Center and may include many different soil associations; however, they are usually visually characterized by a surface crust with pebbles and rocks, often rendered dark and shiny.

## 3.3 Water Resources

### 3.3.1 Surface Water

The Combat Center has 17 watersheds ranging in size from 2,819 acres to 52,178 acres. Quackenbush Lake and Upper Emerson watershed are the only units that lay entirely within the Combat Center boundary (traditional boundary and Exclusive Military Use Area [EMUA]). Combat Center watersheds contain playas, dry washes, seeps, springs, and man-made water bodies. There are no naturally occurring, permanent surface water resources on the Combat Center (Lato *et al*. 1999), all permanent water sources are man-made ponds.

Most surface drainage is internal; flowing inward from all directions, with water soon percolating into the sandy soil of dry washes and/or collecting on playas (Lato *et al*. 1999). All streams are intermittent, and all naturally occurring, standing water is ephemeral, occurring only during and after heavy rains or thunderstorms. When shallow ephemeral lakes have surface waters, they are eventually lost through ground water percolation or evaporation. Evaporation results in precipitation of alkali salts at or near the surface of the playa soils.

There are 14 playas throughout the Combat Center traditional boundary, five playas within EMUA West, and no playas within EMUA South. Two prominent (and the most heavily impacted) playas are Mesquite Lake (located near Mainside) and Deadman Lake (located in Sandhill, Gypsum Ridge, and West Training Areas). Both lakes source of water is seasonal precipitation and runoff from the surrounding watershed. Unlike Mesquite Lake, Deadman Lake does not have any appearance of uplifted and tufted soils, suggesting that the water table is near the surface.

There are 289 dry washes totaling 50,471 acres throughout the Combat Center, but only 12 are considered major washes. The largest dry washes are located in the three largest watersheds (Deadman Lake, Bristol Lake, and Dry Lake). Approximately 25 percent of all dry washes occur in the Bristol Lake watershed (U.S. Army Corps of Engineers 1994).

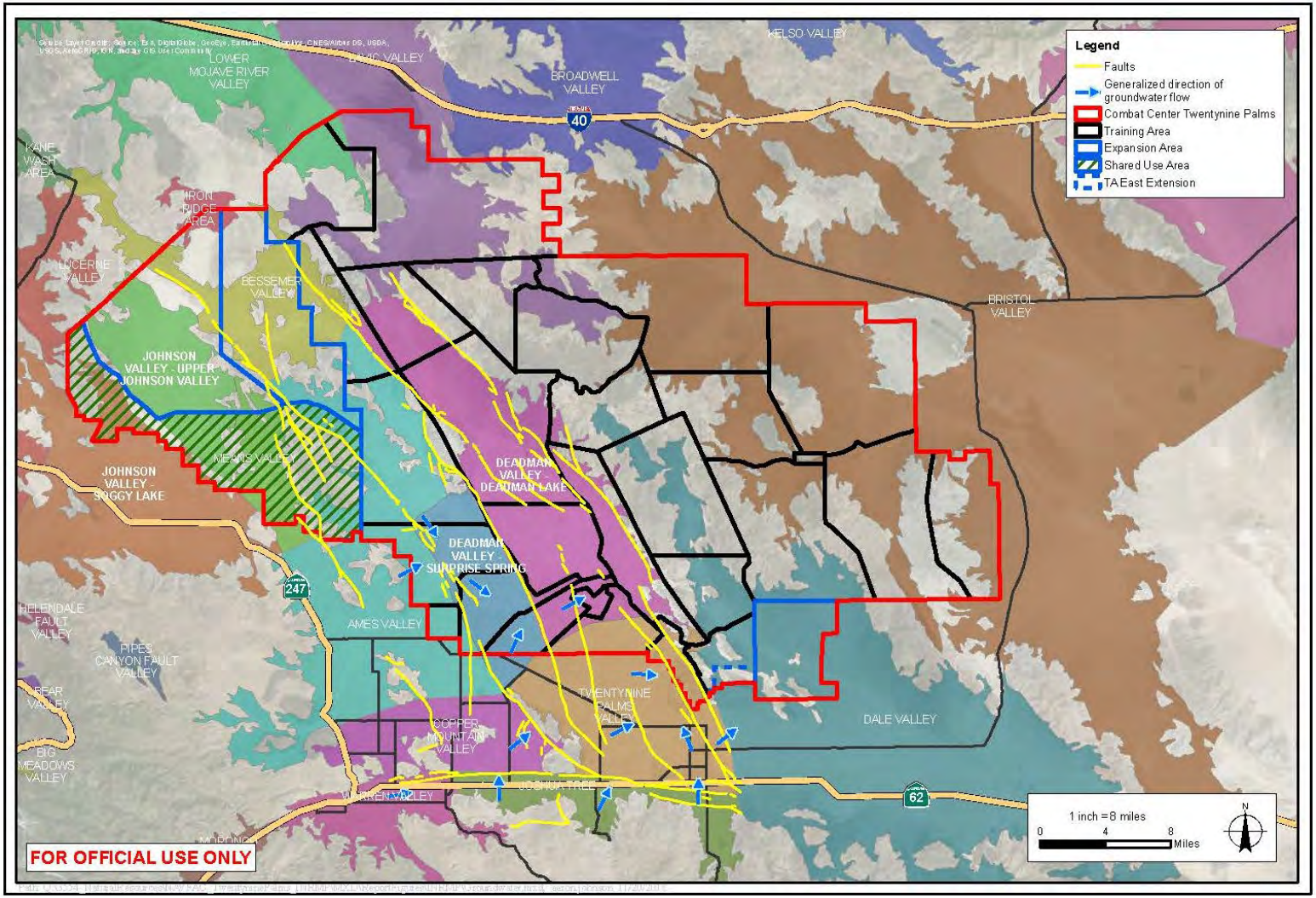
Seeps and springs are a valuable biological resource, particularly when standing or flowing water is available for wildlife. The U.S. Army Corps of Engineers (1994) found four wells and two springs recorded from U.S. Geological Survey topography maps of the Combat Center. Seasonal seeps are located in the Imperial Lode mining area, Lead Mountain area, and several mine shafts. The study also indicated a potential for other seeps to exist seasonally, depending on precipitation and exposed bedrock in the wash.

Man-made water bodies at the Combat Center include stormwater retention ponds to the northeast of Mesquite Lake, golf course ponds, and several sewage lagoons located near Deadman and Mesquite Lake, along with recycled water ponds near the golf course and several sewage lagoons located near Deadman and Mesquite Lakes. None of these waters are regulated under Section 404 of the Clean Water Act. Manmade water bodies are utilized by wildlife, most often migrating birds. In addition, a study by the U.S. Army of Corps Engineers (1994) noted that settling basins trap sediment that would otherwise flow into Mesquite Lake.

### 3.3.2 Ground Water

The groundwater basins within or partially within the Combat Center traditional boundary include Deadman Valley (Surprise Spring and Deadman Lake subbasins), Twentynine Palms Valley, Bristol Valley, Ames Valley, Lavic Valley, and Dale Valley (Figure 3-3). The groundwater basins in the EMUA West are the Johnson Valley Basin, Means Valley Basin, Ames Valley Basin, Bessemer Valley Basin, and the Este Subarea of the Adjudicated Mojave Basin Area. The groundwater basins in EMUA South is the Dale Valley Basin. The principal source of recharge to these basins is infiltration of run-off from the surrounding mountains in the washes and alluvial fans.

**Figure 3-3: Combat Center Groundwater Basins and Fault Lines**



The Mojave Water Agency and Bighorn Desert View Water Agency are responsible for managing the region's water resources to ensure a sustainable supply of water for present and future use. In addition, the Mojave Water Agency is the court-appointed Watermaster for the Mojave River Basin adjudication. Both provide domestic and retail water service and are cooperating to developing a water recharge plan for the groundwater basin.

**Ames Valley Basin**

The eastern portion of the Ames Valley Basin is within the Combat Center boundary. Groundwater in this basin flows eastward from the San Bernardino Mountains to the Emerson Fault and into the Surprise Spring subbasin and northeast toward Emerson (dry) Lake (Mendez and Christensen 1997). Groundwater quality is good, with total dissolved solids (TDS) levels generally below 500 milligrams per liter (mg/L) and no elevated concentrations of other constituents of concern. Ames Valley basin is a source of potable water for 8,300 individuals living in the Johnson and Ames Valley, southwest of the Combat Center (Kennedy/Jenks/Todd LLC 2007).

A small portion of the northern part of the Ames Valley Basin is within EMUA West. Groundwater in this basin flows eastward from the San Bernardino Mountains to the Emerson Fault and into the Surprise Spring subbasin and northeast toward Emerson (dry) Lake (Mendez and Christensen 1997). Groundwater quality is good, as represented by TDS concentrations generally below 500 mg/L.

**Bessemer Valley Basin**

EMUA West contains most of the Bessemer Valley Basin. This basin is bounded by nonwater-bearing rocks of the Iron Ridge Mountains on the north and bedrock highlands on the south, and by the West Calico fault on the east and the Emerson fault on the west (DWR 2004). Water quality of the basin is unknown (DWR 2004).

**Bristol Valley Basin West of Bristol Lake**

The Bristol Valley Basin west of Bristol Lake is located northeast of the Bullion Mountains within the Combat Center boundary. Groundwater exists in unconsolidated, upper and lower alluvial deposits. The upper and lower aquifers are separated by a discontinuous layer of silt and clay (DWR 2004). Depths to groundwater typically range from 125 to 200 ft (38 to 61 m), although perched zones exist near Bristol Dry Lake and Dry Lake, where water levels range from 14 to 89 ft (4 to 27 m). Recharge is from percolation of surface runoff through stream beds and washes. Groundwater moves towards Bristol Lake, where groundwater elevations are close to the ground surface. Koehler (1983) estimated that 640,000 acre-feet (AF) (789,000 megaliters [ML]) of water is stored in the alluvium west of the Ludlow fault, which runs diagonally through the Bristol Valley Basin west of Bristol Lake. (An AF is a unit of volume equal to an area of 1 acre with a depth of 1 foot and is equivalent to 325,851 gallons. As a rule of thumb, 1 AF is considered a typical annual water consumption rate for a suburban family household, whereas a household in an arid desert region may use 0.25 AF annually.) However, there are no drinking water wells in this portion of the Combat Center because groundwater quality does not appear to be suitable for human consumption due to the high TDS, chloride, and arsenic concentrations.

**Dale Valley Basin**

The Combat Center includes the northern portions of the Dale Valley Groundwater Basin. This basin is bounded by nonwater-bearing rocks of the Bullion Mountains to the north, Pinto Mountains to the south, Sheephole Mountains to the east, and the Mesquite fault to the west. Groundwater moves toward Dale Lake in the southeastern part of the valley. Analyses of water from 11 wells in the basin show an average TDS content of 53,457 mg/L with a range of 1,218 to 332,000 mg/L. The water quality in this basin is generally unsuitable for domestic and agricultural uses. Total dissolved solids and fluoride concentrations impair domestic use, and boron and sodium concentrations impair agricultural use of groundwater in this basin (DWR 2004).

In EMUA South, the groundwater conditions are expected to be similar to those in the Bristol Valley and Twentynine Palms basins, with the general exceptions that the water-bearing deposits may be comparatively thinner in proximity to bedrock deposits and average groundwater elevations may be shallower (HQMC 2008). Groundwater recharge is primarily from infiltration of runoff from the slopes of the surrounding mountains and subsurface flow of groundwater past the Mesquite fault to the west. Groundwater moves toward Dale Lake in the southeastern part of the valley.

**Deadman Valley Basin – Deadman Lake Subbasin**

The Deadman Lake subbasin groundwater within the Combat Center boundary is not potable and does not meet drinking water standards due to high concentrations of fluorides, sulfates, and boron. However, groundwater from this subbasin can be utilized for landscaping and other non-consumptive uses. Measurements of the water level in wells indicated a southward flow from the Deadman Lake area into Twentynine Palms Valley basin (DWR 2004).

**Deadman Valley Basin – Surprise Spring Subbasin**

Groundwater in the Surprise Spring subbasin within the Combat Center boundary flows from recharge areas near the end of Pipes Wash towards discharge areas at Surprise Spring near the Surprise Spring Fault (Londquist and Martin 1991). The Surprise Spring Fault is a barrier to groundwater flow and, under predevelopment conditions, water discharged at the land surface in this area. The depth to groundwater in the Surprise Spring subbasin ranges from 200 feet to over 400 ft (60 m to 120 m) bgs (USGS 2003). Groundwater levels have declined more than 190 ft (58 m) as a result of pumping since the 1950s and groundwater no longer discharges at the land surface (Li and Martin 2011). The alluvial deposits can be divided into upper and lower aquifers. The upper aquifer is unconfined and consists of unconsolidated sands with moderately high permeability, whereas the lower aquifer is confined and consists of consolidated sediments of low permeability. The groundwater from the Surprise Spring subbasin, which is used for potable water supply, is from the unconfined portions of the upper aquifer (Li and Martin 2011).

Groundwater within the Surprise Spring subbasin is the only source of potable water for the Combat Center. While it does not have a sole source designation, Surprise Spring would meet the criteria of sole source aquifer by providing over 50% of the water to the community (Combat Center). The sole source designation is meant to be used by communities to help prevent contamination of groundwater from federally-funded projects, and designations typically come

from the local communities. Because only the military pumps from Surprise Spring, it is unlikely that a sole source designation would be requested.

The Surprise Spring groundwater wells are located in a Restricted Area of the Combat Center where mechanized maneuvers, off-highway vehicles (OHV), and training using vehicles are not permitted. The Surprise Spring subbasin contains fossil water dated to be approximately 5,000 years old (Izbicki and Michel 2004). The primary source of recharge to Surprise Spring subbasin is subsurface flows from the adjacent Ames Valley Groundwater basin. The quality of groundwater in the Surprise Spring subbasin varies, but groundwater from the southern portion of the basin, where the Combat Center production wells are located, has TDS concentrations from 159 to 210 mg/L and meets criteria established under the Safe Drinking Water Act and associated amendments (DWR 2004). However, groundwater from the lower aquifer of the Surprise Spring subbasin contains relatively higher TDS, fluoride, and arsenic concentrations than those of the upper aquifer (Li and Martin 2011).

**Este Subarea of the Adjudicated Mojave Basin Area**

The western edge of the EMUA West includes part of the Este Subarea of the Mojave Basin Area. This area was adjudicated in 1996 in the Mojave Basin Judgment. The Judgment assigned Base Annual Production quotas to each producer using 10 AF per year (12 ML per year) or more, based on historical production. Users are assigned a variable Free Production Allowance (FPA), which is a uniform percentage of Base Annual Production set for each subarea. This percentage is reduced, or "ramped down" over time until total FPA comes into balance with available supplies. This percentage was set at 70% for most subareas as of June 2003. Any water user that pumps more than their FPA is compelled to purchase replenishment water from Mojave Water Agency equal to the amount of production in excess of the FPA. Water levels in Este have remained stable for the past several years, indicating a relative balance between recharge and discharge.

**Lavic Valley Basin**

This groundwater basin underlies Lavic Valley in central San Bernardino County and is within the boundary of the Combat Center. The basin is bounded by nonwater-bearing rocks of the Cady Mountains on the north and east, the Bullion Mountains on the south and east, the Lava Bed Mountains on the southwest, and the Pisgah fault on the west. Total dissolved solids concentrations in groundwaters range from 278 to 1,721 mg/L. Water at one well in the basin also exceeds drinking water standards for sulfate and chloride content (DWR 2004). The water quality in this basin is generally unsuitable for domestic and agricultural uses.

**Johnson Valley Basin**

Northwest-trending faults divide this basin into two subbasins referred to by DWR as Upper Johnson and Soggy Lake. The U.S. Geological Survey (USGS) further divides the Soggy Lake subbasin into the Fry and Johnson subbasins. EMUA West includes the Upper Johnson subbasin and small portions of the northern parts of the Soggy Lake subbasin. Groundwater generally flows from southern recharge areas to the north toward the groundwater basin discharge areas at the Means Valley Groundwater Basin and Melville and Soggy dry lakes. Groundwater leaves the basin as subsurface outflow and evaporation beneath the dry lakes. Total dissolved solids concentrations in the Upper Johnson subbasin within EMUA West are up to 3,000 mg/L (DWR

2004), whereas TDS concentrations in the southern portion of the Johnson Valley basin south of the west study area are less than 500 mg/L (Kennedy/Jenks/Todd LLC 2007).

**Means Valley Basin**

The Means Valley Basin is located between Johnson Valley and Ames Valley basins in EMUA West. The alluvial sediments are less than 500 ft (150 m) thick and much thinner in the southern portion of the basin. Natural recharge occurs from runoff from the adjacent mountains, which percolates in the Means Wash to the groundwater. Recharge from precipitation that falls directly on the basin is considered negligible.

Groundwater generally flows from the southern recharge area to the north where it evaporates from Means Dry Lake. The basin is characterized by relatively poor water quality (Kennedy/Jenks/Todd LLC 2007).

**Twentynine Palms Valley Basin**

The Twentynine Palms Valley Groundwater Basin (also known as the Mesquite and Mainside subbasins by the USGS [Londquist and Martin 1991]) includes the water-bearing sediments below Mesquite Lake and the City of Twentynine Palms and is within the boundary of the Combat Center. This basin contains water that exceeds federal limits for concentrations of sulfates, fluorides, and TDS. Water quality in this basin, primarily a sodium sulfate type, is inferior to water from both the Surprise Spring and Deadman Lake subbasins. The Combat Center utilizes the non-potable groundwater from the Mainside subbasin for golf course irrigation. South of the Combat Center, Twentynine Palms Water District pumps groundwater from the Mesquite subbasin. Twentynine Palms Water District increased groundwater pumping and treats the high fluoride levels to reduce the groundwater overdraft in the Joshua Tree Basin, where they currently pump the majority of their water (Twentynine Palms Water District [TPWD] 2008). The Twentynine Palms Basin groundwater also supports mesquite trees near the ecologically sensitive Mesquite Dry Lake (Li and Martin 2011).

## 3.4 Climate

The Combat Center is situated in the Morongo Basin of the Mojave Desert and has an arid, upland desert climate characterized by hot days and cool nights, with low humidity and low annual rainfall. Summers have especially high temperatures, low humidity, and clear, sunny days. On average, the sun shines 97% of the day time in the summer, and 65% in winter (Lato *et al*. 1999). Temperature extremes range from an average daily high of 105.4° Fahrenheit (F) in July to an average daily low of 51.6° F in January. The highest and lowest recorded temperatures at Twentynine Palms were 118° and 10° F, respectively (Lato *et al*. 1999).

Average annual precipitation is variable across the installation and was estimated at generally 4.16 inches, with roughly 1.90 inches (46%) falling between November and March, and about 1.80 inches falling between July and September during regular seasonal storm events. Snowfall is uncommon. Winter storms tend to be relatively gentle and may last up to two days. Between July and September, thunderstorms can be violent and discharge large volumes of water in short periods of time, causing flash floods and significant soil erosion.

The direction and strength of prevailing winds vary with the season. Typically, winter months bring mild northwesterly winds that range from 5 - 10 miles per hour (mph). During the summer, winds are generally westerly to southwesterly, reaching speeds of 10 - 15 mph in the afternoons. The strongest winds occur in the fall, with gusts of up to 77 mph from the northwest.

Climate change is a significant concern for the desert ecosystem and the Combat Center. Scientific predictions identify longer periods of hot temperature extremes and reductions in annual precipitation totals, which will amplify water and heat stress experienced by desert life. Some scientific research has been performed aboard the installation to develop models of climate change impacts and best management approaches to conserve biodiversity on the landscape under the changing climate scenario. Preliminary findings have identified areas suitable as wildlife refugias, which may persist the longest under new climate scenarios and continue to provide valuable habitat to vulnerable species.

## 3.5 Ecosystems

### 3.5.1 Ecosystem Classification

Desert ecosystems, while giving the appearance of a harsh environment, are actually quite fragile. Desert soils are extremely vulnerable to disruption, and once disturbed, can easily be eroded by wind and water. The majority of desert plants are long-lived but slow-growing. Plant recovery depends on amount and frequency of rainfall events, and season conditions. Animals that survive and thrive on the landscapes are hardy and well adapted to challenging and extremely variable niche conditions. Identification, mapping and monitoring of ecosystem types provides the critical information necessary to develop appropriate strategies to effect ecosystem management and subsequent conservation of biodiversity on the landscape.

Ecosystem classification involves the inventory and association of landforms with plant species assemblages. Plant species are commonly used as surrogates to characterize and define ecological communities and landforms provide the abiotic constraints on the system. Krzysik and Trumbull described 14 Combat Center ecosystems with species-ecosystem associations in their 1996 report. The California Department of Forestry mapped the EMUA West and South in 2003, and the USGS mapped the same area in 2004, and both use ecosystem associations compatible with Krzysik and Trumbull (USMC 2012). In 2006-2008, Agri-Chemical & Supply remapped vegetation across the old installation boundary with a different system. Below is a brief summary of the major ecosystems identified:

**Creosote / Bursage Scrub Series**

Creosote bush and white bursage are dominant species in the Creosote / Bursage Series. This series is classified into five ecosystems:

- ***Creosote / Bursage Scrub: Valleys, Gentle Bajadas*** - This ecosystem includes 50% of the Combat Center, in valleys, rolling plains, flats, gentle bajadas and alluvial fans. In undisturbed valleys creosote bush forms elliptical mosaics of clones, with each clone consisting of genetically identical individuals whose ancestors germinated thousands of years ago, some of the oldest genotypes on earth. A total of 142 vertebrate wildlife

species (54 birds, 38 reptiles, and 50 mammals) are possible for this ecosystem type at the Combat Center.

- ***Creosote / Bursage Scrub: Disturbed*** - This ecosystem was originally the Valleys, Gentle Bajadas Ecosystem, but it has been subjected to extensive military training activities with moderate to high disturbance. This disturbed ecosystem covers 10% of the Combat Center. A total of 68 vertebrate species are associated with this ecosystem.
- ***Creosote / Bursage Scrub: Mountains*** - This ecosystem typically possesses moderate to high diversity of woody perennials. Creosote bush is predominantly found as small individuals, never clones. This ecosystem is found on steep slopes, alluvial fans, or bajadas; boulder fields, talus slopes, or rocky outcrops; steep broken ridges or hills; and canyons or arroyos. This ecosystem includes 24% of the Combat Center, mostly in the Bullion Mountains, and is used by 149 vertebrate species.
- ***Creosote / Bursage Scrub: Sand Dunes*** - The Sand Dune Ecosystem is dominated by creosote bush, white bursage, big galleta and Indian ricegrass (*Stipa hymenoides*), and sand dune annuals. It is found on 3% of the Combat Center, predominantly in the southwestern and northern portions. It supports 63 vertebrate species.
- ***Creosote / Bursage Scrub: Lava Flows*** - Lava flows, existing as solid basalt pavements, boulders, and rocky and coarse-gravel substrates, are this ecosystem's primary characteristics. This ecosystem is found on 5.4% of the Combat Center, on the northern boundaries and is used by 71 vertebrate species.

**Other Vegetation Series Ecosystems**

- ***Yucca woodlands: Joshua Trees and / or Mojave Yucca*** - This Joshua tree-dominated ecosystem is confined to the southwestern and northwestern corners of the Combat Center, covering only 0.4% of total land. This biodiversity-rich ecosystem supports 184 vertebrate species.
- ***Saltbush Scrub: Playa and Uplands*** - About 6% of the Combat Center (alkaline margins of dry lake beds) includes the saltbush ecosystem. This habitat supports 50 vertebrate species.
- ***Blackbrush Scrub*** - Blackbrush ecosystems are widespread on upper bajadas and rocky alluvial mountain slopes in the Mojave Desert, but they only comprise 0.7% of the Combat Center, primarily in the northwestern corner of the installation. A total of 154 vertebrate species may be found in this ecosystem.

**Riparian, Wet Areas and Aquatic Ecosystems**

There are five reasons for the ecological significance and biodiversity value of riparian, wet areas, and aquatic ecosystems in the Mojave Desert.

1. They include habitats of exceptional biological diversity and ecological processes.
2. They are landscape corridors for population dispersal, gene flow, and recolonization routes for local extinctions.
3. They are critical feeding and resting sites for migratory birds and bats.
4. Springs / seeps or canyon riparian ecosystems are habitat islands for rare, relict, or endemic habitat specialist species.

5. Due to severe impacts by humans and their animals, remaining native examples of these ecosystems possessing ecological integrity are becoming more significant for local and regional biodiversity.

The different types of riparian systems identified aboard the Combat Center are provided below:

- ***Desert Riparian (Xeroriparian)*** - These tree-dominated, desert wash ecosystems with ephemeral surface waters include less than 0.5% of the Combat Center. This biodiversity-rich ecosystem has up to 178 vertebrate species.
- ***Desert Wash with Ephemeral Flows*** - This smaller wash ecosystem can be consider a smaller scale xeroriparian ecosystem, similar to the Desert Riparian Ecosystem, but dominated by shrubs instead of trees. This system is found on 2 - 4% of the Combat Center and supports 146 species of vertebrate species.
- ***Springs and Seeps*** - This ecosystem is poorly represented at the Combat Center. There are no permanent springs known; only one intermittent spring with hydrophytic vegetation is known (Sunshine Peak) and one ephemeral spring without hydrophytic vegetation (north of Lead Mountain) is known. At least three 'tinajas,"or "highly ephemeral water pockets" are known. A total of 221 vertebrates are possible in this ecosystem.
- ***Dry Lake Beds (Playas)*** - Fourteen playas, 1.9% of the Combat Center, comprise this ecosystem, in EMUA West there are five playas, and in EMUA South there are no playas. Surface water in playas is ephemeral and highly episodic. Fifty species of birds may use playas, and 5 species of fairy, clam and tadpole shrimp have been found in some of the playas when surface waters are present.
- ***Wet Areas / Ponds / Riparian: Perennial*** - This man-made habitat type covers less than 0.1% of the base, all within and near Mainside. The area is heavily used by migratory birds, and it is critical to a number of resident and breeding birds as well as other animals. This ecosystem is used by 88% of the potential avian fauna of the southern Mojave Desert.
- ***Caves, Mines, and Rock Crevices*** - These subterranean habitats are critical for bats, and are used by other wildlife species for water, shelter, and protection from the heat. These are found on the Combat Center and in EMUA West. None are known from EMUA South.

The important feature to note with regard to ecosystems and biological diversity is that about 90% of the Combat Center is in the Creosote / Bursage Scrub Ecosystem. Yucca Woodlands, Desert Riparian, and Wet Areas/Ponds/Riparian: Perennial ecosystems, by far the richest in terms of wildlife biodiversity, include less than 1% of training land.

### 3.5.2 Ecological Sites

An ecological site is a distinctive subset within a given ecosystem that possesses one or more physical characteristics that differ from the surrounding landscape. They are visually identified by the occurrence of unique amounts and types of vegetation, which are products of the combination of all influencing environmental factors including parent material, landscape, climate, soils, biota, hydrology, fire, and time in place.

The following criteria were used to differentiate ecological sites at the installation:

- Significant differences in species or species groups in characteristic plant communities
- Significant differences in the relative proportion of species or species groups in characteristic plant communities
- Significant differences in total annual production of characteristic plant communities
- Soil factors that determine plant production and compositions, site hydrology, and functioning of ecological processes of the water cycle, mineral cycles, and energy flow

The following ecological sites were identified on the Combat Center:

| Table 3-1 Ecological Sites | | |
|---|---|---|
| Alluvial Plain | Lava Flow 3-5” P.Z. | Saline Hill 3-5" P.Z. |
| Cobbly Wash | Limy 3-5" P.Z. | Sand Hill 3-5" P.Z. |
| Desert Patina | Limy 5-7" P.Z. | Sandy Plain 3-5" |
| Dry Wash | Limy Hill 3-5" P.Z. | Shallow Gravelly Loam 5-7" P.Z. |
| Dune 3-5" P.Z. | Limy Hill 5-7" P.Z. | Sodic Dune 3-5" P.Z. |
| Granitic Drain 5-7" P.Z. | Loamy Hill 5-7" | Sodic Sand 3-5" P.Z. |
| Granitic Loam 3-5" P.Z. | Moist Granitic Drain | Steep South Slope |
| Gravelly Ridge 5-7" P.Z. | Outwash Plain | Valley Wash |
| Gypsic Flat 3-5" P.Z. | Saline Flat 3-5" P.Z. | |
| (Note: P.Z. = Precipitation Zone) | | |

## 3.6 Flora

The Mojave Desert is divided into five floristic regions (Rowlands *et al*. 1982). The Combat Center lies in the South-Central Region where temperature and rainfall patterns approach conditions more typical of the hotter, drier Sonoran Desert to the south.

### 3.6.1 Flora Inventory

The vegetation at the Combat Center is predominantly Creosote Bush Scrub and Saltbrush Scrub. A combination of vegetation mapping and monitoring efforts, plus sensitive plant surveys, build and refine plant datasets over time. To date, over 440 native and naturalized vascular plants have been recorded for the Combat Center (Appendix C). Of these, 391 are native and 52 are non-native.

### 3.6.2 Plant Communities

Creosote bush (*Larrea tridentata*) and desert annuals are the predominant vegetative species. Plant density and diversity increases in higher elevations and within desert wash systems. The four most prevalent vegetation types occurring on the Combat Center in the 2006-2008 mapping include: creosote bush scrub, Mohave yucca, saltbush scrub, and big galleta (Agri-Chemical & Supply 2008). Substantial areas of the EMUA South are also covered with desert dunes that have minimal vegetation. Additionally, a small area consists of the tree-dominated catclaw acacia community.

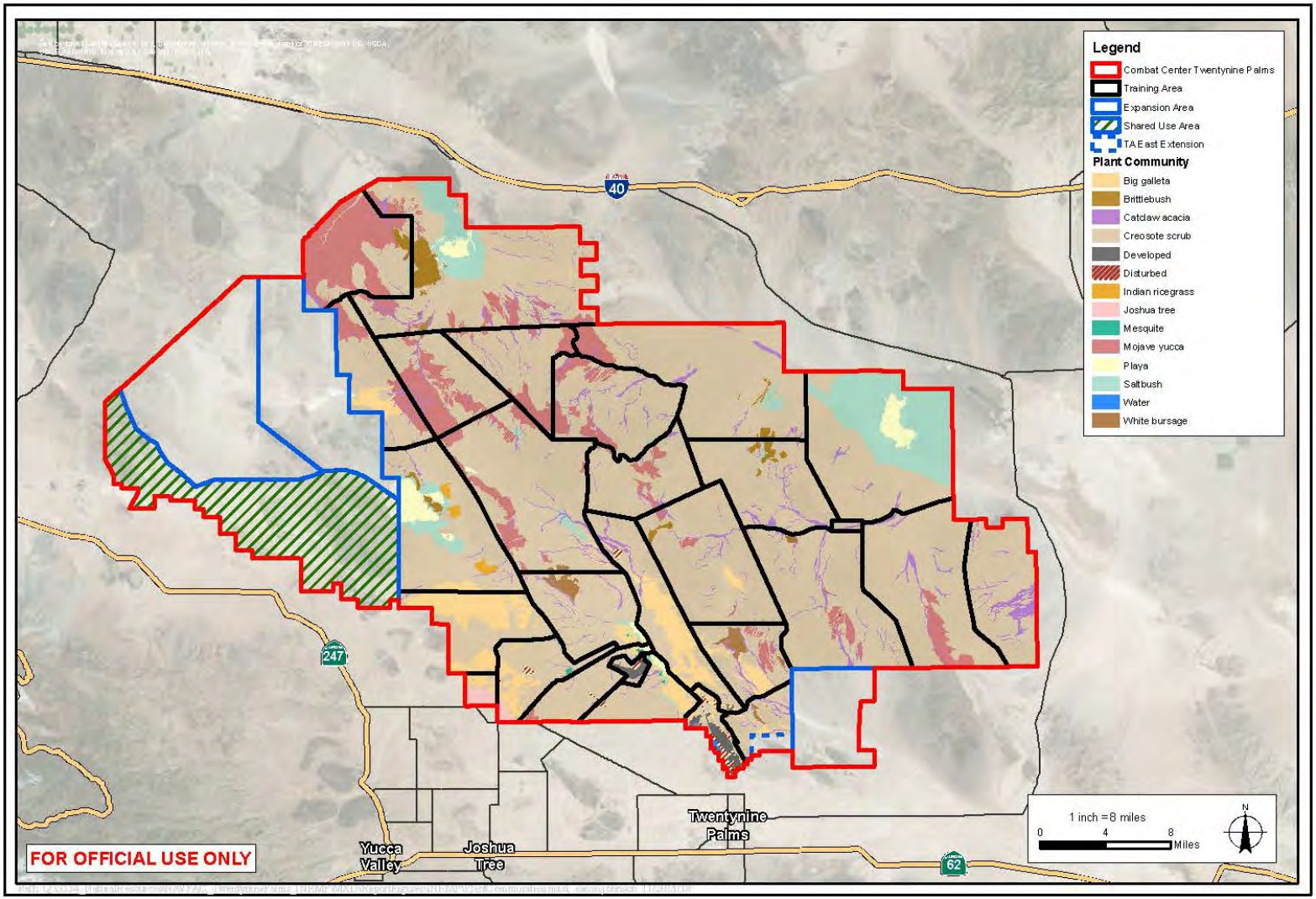
There exist variations in the classification and naming of vegetation types (plants communities) on the Combat Center over time. For example, Mojave creosote bush scrub (Lato *et al*. 1999)

was called creosote bush scrub by Krzysik and Trumbull (1996), which was broken into various groups by the UCR (1993), and later the Holland code was used to complete a vegetation community map for the installation. In 2016, the Combat Center established a standardized protocol for mapping vegetation using the California Manual of Vegetation (edition 2; CMV2) and completed an update to the vegetation map for the legacy base area. The mapping effort identified 18 plant communities at the alliance level (USMC 2016), which are presented in Table 3-2 and Figure 3-4. Plant community information for the land expansion areas was assessed for the 2012 EIS (USMC 2012) but were not collected using the same protocol, and are not readily available. Vegetation mapping is ongoing for the expansion area to ensure consistency between datasets. It is a goal of the vegetation mapping program at the Combat Center to update and revise the vegetation map every 5 years.

**Table 3-2 Plant Communities**

| **Vegetative Alliance** | **Acres** |
|---|---|
| *Senegalia (=Acacia) gregii* | 4,826.33 |
| *Ambrosia dumosa* | 472.24 |
| *Ambrosia salsola* | 4,662.59 |
| *Atriplex canescens* | 1,678.11 |
| *Atriplex hymenelytra* | 189.93 |
| *Atriplex polycarpa* | 9,132.97 |
| *Chilopsis linearis* | 1,005.55 |
| *Encelia farinosa* | 5,063.24 |
| *Ephedra californica* | 134.32 |
| *Condea (=Hyptis) emoryi* | 2,090.33 |
| *Larrea tridentata* | 224,640.05 |
| *Larrea tridentata-Ambrosia dumosa* | 243,899.18 |
| *Larrea tridentata-Encelia farinosa* | 62,601.88 |
| *Hilaria (=Pleuraphis) rigida* | 2,702.87 |
| *Prosopis glandulosa* | 326.52 |
| *Psorothamnus spinosus* | 9,973.06 |
| *Suaeda moquinii* | 201.47 |
| *Yucca schidigera* | 2,101.68 |
| ***Total*** | ***575,702.32*** |
| **Non-Vegetated Land Cover** | |
| Developed | 3,006.00 |
| Disturbed | 2,284.24 |
| Mud Hills | 146.18 |
| Playa | 8,107.70 |
| Sparsely Vegetated Desert Pavement | 7,865.87 |
| ***Total*** | ***21,409.98*** |
| **Grand Total** | **597,112.30** |

**Figure 3-4: Combat Center Plant Communities - 2016 Dataset**



### 3.6.3 Special Status Flora

Special status flora includes those species federally or state-listed as endangered or threatened; proposed or a candidate for such listing; included on List 1, 2, 3, or 4 in the California Rare Plant Ranks (CRPR) (formerly California Native Plant Society; Skinner and Pavlik 1994); or meet criteria to be considered on one of these lists. Congress has not waived sovereign immunity under the Federal ESA; therefore, MAGTFTC is not legally required to comply with California endangered species laws. However, it is the Marine Corps policy to consider state-listed species in the NEPA process. In addition, the Marine Corps is considering plants important to the culture of local Native American tribes as sensitive.

Thirty-nine special-status plant species have been detected during surveys on the Combat Center including the western and southern EMUA's (Table 3-3, Appendix C). None of these are listed as endangered or threatened by the federal government.

**Table 3-3 Sensitive Status Plants Present**

| Scientific name | Common Name | Special Status* |
|---|---|---|
| *Allium parishii* | Parish's Onion | CRPR 4.3 |
| *Androstephium breviflorum* | Small-flowered Androstephium | CRPR 2B.2 |
| *Castela emoryi* | Emory's Crucifixion-thorn | CRPR 2B.2 |
| *Chilopsis linearis* ssp. *arcuata* | Desert Willow | T1 |
| *Chorizanthe spinose* | Mojave Spineflower | CRPR 4.2 |
| *Chorizanthe xanti* var. *leucotheca* | Riverside Spineflower | CRPR 1B.2 |
| *Cryptantha costata* | Ribbed Cryptantha | CRPR 4.3 |
| *Cryptantha holoptera* | Winged Cryptantha | CRPR 4.3 |
| *Cymopterus multinervatus* | Purple-nerve Cymopterus | CRPR 2B.2 |
| *Cylindropuntia wigginsii* | Wiggin's Cholla | CRPR 3.3 |
| *Datura wrightii* | Wright's Jimsonweed | T1 |
| *Dudleya saxosa* ssp. *saxosa* | Panamint Liveforever | CRPR 1B.3 |
| *Eremothera boothii* ssp. *boothii* | Booth's Evening-primrose | CRPR 2B.3 |
| *Eriophyllum mohavense* | Mojave Woolly Sunflower | CRPR 1B.2 |
| *Eriastrum harwoodii* | Harwood's Eriastrum | CRPR 1B.2 |
| *Eriastrum sparsiflorum* | Few-flowered Eriastrum | CRPR 4.3 |
| *Euphorbia abramsiana* | Abram's Spurge | CRPR 2B.2 |
| *Euphorbia parryi* | Parry's Spurge | CRPR 2B.3 |
| *Euphorbia revolute* | Revolute Spurge | CRPR 4.3 |
| *Funastrum utahense* | Utah Vine Milkweed | CRPR 4.2 |
| *Galium angustifolium spp. gracillimum* | Slender Bedstraw | CRPR 4.2 |
| *Larrea tridentata* | Creosote Bush | T1 |
| *Lasthenia glabrata* ssp. *coulteri* | Coulter's Goldfields | CRPR 1B.1 |
| *Matelea parvifolia* | Spearleaf | CRPR 2B.3 |
| *Monardella robisonii* | Robison's Monardella | CRPR 1B |
| *Muilla coronate* | Crowned Muilla | CRPR 4.2 |
| *Nicotiana obtusifolia* | Desert Tobacco | T1 |

| Table 3-3 Sensitive Status Plants Present | | |
|---|---|---|
| **Scientific name** | **Common Name** | **Special Status*** |
| *Penstemon albomarginatus* | White-margined Beardtongue | CRPR 1B.1 |
| *Penstemon pseudospectabilis* | Desert Beardtongue | CRPR 2B.2 |
| *Penstemon thurberi* | Thurber's Penstemon | CRPR 4.2 |
| *Physalis lobate* | Lobed Ground-cherry | CRPR 2B.3 |
| *Populus fremontii* ssp. *fremontii* | Fremont's Cottonwood | T1 |
| *Portulaca halimoides* | Desert Portulaca | CRPR 4.2 |
| *Prosopis glandulosa var. torreyana* | Honey Mesquite | T1 |
| *Salvia columbariae* | Chia | T1 |
| *Sclerocactus polyancistrus* | Mohave (Red-spined) Fishhook Cactus | CRPR 4.2 |
| *Sidalcea neomexicana* | Salt Spring checkerbloom | CRPR 2B.2 |
| *Simmondsia chinensis* | Jojoba | T1 |
| *Wislizenia refracta* ssp. *refracta* | Jackass-clover | CRPR 2B.2 |

*Definitions:

***Tribes***

T1 Species of interest/concern as identified by tribes.

.

***California Rare Plant Ranks*** (CRPR)

*Inventory of Rare and Endangered Vascular Plants of California:*

1B Rare or endangered in California and elsewhere.

2 Rare or endangered in California, but more common elsewhere.

3 Need more information (a review list).

4 Plants of limited distribution (watch list).

***CRPR Threat Ranks***

.1 - Seriously endangered in California

.2 – Fairly endangered in California

.3 – Not very endangered in California

There are two rare plants potentially present or with a potential to occur on the Combat Center that have not been detected during surveys (Table 3-4). Twelve species that were included in this table in previous INRMP's have been confirmed present (UCR 1993; Elvin 2000).

| Table 3-4 Sensitive Status Plants Potentially Present | | |
|---|---|---|
| **Scientific name** | **Common Name** | **Special Status** |
| *Gilia aliquanta* spp. *aliquanta* | Puffcalyx gilia | CRPR 3 |
| *Quincula lobata* | Chinese Lantern | CRPR 2 |

*Definitions:

***California Rare Plant Ranks*** (CRPR)

*Inventory of Rare and Endangered Vascular Plants of California:*

1B Rare or endangered in California and elsewhere.

2 Rare or endangered in California, but more common elsewhere.

3 Need more information (a review list).

4 Plants of limited distribution (watch list).

***CRPR Threat Ranks***

.1 - Seriously endangered in California

.2 – Fairly endangered in California

.3 – Not very endangered in California

One regionally sensitive species not discussed above, the Joshua tree (*Yucca brevifolia*), is currently a candidate for listing under the ESA by USFWS. An icon of the desert southwest, this species is particularly susceptible to the threat of climate change as well as other factors such as habitat disturbance, pollinator community changes, and the development of fire regimes from invasive plant establishment. The Combat Center recognizes this unique resource and has several occurrence maps for the species aboard installation. While no formal protections have been established for this species by the installation at this time, existing internal protections help to avoid and minimize impacts to this species. These protections include the 1 km-no-train buffer around base boundary which reduces any potential indirect impacts to Joshua trees near the Base boundary; the Sandhill, Acorn, West, and Restricted Area Training Areas do not support off-road travel so no impacts to Joshua trees should occur in these training areas; cross country travel is discouraged in the remainder of the training areas; and new actions including but not limited to training and ground disturbances are reviewed through the NEPA process which provides the opportunity to incorporate avoidance and minimization measures for Joshua tree impacts such as tree surveys, avoidance measures, and best management practices to minimize the introduction of invasive species, etc. Should the species become listed, the Combat Center would work with USFWS to develop a conservation plan for Joshua Trees that would include focused surveys and a threats assessment, and the development of management recommendations and best management practices to protect and reestablish the species.

## 3.7 Fauna

Wildlife species at the Combat Center are typical of Mojave Desert fauna except around Mainside, where a wide variety of non-desert adapted species can be found, particularly around areas with manmade water (Cutler *et al.* 1999). Most wildlife species on the installation (except those found only at Mainside) are adapted to desert scrub habitats that maintain xeric conditions with little cover.

In natural areas outside of the Mainside Cantonment Area, seeps, springs and ephemeral streams sustain more vegetation and thermal cover, more individuals of particular species, higher wildlife species richness, and overall more biotic activity. Man-made water sources also provide a valuable source of perennial water for wildlife; ongoing monitoring at these sources has documented large mammals such as the bighorn sheep, coyote (*Canis latrans*), and bobcat (*Lynx rufus*), using these water sources and returning to them regularly. Bats also typically feed over these areas because of increased abundance of invertebrate prey. Spring and fall migratory bird species, typically not associated with desert environments, forage and rest in these areas, particularly at sources of manmade water.

Rocky terrain provides habitat for many reptiles, rodents, and bird species. Along with different vegetation communities that normally occur with increasing elevation in these ranges, differences in slope and aspect result in microhabitats that support different species. Species that occur in these areas include bats that rely on rocky outcrops for roosting sites, and raptors, that use cliff faces and rocky ledges for roosting or nesting.

Playas provide little wildlife habitat because they are usually devoid of vegetation. However, they do support endemic microbiological communities of algae that can support brine shrimp

(*Artemia salina*). Migratory waterfowl and large mammals may visit these areas after periods of heavy rainfall for water and to forage.

As is typical of most desert systems, larger animal species are uncommon, widely dispersed and often nocturnal. Smaller mammals and reptiles, highly adapted to harsh desert conditions, are much more common but are often secretive, nocturnal, or only active for short periods of time during the year. Birds are among the most conspicuous species, usually occurring in greatest concentration in the vicinity of washes and springs where more structures and complex vegetative assemblages occur. With some exceptions, wildlife species (such as birds and larger mammals) are generally more mobile and not limited to a single habitat type. Some species (*e.g.*, fish, amphibians, and some reptiles and mammals) are highly adapted to one habitat type and restricted to these specialized areas.

The Natural Resources Management Plan (UCR 1993) included the first comprehensive inventory of vertebrate wildlife permanently or seasonally present at the Combat Center. This list included permanent residents, winter residents, summer residents, and species that do not occur regularly. Cutler *et al*. (1999) observed 256 species of vertebrates aboard the Combat Center. Table 3-8 lists sensitive vertebrate species known or suspected at the Combat Center.

### 3.7.1 Invertebrates

Although wildlife surveys typically do not focus on invertebrate species, invertebrates are an essential component of desert ecosystems, providing food for numerous vertebrate species and acting as pollinators for a large number of plant species. The seasonal reproductive cycle of some insect species results in an "explosion" of the population in a relatively short period of time. These insect swarms provide an important prey base for insectivores, such as smaller birds, reptiles, amphibians, and bats. UCR concluded a terrestrial invertebrate survey in 2005 that identified more than 1,500 species, though no listed species were detected (Pratt 2005).

Simovich (2006) investigated all nine of the Combat Center’s dry lakes for presence of aquatic invertebrates. Six species of fairy shrimp, clam shrimp and tadpole shrimp were detected. Nearly all expected species were detected in either their live or desiccated forms; no species detected were considered rare or otherwise sensitive.

### 3.7.2 Fish

There currently are no active perennial springs located aboard the Combat Center. No documentation of native fish species occurring at any location exists. The introduced mosquito fish (*Gambusia affinis*) occurs in some of the manmade treatment ponds. However, no other native, introduced or non-native fish species are known to occur on the installation.

### 3.7.3 Amphibians and Reptiles

Five amphibian species and more than 40 reptile species have been detected at the Combat Center (Appendix D). Cutler *et al*. (1999) found that rocky areas may have lower species richness and abundance than washes, canyons, and sandy flats, particularly during years following low winter / spring precipitation. Circle Mountain Biological Consulting, LLC completed the general wildlife survey in 20 range training areas. The idea of the project was to provide a dependable and statistical baseline of all vertebrates found in the range training areas.

### 3.7.4 Birds

More than 215 species of birds have been detected at the Combat Center (Appendix D). In addition, the San Bernardino County Museum conducted a Neotropical Bird Survey for the Combat Center at Mainside and Wood Canyon, Gypsum Ridge Training Area. A Bird Airstrike Hazard (BASH) plan was completed in 2003. In general, it determined that the Combat Center and the Expeditionary Airfield have a low risk of airstrikes due to the remoteness of the airfield from any source of water.

Cutler *et al*. (1999) recorded 87 resident bird species aboard the Combat Center and another 122 migrants, vagrants, or other transient species of birds. These authors suspect, but did not prove, a greater bird species richness in washes and canyons than at other sites. Bird species richness and overall abundance were greater in 1998 following higher winter/spring precipitation than in 1997. Boarman and Chamblin (2005) completed a study focused on the roosting behavior of the common raven (*Corvus corax*), however, this study was completed primarily due to the known predatory impact of ravens on the desert tortoise (see Chapter 4, Goal 3 discussion).

### 3.7.5 Mammals

Almost 60 mammal species have been observed at the Combat Center (Appendix D). Cutler *et al*. (1999) found small mammal species richness to be greater at high elevation sites than all other types of sites except washes.

In November 1992, 20 bighorn sheep (five rams and 15 ewes) were introduced onto the Combat Center near the Bullion and Cleghorn Pass training areas boundary north of Cleghorn Lakes (UCR 1993). This population is considered an experimental population.

### 3.7.6 Agassiz Desert Tortoise (*Gopherus agassizii*)

**Legal Status** Federal Threatened – Listed April 1990

State Threatened – Listed August 1989

Agassiz's desert tortoise is a large, herbivorous reptile found throughout much of the Mojave and Colorado Deserts, and spends much of the year underground to avoid extreme summer and winter temperatures (Nagy and Medica 1986). They construct and maintain single-opening burrows, of which several may exist within an individual's home range. The desert tortoise is typically active above ground during the spring, summer, and autumn when daytime air temperatures are below 90° Fahrenheit. Most activity occurs during spring and early summer.

The USFWS determined that the Mojave Desert population warranted federal listing in response to documented population declines over large portions of its range (USFWS 1990). The decline was likely due to several causes, including loss and degradation of habitat, upper respiratory tract disease, predation by ravens and coyotes, vehicle strikes, livestock grazing, and direct disturbance and collection by humans. The tortoise was emergency-listed as Endangered on 4 August 1989, and the Mojave population was listed officially as Federally Threatened in April 1990 (USFWS 1990).

The Combat Center is within the southern Mojave subdivision of the Western Recovery Unit for the desert tortoise. Critical Habitat was not designated aboard the installation. However, it shares a 6.2 mile boundary with the Ord-Rodman Critical Habitat Unit to the northwest, and the Pinto Mountain Critical Habitat Unit is six miles southeast of the installation (Snover and Kellogg 1999).

The Upper Respiratory Tract Disease (URTD,), caused by the bacterium *Mycoplasma agassizii* (Brown *et al.* 1994), was a factor in the species listing as Threatened (USFWS 1990). A thick, nasal mucous discharge is a clinical sign of the disease, but URTD may present other sign, including raspy, difficult breathing, ocular discharge, swelling of the eyelids, inflamed eye membranes (such as conjunctivitis), and sunken eyes. Although a closely related bacterium (*Mycoplasma testudineum*) also occurs in desert tortoises, its role and specifically its pathogenicity has not been demonstrated. The primary external indicator of URTD, mucoid nasal discharge, may indicate other diseases (e.g., herpesvirus infection), so biological samples are analyzed to help diagnose URTD status.

Exposure to *Mycoplasma* is tested via Enzyme-Link ImmunoSorbent Assay (ELISA; anti-body response to *Mycoplasma* spp.), Quantitative Polymerase Chain Reaction (qPCR detection of *Mycoplasma* spp. DNA; Brown *et al.* 2002 and Braun *et al*. 2014), and bacterial culturing (Brown *et al.* 2002). The ELISA test detects an immune response by measuring concentrations of antibodies to *Mycoplasma* in blood samples. An immune response indicates a past exposure to, but does not confirm an active infection by, the bacteria of interest. Cultures of nasal exudate indicate the presence of live *Mycoplasma*, and qPCR tests of blood plasma indicate the presence of *Mycoplasma* DNA (indicating a more recent presence of the organism in the tortoise). Recent Combat Center surveys of tortoises included physical exams and diagnostic testing for health and disease assessments using both ELISA and qPCR tests.

Desert tortoises generally occur through much of the Combat Center (Woodman 2001) including the western and southern expansion areas. The most current density information for the installation is presented in Figure 3-5 Tortoise Density (USMC 2017; USMC 2018b). Areas of steep bedrock outcrop, lava flow, and dry lakes are not typically considered habitat and are frequently not surveyed (see USMC 2018b). The following summary reviews tortoise abundance and density for the legacy base (i.e., prior to expansion in 2013), and subsequent expansion areas to the west and south. Legacy and expansion areas were surveyed at different scales (Figure 3-5) but metrics will be standardized over time during future efforts.

**Desert Tortoise Estimates in the Legacy Base**

In 1997 and 1999 Woodman *et al.* (2001) surveyed the Combat Center's desert tortoise population across what is now the legacy base using survey protocols similar to Tortoise Regional Estimate of Density (TRED) surveys (Karl 2010). Like TRED protocols, Woodman's method performed calibration surveys as a means to generate calibration coefficients to reflect the abilities of individual surveyors to detect tortoise sign. However, TRED protocols calibrate based on the number of tortoise burrows detected during a survey transect, Woodman *et al.* 2001 also included observations of scat and burrows in the calibration, rendering detectability by this method more sensitive. Data from the Woodman *et al.* (2001) desert tortoise survey have provided the first established population baseline for the installation and are regularly used in a

variety of ways by the Natural Resources Management Program, including tracking desert tortoise population trends over time.

The Combat Center employs a consistent and comparable approach for tracking population changes over time by comparing the Woodman *et al.* (2001) data with later datasets collected from mark recapture analyses performed at permanent plots located in Bullion, Emerson Lake, and Sandhill TAs (Woodman *et al.* 2001, Woodman 2012, and Karl 2017). Although detailed trend analysis of all population data available is neither appropriate nor realistic for the purposes of this document, generally declines measuring 67%, 80% and 90% over 14, 12 and 16 years respectively have occurred at the Bullion, Emerson Lake, and Sandhill TAs (Woodman *et al.* 2001, Woodman 2012, and Karl 2017). These numbers represent total population reductions over decades, and when broken down into annual decline rates they are comparable to annual declines (ca. 8%) measured across the Western Mojave Recovery Unit from 2004 to 2014 (USFWS 2015).

Population declines may be attributed to a myriad of causes. At the Combat Center, incidence of URTD is low at these plots (Woodman *et al*. 2001, Woodman 2012, Karl 2017) but predation by canids has been a concern at all three sites, especially in the Sandhill TA (B.T. Henen, unpublished observations). Juvenile tortoises have been reported at the Bullion Plot, but less so at the other two sites, implicating poor recruitment at the Emerson Lake and Sandhill plots. The Sandhill TA should benefit from the tortoise headstart program contributing 100 to 140 mm long (carapace length) juveniles, for which releases began in the spring of 2017.

The Combat Center recently conducted a qualitative comparison (USMC 2017) between the Woodman results and data from LaRue (2013). In the LaRue study a survey team performed triangular transect surveys similar to those performed by Woodman *et al.* (2001); however, surveyors did not include calibration surveys in their data, and due to a lack of calibration, only regional patterns of tortoise abundance and their sign could be generally compared. Results from this analysis reflect tortoise sign had declined overall between the Woodman and LaRue surveys for the Prospect and South Lavic Lake TAs, and sign had increased in the Bullion TA and portions of the Delta TA. As a part of this comparison, the Combat Center created a new desert tortoise density map using a conservative analysis of LaRue (2013) data which only modified areas where the original 0-5 tortoises per square mile density provided by Woodman *et al.* (2001) may have increased, to better consider these areas during future planning efforts.

| Table 3-5 Tortoise Densities and Abundances on the Combat Center | | | | |
|---|---|---|---|---|
| Density (#/ mi$^2$) | Area (Acres) | Percent of Total | Average Density ( #/ mi$^2$ ) | Abundance* |
| 0 – 5 | 235,753 | 39.47% | 2.5 | 921 |
| Density may be > 0-5 | 34,326 | 5.75% | 2.5 | 697 |
| 6 – 20 | 123,571 | 20.69% | 13 | 2,510 |
| 21 – 50 | 67,290 | 11.26% | 35.5 | 3,732 |
| 51 – 100 | 12,183 | 2.04% | 75.5 | 1,437 |
| **Sub-total, Occupied Habitat** | 473,123 | 79.20% | n/a | 9,297 |
| **Data Gaps** | 42,029 | 7.04% | 2.5 | 164 |
| **Landforms, No Habitat** | 82,237 | 13.77% | 2.5 | 321 |
| **Grand Total** | **597,389** | **100.00%** | **n/a** | **9,782** |
| Notes: Tortoise data is from surveys conducted in 1997 and 1999 and updated with TCS data from 2013.<br>Source: Final Environmental Assessment for Ongoing Training, (USMC 2018b). | | | | |

Marine Corps training impacts tortoise densities at the Combat Center (Henen 2012) but a new, formative analysis should quantify those impacts after identifying variation in tortoise densities and associating them with variation in habitat suitability (Barrows *et al.* 2016). The complex, interwoven import of habitat suitability (e.g., Barrows *et al.* 2016) and human disturbance on Combat Center desert tortoises (Henen 2012) is a key component of ongoing monitoring and analyses of tortoise distribution and density at the installation (INRMP Task 3.2.1-A, Appendix A). The new habitat suitability analyses proposed under this INRMP will evaluate human disturbance data (i.e., military training and other sources) from Woodman *et al.* 2001 and LaRue 2013, however the comparison between studies will be neither simple nor precise due to variations in the methods, numbers, and spatial distribution across the landscape (Barrows 2011, Barrows *et al.* 2016).

**Desert Tortoise Estimates in the Western Expansion Area (WEA)**

In 2008, surveys detected multiple types of desert tortoise sign throughout the Western Expansion Area, with sign for all sizes and sexes on most topographic features from low bajadas to mountains (Karl 2009). These surveys indicated approximately 9% of the area hosted no tortoises, mostly in unsuitable or disturbed habitat, and the greatest densities were observed in the valleys, bajadas, and foothills of upper Johnson Valley, especially in the north-central portion west of Emerson Dry Lake and west of the Fry Mountains (Table 3-6 and Figure 3-5). The number of desert tortoises in the WEA was estimated at 2,708 ± 780 adults (95% CI; Karl 2010).

| Table 3-6 Tortoise Density in the Western Expansion Area | | |
|---|---|---|
| Density (#/km$^2$) | Area (acres) | Percent of Total |
| 0 | 13,931 | 9.5% |
| 1-3 | 60,458 | 41.2% |
| 4-6 | 57,105 | 38.9% |
| 7-9 | 11,104 | 7.6% |
| 10-12 | 1,970 | 1.3% |
| 13-15 | 0 | 0% |
| **Total** | **144,567** | **98.6%** |
| Notes: Tortoise surveys conducted in 2009. Based on the TRED survey method GIS data (Karl 2010). | | |

Mark recapture and belt transect surveys from 1977 to 2008 offer comparative data (see Karl 2010 for review). The BLM and USGS used mark-recapture sampling to survey the 1-mile (mi)$^2$ (2.59 km$^2$) 'Trend Plot' in Upper Johnson Valley every four to six years since 1980. The density of adult tortoises (i.e., carapace length > 180 mm; Turner et al. 1987) was 179 per mile (mi)$^2$ (69 per km$^2$) in 1980 (BLM 2005), 39 per mi$^2$ in 1990, and about half that in 1994. The densities now are likely lower as densities have declined range-wide (Karl 2010; USFWS 2015).

From 1977 to 2002, biologists estimated tortoise abundance in the western Mojave Desert via belt transects, 10-meter wide and 2.4-km long, surveyed at two transects per 36 mi$^2$ (93 km$^2$; Karl 2010) and at one or two per mi$^2$ (2.6 km$^2$; between 1998 and 2002). The density of such transects would provide coarse estimates of tortoise abundance and density (Karl 2001), but more intense coverage (i.e., transects per unit area) should more accurately estimate abundance and density. The northern portion of Johnson Valley had relatively high tortoise abundance, with patterns similar to more recent surveys (2008 TRED surveys by Karl 2009), including above average sign counts north of the Western Expansion Area, and west of the Emerson Lake TA. Unlike earlier surveys, however, the recent surveys (Karl 2009) did not detect high tortoise abundance north of Means Dry Lake and west and northwest of the Fry Mountains and southern Johnson Valley. The differences between the earlier and later studies may be partially due to survey method (i.e., density of survey transects; Karl 2009), but the declines are consistent with range-wide declines (Karl 2010; USFWS 2015), suggesting other threats impacted densities.

**Desert Tortoises in the Southern Expansion Area (SEA)**

Although tortoise sign was detected in most of the Southern Expansion Area, tortoise densities were low, with the higher estimates in the northeast corner, and on bajadas in the south (Table 3-7). The number of desert tortoises in the SEA was estimated as 389 ± 115 (95% CI) adults (Karl 2010).

| Table 3-7 Tortoise Density in the Southern Expansion Area | | |
|---|---|---|
| Density Category (#/km$^2$) | Area (acres) | Percent of Total |
| 0 | 0 | 0% |
| 1-3 | 4,328 | 20.3% |
| 4-6 | 11,202 | 52.6% |
| 7-9 | 3,335 | 15.6% |
| 10-12 | 296 | 1.4% |
| 13-15 | 249 | 1.2% |
| **Total** | **19,409** | **91.1%** |
| Notes: Tortoise surveys conducted in 2009. Based on the TRED survey method GIS data (Karl 2010). | | |

BLM (2005) belt transects provided estimates between 1998 and 2002 but did not detect high sign counts. Nearby on the Combat Center, calibrated belt transect surveys indicated relatively high tortoise density (8 to 39 per km$^2$; Woodman *et al.* 2001) for tortoise of all sizes.

**Initial Results of 2017 Desert Tortoise Translocation**

As a part of the recent land and airspace acquisition project, the Combat Center conducted a large-scale desert tortoise translocation to minimize the effects of military training exercises on the desert tortoise population in the newly acquired lands. Regulatory authorizations received from the USFWS for this effort included a Biological Opinion (USFWS 2017) and Supplemental Environmental Impact Statement (USMC 2017). Under these authorities, the Combat Center has translocated 1043 tortoises (871 large [carapace length, CL > 159 mm] and 172 small [CL < 160]) to four recipient sites including the Lucerne-Ord, Rodman Sunshine Peak North, Siberia, and the Constrained Release Area. As of December 2017, another 557 tortoises were placed in the TRACRS holding facility due to their smaller size (CL < 120) preventing the use of longer-term monitoring transmitters. Of those translocated, 929 (786 large, 143 small) were moved during the period of 8 to 22 April 2017 and 114 (85 large, 29 small) were moved during the period of 2 to 4 October 2017. To monitor translocation efficacy (e.g., survivorship and integration), we used radiotelemetry to monitor approximately 20% of translocated tortoises (158 large, 33 small) and similar numbers of resident tortoises (172 large, 14 small at recipient sites) and control tortoises (222 large, 32 small; at control sites Broadwell, Bullion, Calico, Cleghorn, Daggett, Ludlow, and Rodman Sunshine Peak South). None of the 79 small, monitored tortoises died post translocation. Of the large tortoises tracked in 2017, 15 (9.49%) translocated, 3 (1.74%) residents, and 8 (3.60%) controls died post translocation. Annual clearance surveys will continue on 1-km$^2$ (by UTM) grid cells until less than two large tortoises (per 1-km$^2$ grid) are detected (USFWS 2017 and USMC 2017), after which we will be complete with clearance surveys for tortoise translocation.

**Figure 3-5: Combat Center Desert Tortoise Densities**

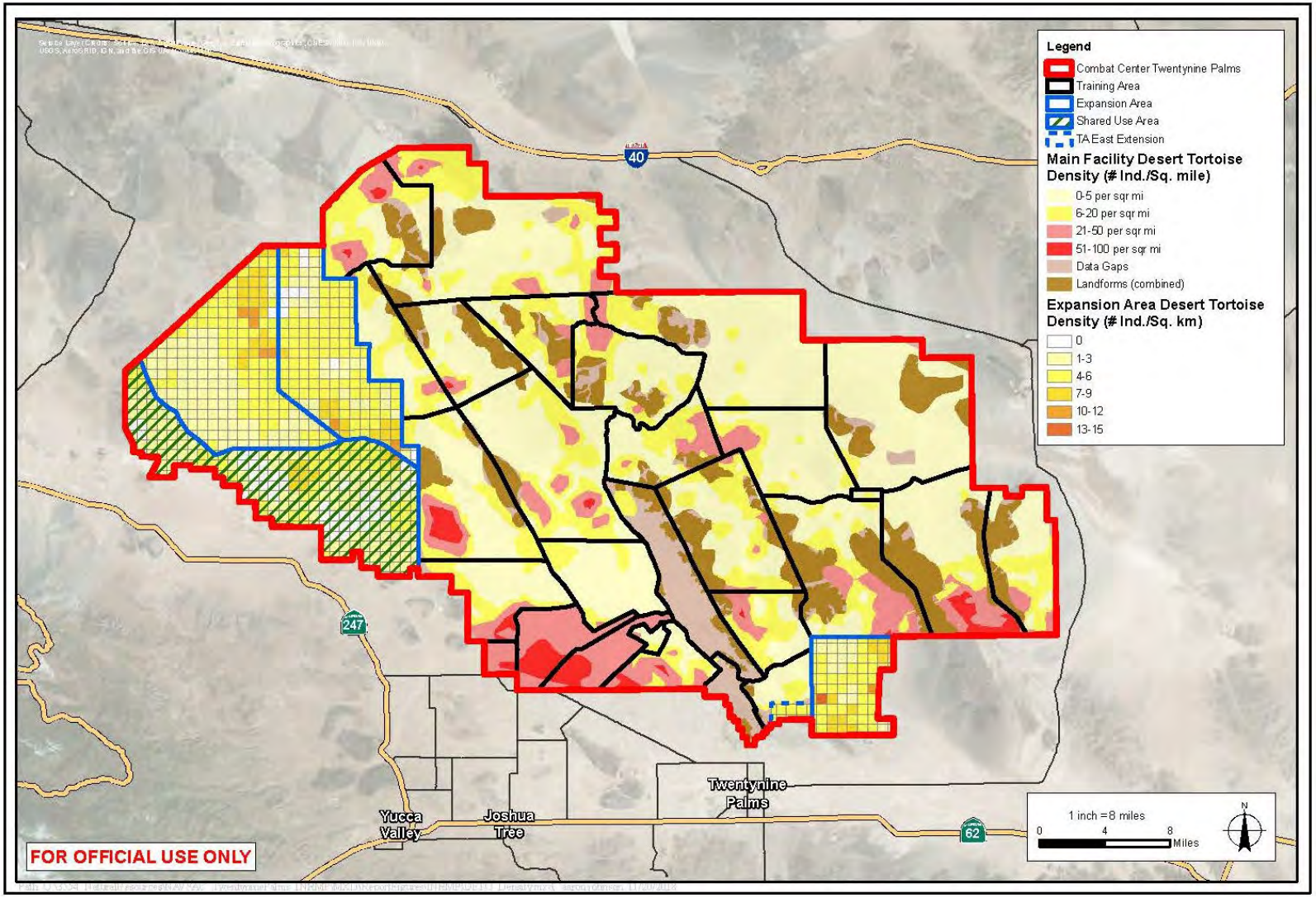



*Figure 3-5 reflects the two desert tortoise density datasets providing full coverage across the installation.*

### 3.7.7 Migratory Birds

The Regional Internal Review Procedures prepared by Chief of Naval Operations (July 31, 2001) state that "INRMPs should be assessed to evaluate their compatibility and contribution to the conservation of migratory birds." In general, the Combat Center has a lack of high-quality habitat for migratory and resident bird species. With no known perennial seeps or springs, most bird sightings occur in developed areas of Mainside, including the golf course and wastewater treatment ponds, with a limited number of sightings at ephemeral surface water sources. No formal surveys have been recently conducted at the golf course or treatment ponds but they are considered viewing ponds and periodic avian surveys have documented MBTA use in years past, and surveys are anticipated again, at a low frequency, in future years. The Combat Center also maintains a volunteer monitoring initiative with the Marine community which seasonally performs informal bird counts at the ponds. The activity is dependent on the interest, availability, and skillset of the individual volunteers and helps to improve the community awareness and connection with the natural resources aboard the installation.

The following list includes descriptions of many past and current actions completed to benefit migratory birds (future projects are detailed in the 5 Year Workplan presented in Appendix A):

- In 1999, MAGTFTC completed a comprehensive survey of all vertebrates, including birds. The study (Cutler *et al.* 1999) determined that at least 87 species of birds are resident and an additional 122 species are migratory through this area.
- In 1998, MAGTFTC and the San Bernardino County Museum completed a comprehensive survey of neotropical migratory birds at the Combat Center. This study (McKernan 1998) primarily focused on the developed areas of the Combat Center, including the golf course and sewage treatment facilities.
- In 1998, the Combat Center completed construction of a ten-acre stormwater retention pond. Though this facility serves other purposes, specific design changes were implemented to increase its use by both migratory and resident species. Educational signs and bird viewing blinds have also been installed around the pond, now informally called the "Wildlife Viewing Area." At least 70 species of birds have been documented using this area.
- The Combat Center developed a "Guidance" document that details allowed and prohibited actions that Marines, family members, contractors and civilian employees of the U.S. Marine Corps can do to reduce "Take" of migratory birds (CCO 5090.1F, Appendix F). This guidance is incorporated in a Combat Center Order, which is signed by the Commanding General of the installation. This guidance also includes regulations and recommendations on the proper timing of tree-trimming within the Mainside area.
- EA staff regularly cooperates with organizations such as Partners in Flight, The Wildlife Society, the American Bird Conservancy's "Cats Indoors" campaign and others. MAGTFTC also cooperates with the regional, interagency Raven Project team led by USFWS Palm Springs Field Office.
- The Marine Corps has worked to improve habitat quality of xeroriparian washes for migratory and resident birds (and other wildlife) through an aggressive saltcedar

(tamarisk) eradication program (refer to section 4.12). The Combat Center has treated more than 40,000 saltcedar since 1997.

- The USFWS Migratory Bird Treaty Office (MBTO) - Region 8 in Sacramento has issued the Combat Center a Special Purpose Permit. This permit allows the limited removal of nests of mourning dove (*Zenaida macroura*), greater roadrunner (*Geococcyx californianus*), common raven, mallard (*Anas platyrhynchos*), house finch (*Carpodacus mexicanus*), great horned owl (*Bubo virginianus*), and barn owl (*Tyto alba*), "when nests are built on or near tactical vehicles, pose a health or safety threat or the nests are in a location where birds are in danger." Actions taken under authority of this permit are reported to the MBTO on an annual basis. The current permit expires in March of 2019. The Combat Center intends to apply for a renewal of this permit in calendar year (CY) 2019.
- A BASH Plan was completed in 2003. In general, it determined that MAGTFTC and the Expeditionary Airfield have a low risk of airstrikes due to the distance between the airfield and any source of water.
- Educational Outreach and briefings (Chapter 4, Goal 4) include information on migratory birds, specifically directing Marines to not feed ravens. Additionally, guidance from USFWS to ensure that any new utility poles not be compatible for raven nesting (existing poles will be modified by MAGTFTC and Southern California Edison on a conditional basis).
- Boarman and Chamblin (2005) completed a study focused on the roosting behavior of the common raven; however, this study was completed primarily due to the known predatory impact of ravens on the desert tortoise (Chapter 4, Goal 3). A similar survey in 2010 by Boarman (2014) indicated the similar patterns of high Raven numbers near subsidies at Mainside, and high numbers near units training in some training areas.
- The Combat Center and USGS (Las Vegas, Nevada) completed a preliminary study of burrowing owl (*Athene cunicularia*) at the Combat Center. A final version of this study was received in 2007, further research and management recommendations will be considered in the future.
- ICF Jones and Stokes completed an Avian Point count survey around the Expeditionary Air Field in support of the BASH plan in 2008.
- Circle Mountain Biological Consulting, LLC completed the general wildlife survey in 20 range training areas. The idea of the project was to provide a dependable and statistical baseline of all vertebrates found in the range training areas. This project was completed in 2012.
- Public Works Division and EA worked together to incorporate "Avian Protection Guidelines" in accordance to Southern California Edison line and power-pole configuration for all new power pole construction in 2011.

### 3.7.8 Other Special Status Fauna

In total, 39 species with some level of special status have been detected on the Combat Center, including 2 reptile, 27 bird, and 10 mammal species (Table 3-8). Four of these species are federally listed as threatened or endangered, however three are nonresidents, including the willow flycatcher [*Empidonax trailli*], Bell's vireo [*Vireo bellii*], and snowy plover [*Charadrius*

*nivosus*]. For each of these avian species, the subspecies observed on the Combat Center was also unknown or otherwise unnoted (USMC 2012). The desert tortoise is the only federally-listed resident faunal species known to occur on the Combat Center, and is a state-listed threatened species under the California Endangered Species Act. While the peninsular population of desert bighorn sheep (*Ovis canadensis nelsoni*) are listed as federally endangered, desert bighorn sheep at the Combat Center are well outside of this population. The population is fully protected by the state, and federally identified as a BLM Sensitive species. The table below lists special status faunal species documented aboard the Combat Center:

| **Table 3-8 Sensitive Status Fauna Present** | | |
|---|---|---|
| **Scientific Name** | **Common Name** | **Special Status** |
| **Reptiles** | | |
| *Uma scoparia* | Mojave Fringe-toed Lizard | CSC |
| *Gopherus agassizii* | Desert Tortoise | FT, ST, T1 |
| **Birds** | | |
| *Aythya americana* | Redhead | CSC |
| *Pelecanus erythrorhynchos* | American White Pelican | CSC |
| *Haliaeetus leucocephalus* | Bald Eagle | BGEPA; SE |
| *Circus cyaneus* | Northern Harrier | CSC |
| *Aquila chrysaetos* | Golden Eagle | BGEPA, FP |
| *Charadrius nivosus* | Snowy Plover | #, CSC |
| *Numenius americanus* | Long-billed Curlew | BCC |
| *Chlidonias niger* | Black Tern | CSC |
| *Geococcyx californianus* | Greater Roadrunner | T1 |
| *Athene cunicularia* | Burrowing Owl | BCC, CSC |
| *Asio otus* | Long-eared Owl | CSC |
| *Asio flammeus* | Short-eared Owl | CSC |
| *Chaetura vauxi* | Vaux's Swift | CSC |
| *Calypte costae* | Costa's Hummingbird | BCC |
| *Selasphorus sasin* | Allen's Hummingbird | BCC |
| *Colaptes chrysoides* | Gilded Flicker | SE |
| *Falco peregrinus anatum* | American Peregrine Falcon | FP |
| *Contopus cooperi* | Olive-sided Flycatcher | CSC |
| *Empidonax trailii* | Willow Flycatcher | #, SE |
| *Lanius ludovicianus* | Loggerhead Shrike | BCC, CSC |
| *Vireo bellii* | Bell's Vireo | # |
| *Riparia riparia* | Bank Swallow | ST |
| *Toxostoma lecontei* | LeConte’s Thrasher | CSC |
| *Oreothypis luciae* | Lucy's Warbler | CSC |
| *Setophaga petechia* | Yellow Warbler | BCC, CSC |
| *Xanthocephalus xanthocephalus* | Yellow-headed Blackbird | CSC |
| | All raptors | CSC, FP |
| **Mammals** | | |
| *Macrotus californicus* | California Leaf-nosed Bat | CSC |
| *Lasiurus xanthinus* | Western Yellow Bat | CSC |
| *Corynorhinus* (= *Plecotus*) *townsendii* | Townsend's Big-eared Bat | CSC |

| Table 3-8 Sensitive Status Fauna Present | | |
|---|---|---|
| **Scientific Name** | **Common Name** | **Special Status** |
| *Antrozous pallidus* | Pallid Bat | CSC |
| *Nyctinomops femorosaccus* | Pocketed Free-tailed Bat | CSC |
| *Eumops perotis californicus* | Western Mastiff Bat | CSC |
| *Chaetodipus* (= *Perognathus*) *fallax pallidus* | Pallid San Diego Pocket Mouse | CSC |
| *Canis latrans* | Coyote | T1 |
| *Vulpes macrotis marsipus* | Desert Kit Fox | FP |
| *Taxidea taxus* | American Badger | CSC |
| *Ovis canadensis nelsoni* | Bighorn Sheep | BLM-S, FP |

# No subspecies specified in formal records.
*Definitions:
***Federal*** Federal categories per the Endangered Species Act, administrated by the USFWS.
FT Threatened - any species officially listed by the USFWS that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
BGEPA Bald and Golden Eagle Protection Act of 1940.
BLM-S Bureau of Land Management Sensitive
BCC Bird of Conservation Concern

***Tribes***
T1 Species of interest/concern as identified by tribes.

***State*** State categories per the 1984 California Endangered Species Act
SE Endangered - any species officially listed by the California Fish and Game Commission that is in danger of extinction throughout all or a significant portion of its range.
ST Threatened - any species officially listed by the California Fish and Game Commission that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
CSC California Species of Special Concern.
FP Fully Protected

Birds represent the largest number of sensitive species at the Combat Center. Twenty-eight sensitive species have been observed, primarily near Mainside due to the wet areas created by the golf course, sewage treatment systems, and the evaporation ponds. Sensitive birds have also been observed throughout the training areas.

# 4.0 NATURAL RESOURCES MANAGEMENT

## 4.1 Introduction

The Natural Resources Management Program at the Combat Center seeks to address local, regional, and national priorities through the use of management practices and standard operating procedures that directly affect flora, fauna, soil, and limited water. The program integrates landscape, ecosystem, and species-scale perspectives to address DoD requirements from the MCO 5090, such as the conservation of biota, sustaining yields of renewable resources, performing scientific research, education, and supporting various forms of recreation.

Managing environmental considerations requires a broad array of technical expertise, time, and resources. The program description presented here highlights elements of natural resources that are overseen by various levels and entities within the installation, as well as those elements specifically under the purview of the Natural Resources Division of the Conservation Branch in the Environmental Affairs directorate. Elements not directly related to the biological program managed by the Conservation Branch are identified as such in the desecriptions, and varying levels of detail are provided depending on their applicability to the management of soils and biology, and reference information is provided to assist the reader with accessing additional information outside the purview of biological resources, if needed.

The Natural Resources Program adopts management approaches that integrate large-scale planning objectives with specific, distinct projects and actions. The NR Program also elevates certain priorities into standard operating procedures. This Program description is a written summary of the program background and context; Appendix A presents a 5-Year Workplan outlining specific actions, budgets and timeframes.

## 4.2 Program Description

### 4.2.1 Goal 1: Strengthen the Combat Center's Operational Capabilities

Activities performed under this goal seek to proactively enable or expand capability of the Combat Center to sustain existing and future training and operations, in alignment with environmental laws and regulations. Specific program elements include:

1.1 Align Natural Resources Management and Mission Statement
1.2 Training Lands Degradation Minimization
1.3 Ensure NEPA Compliance

**Element 1.1 – Align natural resources management and mission sustainment**

This element recognizes the Natural Resources Program's dual role in supporting the Combat Center's mission and managing the natural resources aboard the installation. While a new addition to the framework, the element ties into concepts from the earlier program.

The objectives listed below identify a structure for identifying current tasks and future initiatives with the explicit aim of reducing environmentally-sourced encroachment on military training and

other operations. Ongoing assessment of program operations against these objectives will assist the Natural Resources Program in maintaining its mission-supporting focus.

Objectives:

*1.1.1 - Reduce the regulatory burden on mission implementation;*

*1.1.2 - Use the Integrated Natural Resources Management Planning process for natural resources management;*

*1.1.3 - Coordinate installation resources management with training area users;*

*1.1.4 - Coordinate installation resources management with regional initiatives and management strategies;*

*1.1.5 - Minimize wildlife conflicts; and*

*1.1.6 - Adequately staff and support implementation of the Natural Resources Program.*

The 5-Year Workplan identifies specific actions that will be taken to fulfill the objectives of this program element.

***Wildlife Conflict Minimization*** *addresses topics such as Pest Management, Animal Control, and Subsidy Management Program and is described in greater detail, below.*

*Pest Management* – The Integrated Pest Management Plan discusses many aspects of pest management that are not directly within the scope of this INRMP, such as control of disease vectors and protection of facilities. The Integrated Pest Management Plan (Naval Facilities Engineering 2017) is developed by an interdisciplinary team from Environmental Affairs, Public Works Department, the Naval Facilities Hospital (Infectious Disease Branch), Naval Facilities Southwest, and others. The Plan is revised every 5 years and:

- Supports the military mission by protecting the health and welfare of military and dependent personnel,
- Maximizes the service life of structures and other types of real property,
- Reduces reliance on pesticides to solve pest problems, and
- Implement environmental protection measures at every opportunity.

The plan emphasizes Integrated Pest Management and applies to all pesticide use on the Combat Center except pesticide repellents used for personal relief. Environmental Affairs directorate responsibilities to the Integrated Pest Management Plan include:

- Supporting the military mission by protecting the health and welfare of military and dependent personnel,
- Maximizing the service life of structures and other types of real property,
- Reducing the reliance on pesticides to solve pest problems, and
- Implementing environmental protection measures at every opportunity,

- Protecting native wildlife species and their habitats.

*Animal Control* – All wildlife species are protected at the Combat Center unless specifically targeted for control, with the exception of the European starling, house sparrow, Eurasian collared dove, rock pigeon, household invertebrates, household rodents, and Africanized or European honeybees. Coyotes are only considered pests under very specific circumstances, such as animals habituated to human presence. Feral or free-roaming dogs, coyotes, and Africanized honeybees are considered pests aboard all areas of the Combat Center, and the Combat Center implements measures to control the populations of these species on the entire installation, not just in areas with tortoise value. Ravens are protected under the federal Migratory Bird Treaty Act but in certain areas of Mainside and the Range Training Areas, where their numbers or predatory behaviors are problematic, they are considered pests.

Africanized honeybees (*Apis mellifera scutellata*) are prevalent in San Bernardino County. A terrestrial invertebrates study aboard the Combat Center (Pratt 2005), estimated that greater than 85% of all bees found are Africanized honeybees. Africanized honeybees are much more aggressive than the European honeybee. They become agitated much easier and will stay agitated for a longer period of time. The two types of bees are virtually indistinguishable except through a microscope. Marines are warned to treat all bees as the more dangerous Africanized honeybee variety.

The spread of non-native fire ants (*Solenopsis invicta*) is a concern. Non-native fire ants are slowly spreading northward from Southern California. They are typically found in the vicinity of irrigated areas and are unlikely to pose a significant threat to natural systems in the training areas. At the Combat Center, non-native fire ants are managed largely by military housing.

Feral, free-roaming dogs are a concern throughout the desert and are considered pest species on the Combat Center. Coyotes are also considered a pest species as individual animals can become a nuisance or depredate desert tortoises. Individuals that are found in housing areas or continually staying in populated areas will be dealt with by the Natural Resources staff and the Conservation Law Enforcement Officers on a case-by-case basis. Coyotes in the training areas will be subject to control efforts, as reports have documented signs of decreased inhibition and sometimes aggression towards marines. Under the 2017 Biological Opinion, control of coyotes is required to support the desert tortoise translocation effort. Installation guidance has been developed to guide the execution of controlled depredation efforts for coyotes (see Appendix G) and several events have been implemented to date. Targeted coyote depredation efforts have begun under the leadership of the Conservation Law Enforcement Officers and sometimes use trained volunteers. Coordinated hunting efforts are anticipated in the future as well, once the framework for hunting on base is developed. All hunting and depredation efforts will be located in areas within and around headstart release areas and translocation control and recipient areas.

Ravens and many other species occur throughout the built and natural areas of the installation and their population sizes are artificially inflated by provision of subsidies such as food, water, and shelter. In the built environment, the overabundance of ravens degrades the quality of the Marines work environment, particularly when several hundred roost in a single location on a repeated basis. In natural areas, raven predation is thought to reduce the effectiveness of desert

tortoise conservation measures taken by the installation. To manage these situations, the Combat Center is pursuing a MBTA Depredation Permit that will, if obtained, allow certain staff to implement lethal control measures. See Goal 2, Element 2.6 for more information on invasive species management and Goal 3, Element 3.1 for more information on depredation efforts for both ravens and coyotes in relation to the desert tortoise.

*Subsidy Reduction* - A subsidy reduction program is maintained by the Combat Center to identify and reduce subsidies made available by the presence of humans but it is impossible for an installation of this size to completely eliminate these opportunities. The effectiveness of the subsidy reduction program monitors the abundance of target species and resources made available to them, and tracks changes in their use of space and other resources over time. Desert tortoise predators such as ravens and coyotes are of primary focus in this program, as they are identified in the 2017 LandEx BO as desert tortoise predators warranting subsidy reductions, and both species pose hazards to the Marines as well as the tortoise.

Under this program, as information about predator species is received, new management recommendations are formulated to address changing or emerging conditions and new practices and technologies for predator management are explored. In this way, the subsidy reduction program uses an adaptive management approach to respond to ever-changing conditions to best manage the Combat Center's influence on these populations. While the program is outlined here, subsidy reduction practices outlined under this plan are not consolidated and are instead integrated into Goals 1 & 3, Objective 1.1.5 – Minimizing Wildlife Conflicts, Objective 3.1.2 - Inventory and Monitor to Identify Threats to Desert Tortoises, and Objective 3.1.4 - Minimize Tortoise Injury and Mortality Aboard the Combat Center. See the 5 Year Workplan under these Objectives for specific tasks identified for this program.

**Element 1.2 –Training Lands Degradation Minimization**

The majority of land disturbance on the Combat Center is caused by military training. Considering the huge costs and long time periods involved with restoration of disturbed lands, minimization and management of disturbance is the most cost effective technique to manage natural resources at the Combat Center. The Natural Resources Program supports ongoing, flexible military training by meeting the following objectives under this element:

Objectives:

*1.2.1 - Minimize damage to training lands, disturbance to natural resources and ensure ongoing coordination with military planners;*

*1.2.2 - Design roads to benefit both military use and conservation; and*

*1.2.3 - Prevent damage to sensitive areas.*

***Disturbance Minimization*** may be affected by creating new Pre-designated Range Training Support Sites (PRTSS) and by locating new range projects in previously disturbed areas. Master planners at the Combat Center contribute significantly to implementing this objective. NEPA documentation associated with new projects will emphasize the use of already disturbed lands as alternatives to be strongly considered. Planners and Training Lands managers should also

employ the following techniques, which are pertinent to the management of concentrated military use sites:

- Maintain and delineate road access to sites to discourage units from making alternate routes,
- Ensure proper drainage when utilizing sites to return water to natural channels downstream from sites.

***Training Lands Restoration -*** Training lands restoration work to date has primarily emphasized soils stabilization first, and very infrequently, the reestablishment of native plant assemblages. Usually, restoration projects are developed to address specific, small-scale areas of localized disturbance and emphasize reducing compaction and soils losses from wind and water erosion events, and employ soils management techniques such as ripping, pitting, swaling, and the creation of small catchment basins. Practices that actively seek to reestablish native vegetative cover can also assist with meeting these objectives and provide more rapid returns to healthy habitat. Restoration as a component of prudent lands conservation efforts provides many long-term benefits, especially when focused in the upper drainsheds. Hydrological functioning is improved, soil and water are retained on-site benefiting groundwater recharge, subsurface streamflow, native plant reestablishment, and ultimately fulfills the goal of training lands restoration efforts – to maintain a high-quality, realistic training environment and support ecosystem health.

For several reasons, revegetation practices have not historically been used; these include difficulties with attaining meaningful levels of seed germination and seedling establishment, costs of irrigation when used, which include up front system establishment and low success rates once water applications are stopped, and the general observation that native plant cover naturally return to disturbed areas over time. However, ground disturbance is well-documented to facilitate the establishment and spread of non-native, invasive plants such as *Schismus*, *Brassica tournefortii*, and even *Tamarix ramossisima*, all of which have long-term negative impacts on ecosystem health. For this reason, more attention will be paid to the decision to include revegetation in future projects, especially in areas with higher known densities of desert tortoise and environmentally sensitive areas. The selection of revegetation practices during the planning of training lands restoration projects shall include cost-benefit considerations on a case-by-case basis, prior to their funding, to ensure meaningful value from the action (see Appendix A for details).

The goal of training lands restoration shall also be supported by other types of specific restoration approaches as well as general aspects of the Natural Resources Management Program as outlined in this INRMP. Strategies such as removing jeep trails, minimizing encroachment/off-road travel, reevaluating the movement of roadway alignments to minimize disturbance through sensitive areas and the establishment and use of PRTSS will minimize impacts to soils and opportunities for non-native invasives to establish, further reducing impacts across the landscape.

***Roadway Construction and Repair -*** A major portion of land management involves the construction and maintenance of access roads. The road system in the training areas is

comprised of unpaved Main Supply Routes (MSR) and secondary trails and are poorly marked. MSRs are graded and better maintained to allow for faster travel between training areas. There are also smaller roads, often called jeep trails, to allow movement through the Combat Center. These roads are not well maintained and frequently change. Roads that are washed out are not always repaired and new roads are occasionally created. Roadway maintenance, construction and repair cannot be reasonably restricted to seasonal actions, even in non-emergency situations, as such restrictions have significant potential to limit the implementation of the military mission. However, considerable consideration is given during maintenance and construction events to ensure minimal impacts to the environment.

Road maintenance crews at the Combat Center must be particularly cautious about creating berms along road shoulders. Road berms can channel water and create rutting or washouts. Steep berms are problematic for desert tortoises, particularly juveniles, as they can create physical barriers to movement or cause tortoises to overturn when attempting to climb.

***Access Across BLM Lands -*** The BLM administers much of the lands adjacent to the Combat Center and there are times when it is advantageous for military units to use routes through BLM land to access the installation. This is necessary when transit through training ranges is prohibited due to live-fire training exercises. One training range, America Mine, is only ground accessible through BLM land. Units are required to request clearance from MTD in order to access any part of the installation through BLM land.

***Special Use Area Marking -*** The Combat Center is developing a uniform system of marking Special Use Areas to prevent further disturbance to sensitive areas. Desert tortoise awareness signs are posted at entry points to training areas and off-limits signs are located along MSRs adjacent to off-limits areas. Information concerning a uniform marking system will be incorporated into mission awareness training.

***Special Interest Area Protection -*** Designation of special protection status for unique or fragile areas is an important management tool. It is more cost effective to put use restrictions on areas to minimize disturbance than to mitigate damage. These areas are not considered off-limits to training; they are only being recognized as having unique features that warrant extra consideration in the planning process. Special interest areas include locations such as flood plains, lava tubes and mines, and wet areas. As part of the NEPA process, EA reviews proposed projects and activities at the Combat Center. Natural resources managers can identify concerns and recommend measures to minimize disturbance.

**Element 1.3 - Ensure NEPA Compliance aboard the Installation**

The NEPA of 1969 mandates Federal agencies use a systematic, interdisciplinary approach which applies natural sciences, social sciences, and environmental design arts in project planning and decision-making processes to protect, restore, or enhance the environment. Combat Center Order 5090.4F regulates NEPA compliance at the Combat Center. The Commanding General, through the Head of EA, is responsible for implementation of a NEPA program. The Combat Center maintains NEPA compliance through the Environmental Impact Review Board (EIRB). The Chief of Staff is the Chairman of the Board. The AC/S G-4 serves as a Member, and the Head of EA serves as the Executive Agent. The Head of PWD, AC/S MTD, and a legal

representative participate as standing members. The Combat Center Environmental Impact Working Group is a subcommittee of the Installation EIRB and assists in the passing of information from the Project Proponent to EA. This working group has representatives from units as well as appropriate technical experts. The Natural Resources Program has two NEPA-related objectives to ensure compliance aboard the installation:

Objectives:

*1.3.1 - Use an established, NEPA project review process to identify projects and activities on the Combat Center that might impact natural resources and work with project planners to resolve issues early in the planning process;*

*1.3.2 - Maintain and acquire any necessary environmental reviews, permits and other legal authorizations to operate the Natural Resources Program*

***The Combat Center NEPA Project Review Process***

The NEPA review process is initiated when a project proponent creates a project file in the automated, online system (NEPA PAMS) and submits the file as a Request for an Environmental Impact Review (REIR) to the NEPA Program Manager. The project REIR is then routed via the electronic system through Environmental Affairs to subject matter experts who review the project file to determine information gaps, potential impacts, issue resolutions, permits or approvals requirements, and recommend modifications to the proposed action if necessary.

If all subject matter experts determine a project's actions will not have significant effects and do not require an Environmental Assessment or Environmental Impact Statement, the project is found to be Categorically Excluded (CATEX). The Marine Corps uses the Department of the Navy's list of 45 CATEX's to identify the types of exemption(s) such action(s) may fall under, and a Decision Memorandum document is prepared which summarizes pertinent project details and CATEX determinations. CATEXs most commonly used at the Combat Center apply to actions such as studies, data, and information-gathering that involve no physical change to the environment, routine repair and maintenance of facilities in order to maintain existing operations, and new construction that is consistent with existing land use. If a proposed project includes the following "Extraordinary Circumstances," a CATEX may not be issued:

- Adversely affects public health or safety;
- Has the potential for significant environmental effects on wetlands, threatened or endangered species, historic or cultural resources;
- Involves effects that are highly uncertain, involve unknown risks;
- Establishes precedents or makes decision for future actions with significant effects; or
- Threatens to violate Federal, state, or local laws or requirements imposed for the protection of the environment.

An Environmental Assessment is completed when screening criteria for a categorical exclusion are not met. Examples include a new military exercise, construction of a new range, actions involving wide geographic areas, projects that may affect wet areas or other sensitive plant

communities, threatened or endangered species or cultural resources. EAs require Commanding General approval, and if appropriate, a Finding of No Significant Impact (FONSI) is signed and issued.

If the environmental assessment process determines that a FONSI is not appropriate, the project may be modified to remove significant impacts. The environmental assessment process may then be repeated, and if modifications or mitigation are sufficient to remove significant impacts, a FONSI may be issued. If these options fail, the action may be dropped, or a more detailed Environmental Impact Statement may be prepared. An Environmental Impact Statement is prepared for those actions that will have a significant effect on the quality of the human environment. Once the Environmental Impact Statement is prepared and a Record of Decision issued, the Marine Corps may proceed with the project.

***Mitigation*** actions are specific activities that minimize or avoid impacts on the resources that would be negatively affected by the proposed project. Below are five general mitigation tactics as defined by Council of Environmental Quality (CEQ) regulations:

- Avoid the impact altogether by not taking a certain action or parts of an action;
- Minimize impacts by limiting the degree or magnitude of the action and its implementation;
- Rectify the impact by repairing, rehabilitating, or restoring the affected environment;
- Reduce or eliminate the impact over time by preservation and maintenance operations during the life of the action;
- Compensate for the impact by replacing or providing substitute resources or environments.

EA uses the afore described NEPA review process to ensure the Combat Center's natural resources activities are properly planned, coordinated, and documented. It also uses the NEPA review process to identify aspects of other organizations projects that have the potential to affect the installations natural resources. Thus, EA is both a proponent and a responsible agent for compliance with NEPA.

***Existing NEPA Analyses***

The Combat Center has completed NEPA analyses for several projects. The analyses for these projects are incorporated into this document through their Natural Resources Program references, which are listed below. Actions authorized under these analyses that are also identified in our programs will not require further analysis in the Environmental Assessment for the 2018 - 2022 Combat Center INRMP.

- 2003 Environmental Assessment and associated 2002 BO: Addresses environmental effects resulting from basewide training operations, preparation of training lands, and maintenance and construction activities.
- 2012 Environmental Impact Statement and associated BO: Addresses the expansion of the Combat Center to include specific military training operations and preparation of military training lands, within pre and post expansion acreages.

- 2017 Supplemental Environmental Impact Statement and associated 2017 BO: Addresses implementation of the desert tortoise translocation, as required under the 2012 EIS.
- 2018 Ongoing Training Environmental Assessment: Addresses environmental effects resulting from rotary wing and tilt-wing landing operations in the pre-expansion lands.

***Existing Environmental Reviews, Permits and Other Legal Authorizations***

The Conservation Branch of Environmental Affairs maintains several permits and other legal authorizations specific to federally protected species that are necessary to maintain installation compliance with environmental law. These authorizations include two Biological Opinions and two Section 10 permits for Desert Tortoise, and a Migratory Bird Treaty Act handling permit. Compliance with these authorizations is reviewed in more detail under Goal 3 of this section.

### 4.2.2 Goal 2: Support Natural Systems on the Landscape

This Goal ensures natural resources management provides good stewardship of the public lands entrusted to the U.S. Marine Corps for military training. Landscape level planning and adaptive ecosystem management strategies are employed to conserve the biodiversity of native flora and fauna. Ongoing monitoring and management of vegetation and wildlife considers all associated biological communities, ecosystem processes and human values. Areas on DoD installations that contain natural resources (ecological, scenic, recreational, or educational) that warrant special conservation efforts may be designated as special natural areas, where such conservation is consistent with the military mission. Natural resources managers contribute expertise and otherwise coordinate with other Combat Center divisions and directorates to improve how operations indirectly influence natural resources considerations. Coordination with outside agencies, regional ecosystem initiatives and planning efforts improves the effectiveness of the Natural Resources Program. On a project-by-project basis, management efforts will steer projects and tasks towards science-based efforts as much as practicable/feasible, such that in time, “routine” efforts resulting from the management and monitoring of ecosystems will also further general knowledge of desert systems. Program Elements under this goal include:

2.1 Coordinated Ecosystem Management;
2.2 Landscape Level Planning;
2.3 Habitat Management;
2.4 Wildlife Management;
2.5 Wet Areas Management;
2.6 Climate Change;
2.7 Invasive Species Management;
2.8 Wildfire Management;
2.9 Mainside Grounds Management Support

**Element 2.1 Coordinated Ecosystem Management**

Numerous regional land use or planning initiatives potentially influence natural resources management at the Combat Center, and many regional constraints and opportunities are shared between differing interests. Coordination with outside interests provides a significant opportunity to share information, identify early issues and upcoming priorities, and ensure

natural resources management strategies are appropriately crafted to best address issues of regional significance.

Objective:

*2.1.1 - Develop management strategies and projects that provide local as well as regional benefits.*

**Element 2.2 - Landscape Level Planning**

The Conservation Branch of Environmental Affairs is refining a landscape level planning approach, currently employed informally, to best identify how landscape level planning will be executed under the Natural Resources Program to best conserve the long-term sustainability and biodiversity at various relevant ecological scales. The approaches developed will be science-based and work to identify, maintain and restore the composition, structure and function of natural communities that comprise ecosystems. The approach will consider how and what effects installation programs have, on both spatial and temporal ecological scales, and identify options to develop sustainable human activities that best coexist with the dynamic landscape and mission needs. Effective management requires regional partners sharing, and working together towards, a vision of future ecosystem health. This standard is already emphasized during project development for the Natural Resources Program, and during the NEPA review process for installation projects. The best science and data available must be used to develop planning priorities, identify potential conflicts, and develop "SMART" goals (strategic, measurable, attainable, realistic, time bound). Once implemented, landscape-level planning projects will be monitored and results will inform the need for and direction of additional management actions.

Objectives:

*2.2.1 – Use landscape level planning to alter limiting factors and promote priority endemic species;*

*2.2.2 – Manage for climate change by ensuring suitable habitat exists for species, including habitat connectivity across and beyond the base boundaries as appropriate, and is maintained under an altered climate regime.*

***Climate Change*** significantly influences the course and magnitude of environmental trends on the landscape and is therefore a priority in landscape-level planning. The Conservation Branch seeks to quantify risks associated with changing climate and determine whether species will persist under more extreme future climate regimes. Modeling is being used to examine the persistence of indicator species, and results indicate climate refugia exist for the desert tortoise. Examining whether such refugia exist for other prominent or keystone species is a prime objective of this INRMP.

Habitat modeling is a critical, efficient first step towards conservation planning for climate change aboard the installation. By nature, models capture and express abstractions of environmental patterns, and via ongoing monitoring at prudent intervals, will be used to establish baseline trend data to iteratively refine projections and improve robustness and utility. These data and models will inform the development of science-based, land management practices to

best conserve flora, fauna, and natural communities. Science-based management practices provide capacity to evaluate effectiveness of the practice, and facilitate the adaptive management process.

**Element 2.3 Habitat Management**

The Natural and Cultural Resources Branch of Environmental Affairs provides ongoing monitoring and adaptive management to sustain habitat at the Combat Center. A habitat is the assemblage of biotic and abiotic elements in which a particular individual or population of plant, animal, or other organism lives. Habitat contains a network of abiotic and biotic elements that cycle nutrients within and among species and trophic levels. Given localized natural and anthropogenic factors, the quality of habitats may vary spatially and temporally. Approaches to habitat monitoring and management will be reevaluated over time to ensure an organized, landscape approach to identify and track trends in health across a range of landscapes and natural communities. Monitoring will establish baseline conditions and evaluate trends for habitats and, on a case by case basis, grow to include measuring stressors and drivers, and identify and monitor indicator species.
Specific objectives of the monitoring program include:

Objectives:
*2.3.1 – Survey and monitor habitat to assess trends in quality over time;*

*2.3.2 – Monitor training related changes to vegetation;*

*2.3.3 – Maintain and modify existing habitat as necessary to support healthy floral and faunal population sizes, and overall diversity.*

The following strategies will be flushed out, scheduled, and implemented to develop a more formalized monitoring schedule, to ensure consistency with the above objectives:

- The types of habitats across the installation will be mapped and ground-truthed. Monitoring will include GIS analyses to assess the relationships between landforms, vegetative assemblages, and sensitive species. Monitoring will verify presence (via field-truthing) and assess condition of representative areas of habitat types, in areas of different disturbance levels. We will build a geodatabase to document and analyze these habitat areas and establish long-term monitoring plots. Rare and unique habitat types, such as mesquite dune systems, will be emphasized.

- Vegetation alliances will be monitored every 5 to 10 years to capture changes across natural communities. Vegetation monitoring will follow the installations standardized protocol, which incorporates the state's VegCAMP mapping standards. Particularly invasive plants will be included in the mapping.

- Integrated Monitoring of Habitat will closely examine relationships between select elements of particular habitats that are critical to sustaining sensitive or listed species across the habitats of the Combat Center. First, species-habitat associations will be measured. Monitoring will then identify key components (drivers and stressors) of these habitats, collecting baseline data on these components, as well as the vegetation,

water, and soils. Since habitats drastically change due to different disturbances, monitoring frequencies will be developed on a system-by-system basis, and will compare and contrast areas with high and low anthropogenic influences.

Habitat management and monitoring will be integrated, adaptive and science-based. Monitoring findings that indicate downward or undesired trajectories for habitat quality (extent, diversity, functioning, etc...) will be used to help identify underlying causes. Thresholds activating responses will be formalized based on site-specific considerations and include associating declines in habitat with declines in resident species of interest. We will use existing thresholds (e.g., minimally viable densities, USFWS 2011) or, with the scientific and regulatory communities, develop new thresholds to manage these resources, and will use the most up to date population viability information available from USFWS. Management actions will target the causes of these declines and will be applied and evaluated in areas of need, as time and budget allow. In a hypothetical situation, if an invasive such as Sahara mustard encroaches on a sensitive or otherwise high-value dune system to the extent that loose sand is becoming stabilized and sand-dependent species were decreasing in abundance, then management may contain or exclude the weed from a particular area, map the desired boundary/area to be protected, and deploy techniques such as hand pulling and early application of pesticides to slow the spread of the target plant. Over the next few years, we will use mapping and ground trothing to quantify the management effectiveness and inform future management plans and efforts.

**Element 2.4 – Wildlife Management**

Successful ecosystem management requires all native species be maintained in areas that support them. The Combat Center is taking appropriate steps via the processes outlined in this INRMP, informed by numerous studies and reports, to ensure that overall biodiversity is not compromised at the installation. In accordance with mission needs, the Combat Center shall maintain wildlife populations through targeted, adaptive management strategies that take into account species priorities, population ecology, population health considerations, and carrying capacities. Approaches to habitat monitoring and management will be reevaluated over time to ensure an organized, landscape approach to identify and track trends in health across a range of landscapes and natural communities. Objectives of wildlife management actions are presented below:

<u>Objectives:</u>

*2.4.1 - Perform general wildlife inventories and monitoring to support self-sustaining populations while maintaining training lands;*

*2.4.2 - Ensure state-listed species are considered in the Combat Center actions;*

*2.4.3 - Provide other general, or otherwise miscellaneous, wildlife management support services;*

*2.4.4 - Restore and rehabilitate training lands when feasible.*

Wildlife management and monitoring will be structured similarly to habitat management and monitoring, and will be integrated, adaptive and science-based. Monitoring results will inform managers about the state of various species, communities and landscapes, and help develop

management actions to retain and bolster critical species and installation biodiversity. Faunal monitoring and management actions taken to ensure consistency with the above objectives will encompass the following strategies:

1) Tracking the abundance of listed and sensitive species in known habitat: Significant species, as determined by their sensitivity or value to listed species, will be selected to represent the different landforms and ecosystems present at the Combat Center. Monitoring will prioritize assessing abundance of these species in areas of different disturbance levels, as practicable. Measurements should also include their habitat requirements including forage, shelter, and water resources, and stressors such as invasives and habitat disturbance. After documenting baselines, trends should be measured, from which we will estimate magnitudes of influence from the different drivers and stressors.

2) Exploring presence/absence of sensitive and listed species in potential habitat: Monitoring will also inventory and field truth areas of potential habitat for listed and sensitive species and determine occupancy.

3) Measuring species richness and biodiversity changes across the installation: General wildlife inventories and vegetation mapping will be performed on broader time scales (every 5-10 years) to track ecosystem health over time.

As with the adaptive management approach outlined in the floral management section, monitoring and management will be integrated and science-based as much as is feasible. Negative data for target species (such as declines in population size or numbers of populations, changes/declines in behavior, etc.) will be used to develop and implement management strategies. Management actions that address the likely causes of these declines will be developed, applied, and evaluated as time and budget allow. Findings from the management efforts will inform management decisions. For instance, desert bighorn sheep range across the installation seasonally in low numbers. While forage and other habitat elements are available, surface water is scarce, especially during high-heat months. By providing more stable, year-round water sources, we can reduce their water stress and sustain them for longer periods in areas of otherwise suitable habitat. In this way, management has determined placement of surface water resources can support the recruitment and retention of a single target species on the landscape.

The Marine Corps understands the importance of sensitive species to the health of any ecosystem and will take State-listed species into consideration when developing management strategies per USC 1535 and 16 USC 1540. Establishing management strategies for sensitive species can contribute to a reduction in their decline and may preclude listing under the Federal Endangered Species Act. Most species management on the Combat Center is directed towards the federally-listed desert tortoise, primarily due to compliance requirements. Conservation measures for this species, however, may also benefit many other species of wildlife such as the burrowing owl, Mojave fringed-toed lizard and the common chuckwalla.

***Desert Bighorn Sheep -*** The experimental bighorn sheep population introduced in 1991 is now believed to be stable. To support the introduction of the experimental population, CDFW and

the Society for the Conservation of Bighorn Sheep constructed guzzlers in the Bullion Mountains in 1991 and 1999. These guzzlers are beneficial to other wildlife species and remote sensing has documented use by coyotes, foxes, bobcat, avian species and bighorn sheep. To date a total of 8 drinker devices (guzzler) have been established on the landscape and are annually visited and maintained. Maintenance efforts include checking system functionality, water levels, levels of use and wear and tear, and direct impacts to local fauna including the desert tortoise. Water basins and the surrounding areas are examined closely for signs of desert tortoise presence and potential mortality in the low-entrance water basins. To date, none of these checks has documented a desert tortoise mortality, in or near to the guzzler fixture.

Desert bighorn guzzlers are also monitored continuously with wildlife cameras installed by the installation, and photographic data has clearly documented increases in the number of bighorn users over time with more frequent use of the systems across certain seasons. Several of the guzzlers now experience year-round occupancy by desert bighorn, as well. However, population surveys conducted in 1997 and again in FY16 do not reflect an increase in the number of head aboard the Combat Center. This is likely due to the fact that the 2016 survey employed an unconventional and high-risk transect survey method in which a helicopter was flown in linear grids across mountainous topography. In this survey, so few observations were made that a statistical value of detectability could not be calculated. While it is possible that the survey results accurately reflected low numbers/presence, existing photographic monitoring data, levels of sheep sign, and the known occurrence of individuals in the southern half of the installation draws the quality of the dataset and unconventional survey methodology into question. The desert bighorn survey will be performed again sometime during the latter half of this INRMP period using a different methodology.

***Bats -*** are an important component of the desert ecosystem as they fill a crucial niche in both plant pollination and invertebrate pest control. Surveys conducted in 1996-1997 and 2011-2012 confirmed the presence of six species of bats and an additional six species were listed as suspected or possibly occurring on the Combat Center. Of these twelve known or suspected species, six warrant special consideration as BLM and/or CDFW Species of Special Concern or former Federal ESA candidate species. Habitat loss is a major contributor to the decline of bat species. The Combat Center has installed four bat gates in three mines in recent years to allow bats access to roosts without disturbance from humans. Additionally, Brown and Berry (1998) recommended evaluation of modifying the bighorn sheep guzzlers for use by bats. Any modifications would not allow for entrapment of tortoises or other terrestrial animals.

**Element 2.5 - Wet Areas Management**

The Combat Center's Waters of the United States study (U.S. Army Corps of Engineers 1994) identified four types of wet areas of special concern: playa lakes, dry washes, seeps and springs, and man-made water bodies. No waters of the U.S. were identified aboard the Combat Center.

All dry lakes, substantial dry washes, seeps, springs, and man-made impoundments aboard the Combat Center are important to biodiversity. Plant and animal biological diversity is most related to availability of water, though in almost all cases this water is ephemeral.

Objective:

*2.5.1 - Manage wet areas to protect their ecosystem functionality*

***Playas*** maintain intra/inter ecosystem integrity and were settings for prehistoric cultural activities. When filled with water, playas support complex invertebrate communities and attract significant numbers of wintering waterfowl. When dry, they are often populated with terrestrial birds and mammals when adequate vegetative cover exists (Krzysik and Trumbull 1996). The aquatic invertebrates survey completed in 2007 found fairy shrimp, tadpole shrimp, and clam shrimp in the different playas on the Combat Center. None of these species are listed or considered sensitive. The U.S. Army Corps of Engineers has identified a total of 14 important playas either entirely or partially within the Combat Center boundary. Eleven of these are within the legacy base boundary and include Lavic Lake, Galway Lake, Emerson Lake, Little Emerson Lake, Ames Dry Lake, Quackenbush Lake, Miller Dry Lake, South Miller Dry Lake, Deadman Lake, Dry Lake (Lead Mountain) and Mesquite Lake. Four are within the EMUA West, including Galway Lake, Melville Lake, Means Lake and Soggy Lake. There are no playas in EMUA South and Galway Lake is within the traditional boundary and EMUA West.

The two major impacts that occur to playas in the Combat Center result from vehicular use and bombing. Driving has created compacted and rutted surfaces; Emerson, Deadman, and Lavic Lakes each have more than four miles of roads. The fourteen playas together have about 17 miles of roads.

Since a 1994 Army Corps of Engineers report, the berm on Mesquite Lake along the Combat Center boundary and the berm along the western boundary of Emerson Lake have been breached in several places to restore more natural water flows. Storm water retention ponds have been constructed above Mesquite Lake to protect it from Mainside runoff. The Combat Center identified a limited number of authorized crossing sites on Deadman Lake, a heavily used lakebed. Signs have been placed to identify these crossings and close others. Crossings are maintained to encourage vehicles to use the routes and not create new ones.

***Dry washes*** serve as sediment transport corridors, maintain intra/inter ecosystem integrity, and are rich with historical and cultural resources (U.S. Army of Corps Engineers 1994). Dry washes are zones of high animal activity, most notably insects, which attract many birds and mammals. These washes also act as travel corridors for many desert wildlife species.

Most of the military impact to dry washes is from vehicular use as most washes are also locations for the MSRs. In 1994 there were approximately 76 miles of desert wash roads on the installation (U.S. Army Corps of Engineers 1994).

***Seeps and springs*** are, when discharging, valuable sources of water for wildlife. Most seeps and springs are located in mountainous terrain and are generally inaccessible; therefore, they are not affected by military activities. There are only a few identified surface discharging seeps or springs on the installation. When standing or flowing water is available, these seasonal seeps are a valuable biological resource for wildlife.

***Man-made bodies of water*** at the Combat Center include stormwater and wastewater ponds located in the “Mainside” cantonment area and stormwater ponds in Camp Wilson. These

surface waters provide important resources to both migratory and resident wildlife species, particularly birds. There are no man-made bodies of water located in the training areas to be impacted by military training. Man-made waters are not regulated under section 404 of the California Water Authority (CWA).

***Wet area inventory and floodplain delineation*** are not critical for natural resources management aboard the Combat Center as they are few in number, with the possible exception of small seeps or intermittent springs. A 100-year floodplain report was completed for Deadman and Mesquite playa lakes in 1997. There is no need for additional floodplain delineations at this time.

**Element 2.6 - Invasive Species Management**

Invasive species may be generally defined as those life forms that are not native to a particular area, their transit was assisted by humans at some point in recent history, and their presence currently generates harm to the environment, economy and/or human health. Under this definition, non-natives differ from invasives in that non-natives may find habitat niches and coexist within an ecosystem without harmful detriment, whereas an invasive species may not have a "check-and-balance" within the introduced system and typically proliferates uncontrolled or with very little resistance to population growth, upsetting ecological balances with results ranging from reduced biodiversity, degraded habitat, altered native genetic diversity, reduced ecosystem functioning and services, and heightened disease transmission (of exotics and native diseases, to any/all life forms naturally present within the system, to include humans). The types of species that may be classified as invasive can be broad, unpredictable, and generally include plants, animals, bacteria, fungi, and even other life forms. The emphasis of the Combat Center's Natural Resources Program will be on plant and animal species of concern, however attention will be given on a case-by-case basis should other life forms of concern be found (such as pathological fungi known to infect bats and reptiles, or invasive beetles known to infect mesquites).

The invasive species management program seeks to understand the impacts from invasive species, primarily plant and animal, on natural processes through monitoring, investigative research, and data analysis, so that data may inform exotic species management decisions. For instance, some studies have documented that invasive species can also provide benefits within an ecosystem, as shown in nutritional studies of *Schismus* on desert tortoises (Nagy *et al.*1998 and Drake *et al*. 2016), an area where research results are, varied, incomplete, and warrant additional attention. In some cases, the management of invasive species also has the potential to overlap with those priorities identified under the integrated pest management and animal control aspects of wildlife management, as discussed in Element 1.2. In these instances, species of concern are expected to exhibit particular influence on the desert tortoise or the well-being of the Marine community and may involve overabundance of native species of interest, and on a case-by-case basis will be handled outside of this Natural Resources Program Element.

<u>Objective:</u>

*2.6.1 - Prevent, contain and slow the spread of invasive species aboard the Combat Center to conserve and enhance native species and functionality of natural systems.*

The *Preliminary Survey of Nonnative Plant Species at Marine Corps Air Ground Combat Center* (Anteon 2001) lists eight observed invasive species aboard the Combat Center. The study *Invasive Nonnative Plant Survey* (Agri-Chemical and Supply, Inc. 2005), which was concentrated along the western boundary, observed nine invasive species. EA is actively managing for three of the species.

The removal of *Tamarix spp*. (*T. aphylla and T. ramosissima*), or saltcedar, is an ongoing land restoration action. *Tamarix ramossisima* is listed as a noxious weed by the California Department of Agriculture and has been assigned a high ranking from California Invasive Plant Council; this species of tamarisk is being actively targeted for removal when found. Trees have been removed from Mainside and in the training areas, most notably Lead Mountain. More than 50,000 plants have been removed since 1996. *T. aphylla* is not listed by CDFA as a weed of concern, and is ranked as "limited concern" by the California Invasive Plant Council. This tamarisk species is primarily found at Mainside, where it is cultivated as windbreaks or has become established in a select few natural areas with shallow water tables. It is thought that seed production at this latitude is poor, which reduces successful establishment in natural lands. A project to remove a *T. aphylla* windbreak was supported by the Combat Center until, in the late planning stages project costs rose above $800,000 and became exorbitant. Management for *T. aphylla* shall focus on excluding the species from high-value natural areas with adequate habitat (shallow water tables).

Russian thistle (*Salsola spp.*) is an invasive plant species that is being targeted for removal in certain areas of infestation. Complete eradication is not a reasonable goal; management efforts will focus on containment.

The nonnative grass Mediterranean grass (*Schismus barbatus*) is pervasive across the Combat Center. The plant material burns well and when present, significantly increases the risk of wildfire. The pervasiveness of this species limits planning and control options.

**Element 2.7 - Wildfire Management**

Historically, fire is not common in the Mojave Desert and most plants native to these ecosystems are not fire-adapted. Increased soil disturbance and the spread of nonnative grasses have resulted in increased fire frequency and fire size. In undisturbed Mojave Desert systems, limited precipitation supports "islands" of plant life separated by gaps and bare soil, which effectively served as fire breaks, limiting the ability of plant materials to carry and spread flames across a landscape. In the past few hundred years, western expansion has increased use of desert lands, resulting in significant increases in anthropogenic disturbances as well as the introduction of an array of non-native grasses that thrive in the desert climate. These grasses burn well and can grow thickly between the natural vegetation in non-drought years, increasing vegetative cover and the distance that a fire may spread. Today, wildfire is a threat to ecosystem function and biodiversity in the Mojave Desert, mostly because the resident species are not resistant or resilient to the effects of fire. The Combat Center is monitoring for nonnative annuals and grasses and has begun tracking increases in fire-related species such as Mediterranean grass (*Schismus barbatus*).

Control efforts are available. Nonnative annuals and grasses benefit from and are spread by disturbance events. Seeds may be spread from vehicles, boots and clothes into new areas. Disturbed areas with reduced native vegetative cover provide less competition for nonnative seedling establishment. Disturbance minimization is a priority. Containment and early eradication are also critical efforts to controlling potential fuels. Potential causes of fires should also be addressed. The military use of pyrotechnics increases the probability of wildfires starting in some areas of the Combat Center where nonnative annual grasses proliferate.

The issue of wildfire control has legal implications involving federally-listed species, such as the desert tortoise (Duck *et al.* 1997). There is currently no observable need for wildfire prevention (*e.g.*, firebreak construction and maintenance) activities. However, should a high rainfall year occur, it's possible that a resultant wildfire would require active suppression (*e.g.*, equipment and personnel moving across open desert, firebreak construction, and back-burning operations) which would involve "take" risks. In addition, wildfire suppression creates other negative impacts on ecosystem functionality, such as soil compaction, vegetation destruction, and the creation of trails that can lead to increased long-term human impacts.

Objective:
*2.7.1 - Implement the Wildfire Management Plan for the Combat Center*

Wildfire Management Plans are required for installations by U.S. Marine Corps policy, and the Natural and Cultural Resources Branch, along with the Combat Center Fire Department, are currently revising the existing plan to ensure awareness and oversight of wildfire potential and develop appropriate monitoring and oversight responses to ensure the maintenance of ecosystem biodiversity and functionality. Wildfire management planning is an important step in responding to a potentially increasing risk for the Combat Center ecosystem, and there may be value-added components to enhance military training.

**Element 2.8 - Mainside Grounds Management Support**

The Mainside area occupies approximately 8.2 square miles of the 1,102 total square miles of the Combat Center. The improved and/or landscaped areas of the Combat Center are completely within Mainside. There are various types of landscaping found at Mainside, from formalized xeriscaping conducted by professional landscape companies to informal plantings done by Marine units around their buildings. Residents in base housing also have different degrees of landscaping in place around their homes. Mainside landscapes consists of a variety of trees, shrubs, and ground covers that require routine maintenance efforts, such as mowing, weeding, pruning, fertilizing, pest control, and irrigation.

Objective:
*2.8.1 - Ensure that Mainside landscaping and grounds maintenance are integrated and consistent with natural resources goals and objectives*

***Landscaping*** - Desert landscaping presents a unique opportunity for plant and irrigation selection to maximize water conservation, limit energy use, and improve the visual landscape for the Marine Corps community. Xeriscaping emphasizes the use of drought tolerant and desert adapted species in landscaping; the Natural Resources Program requires all new buildings

incorporate xeriscaping principles during the regular maintenance of existing landscaping and in the planning of new landscape features. Since 2005, the Headquarters building, Battalions office buildings, chow halls, and bachelor enlisted quarters have all been re-landscaped. Irrigation systems prioritize using two types of water, non-potable water and recycled wastewater. The golf course is the only user of recycled wastewater, and most of the other landscaping is irrigated with nonpotable water. The Combat Center is continuing to develop a distribution system for non-potable water, however non-potable water cannot be used in some situations such as residential lawns or playgrounds because the quality is too poor. Water conservation efforts are also overseen by Environmental Affairs in conjunction with PWD, and irrigation system evaluations can be performed by the Public Works Department to evaluate efficiencies and improve usage. Microirrigation is encouraged when appropriate.

**Element 2.9 - Soils Monitoring and Management**

The Combat Center completed an installation-wide soils inventory in 1999 (Lato *et al.* 1999) and does not need to redo this product for some time. Natural Resources Management efforts are not typically defined around soils considerations and there is no focused management program for soils at the installation or Conservation Branch level. However, soil parameters are included with other considerations while managing military activities, protecting stability, conserving wildlife habitat, and restoring training lands when/if feasible. Site-specific soil testing is also performed for natural resources management activities such as training land rehabilitation and erosion control, and soils inventory data are used to make decisions regarding land use and wildlife habitat management options. No program-level objectives are defined for soils monitoring and management at this time.

**Element 2.10 - Air Quality**

In California, air pollutant emissions are regulated at the federal, state, and local levels. Federal and state requirements are the responsibility of the Environmental Protection Agency (EPA) and the California Air Resources Board (CARB), respectively, and local requirements are implemented through the Mojave Desert Air Quality Management District's (MDAQMD) Rules and Regulations. MDAQMD requirements are based primarily on federal and state attainment directives and ensure compliance with state and national standards. Any equipment, operation, or process that has the potential to emit (PTE) air contaminants to the environment or that controls air contaminants is required to have an MDAQMD Permit to Operate (PTO), unless specifically exempted under MDAQMD Rule 219.

The Pollution Prevention Section of Environmental Affairs oversees Air Quality Management, thus specific objectives and projects for air quality are not presented in this Chapter or in the 5 Year Workplan. There are two air quality monitoring stations aboard the legacy base; the Mainside and Sandhill stations. These characterize air quality trends and help differentiate between pollutant loads moving onto the installation from external sites (largely resulting from disturbance occurring on neighboring lands), and loading resulting from internal, mission-related activities. The Pollution Prevention Section monitors these data and prioritizes any necessary corrective actions. MDAQMD recognizes the region for non-attainment of several pollutants, one of which is $PM_{10}$ (suspended particles of diameters 10 microns or less in size), and are largely associated with dust levels. Generation of $PM_{10}$ at the Combat Center is largely associated with activities that fall under the purview of the Conservation Branch of

Environmental Affairs, and management strategies are outlined in Combat Center Order 5090.4F and below, including:

- Maintaining, managing and restricting vehicle use to unpaved roadways (to minimize width proliferation, off-road vehicular travel, and minimize environmental disturbance);
- Avoiding desert playa lakebeds (which are composed of high levels of fine soil particulates and are sensitive ecological resources); and
- Maintaining the 20-mph speed limit (which reduces dust proliferation and improves sighting and response time for desert tortoises on roadways).

**Element 2.11 - Water Resources**

The Combat Center has a Stormwater Pollution Prevention Plan and a Groundwater Resources Management Plan which guide and ensure compliance for the management of these resources. Drinking water aquifers such as Mesquite basin offer mostly salt water, whereas the high-quality Surprise Springs basin offers potable water reserves which are the only drinking water source for the installation. This aquifer does not experience natural recharge and stored water is 20,000-years-old. A Water Conservation Study (Beck 2004) reviewed the installations water sources, future water demand and conservation measures. This plan addresses the bases future water needs and options, and includes methods to minimize water use. Most of the Combat Center's water resources management programs are not within the scope of the Natural Resources Program and thus are not pertinent to this INRMP. During 2018-2022, the Combat Center will continue to conserve and protect from pollution known water sources and seek new sources of water. Combat Center Order CCB 5090, the Combat Center Drought Response Policy, includes measures to be taken by Marines and other forces training on the Combat Center to conserve and protect water resources. For more information and references supporting other various aspects of water resources management, see INRMP sections 2.8.2, 3.2, and Chapter 4 Goal 2 Element 2.5.

### 4.2.3 Goal 3: Manage Federally Protected Species

The Marine Corps is committed to the protection of federally listed species found aboard the Combat Center and will ensure installation compliance with all applicable laws, particularly the Sikes Act upon which this INRMP is predicated but also the Endangered Species Act, Migratory Bird Treaty Act, Bald and Golden Eagle Act of 1940, Executive Order 13186, DoD Directive 4715.03, Marine Corps Order P5090.2A, USFWS regulations and agreements and other applicable laws and guidance from headquarters. Activities performed under this Goal shall protect listed species from harm and work to support recovery, as feasible, while ensuring the least disturbance possible to the military mission. Elements of this program Goal include:

3.1 Desert Tortoise Management;
3.2 Other Sensitive Species Management

**Element 3.1 - Desert Tortoise Management**

The desert tortoise is the only federally-listed species resident aboard the Combat Center. The Desert Tortoise Management Element of the Natural Resources Program strives to both protect and improve desert tortoise habitat, and increase tortoise population growth using research, habitat management, awareness, and other methods. This INRMP includes a variety of actions that are specifically intended to benefit the recovery of the species, and which align with the

USFWS Recovery Plan for the Desert Tortoise. Please see relevant sections of the 5 Year Workplan for details.

Objectives:

*3.1.1 - Inventory and regularly monitor desert tortoise using standardized protocols to improve the understanding of long-term population trends aboard the Combat Center;*

*3.1.2 - Inventory and monitor to identify threats to desert tortoise;*

*3.1.3 – Perform health assessments to further the Combat Center's knowledge of desert tortoise health aboard the installation;*

*3.1.4 - Minimize tortoise injury and mortality aboard the Combat Center;*

*3.1.5 - Operate TRACRS to contribute to the recovery and eventual delisting of the desert tortoise;*

*3.1.6 - Implement the following required provisions from the Biological Opinions for Desert Tortoise: General Conservation Measures, Reasonable and Prudent Measures, Terms and Conditions, Conservation Recommendations; and required provisions from the 2017 SEIS.*

*3.1.7 - Improve desert tortoise population numbers aboard the installation and support recovery of the population aboard the installation and in adjacent recovery unit and apply appropriate land-use restrictions to high-density tortoise population areas aboard the installation that balance training and natural and fiscal resource requirements.*

**Effects of the Combat Center Activities on the Desert Tortoise**

Various types of military activities occur on the Combat Center and not all types occur equally across the landscape. Facility development at Mainside, air operations, fixed range use, and small arms operations are not likely to have significant effects on tortoise populations. Large munitions impacts (*e.g.*, aerial bombs, artillery, tank, and mortar rounds) have little direct impact on populations. Direct mortality and injury from on-the-ground military training and maintenance activities are likely, but expected to be rare. Operations in undisturbed tortoise habitat areas may have the most significant effects on populations through habitat degradation, though not necessarily mortality. The most significant contributor to tortoise mortality will most likely be off-road travel, which can crush either tortoises or burrows. This type of impact is a concern in all tortoise habitat areas, not just on the Combat Center. The Combat Center has created flow down charts to minimize impacts to desert tortoises encountered on the installation (Appendix E).

The Combat Center operates under two Biological Opinions. The *Biological Opinion for the Base-Wide Training Operations and Routine Maintenance Program at the United States Marine Corps Air Ground Combat Center, Twentynine Palms, San Bernardino County California (1-8-99-F-41)* (Basewide BO; USFWS 2002) was received in 2002. It describes training, land use, and their combined effects on the desert tortoise, along with conservation strategies that focus on general conservation measures to be taken by the installation, and conservation strategies specific to mission-related construction and maintenance activities. The Basewide BO authorizes up to 150 acres per year of habitat impact from facility construction and maintenance activities, under certain conditions, without further consultation.

The 2017 BO (responding to a 2017 Supplemental EIS [SEIS]), entitled *Biological Opinion for Land Acquisition and Airspace Establishment, Twentynine Palms, California (8-8-11-F-65R)* (LandEx BO), analyzes the potential impacts to natural resources from the expansion of training activities in newly acquired Exclusive Military Use Areas. The LandEx BO replaces those portions of the Basewide BO that pertain to preparation of training lands and military training activities aboard the installation. The LandEx BO authorizes take, subject to various conservation measures, of up to 15 large desert tortoises per year from training activities. The Combat Center produces a combined annual report to meet the reporting requirements of each BO.

In addition, the Combat Center may occasionally operates under project-specific BOs addressing impacts with discrete, short-term actions such as facility construction. Two Section 10 USFWS Permits also support installation activities. One USFWS permit (#TE017730-5) authorizes desert tortoise handling and health assessment activity not associated with the LandEx BO, and the other Section 10 permit is held by UCLA, which works under a cooperative agreement with the Combat Center to operate the TRACRS (permit no. available upon request).

**Conservation Initiatives**

The Combat Center conducts a variety of desert tortoise conservation activities in response to requirements identified in the BOs referenced above, and generally in keeping with its requirements under section 7(a)(1) of the ESA to further conservation of threatened and endangered species.

***Translocation -*** The Combat Center developed a scientifically rigorous program, consistent with USFWS guidance, to translocate tortoises from high and moderate impact areas before the first MEB exercise (refer to Appendix A in the EIS for preliminary methodology). Habitat quality, tortoise health, and population assessments were performed over three years; the evaluations assessed impact, recipient and control areas, and their associated tortoises. Tortoises were translocated prior to the first MEB or building block exercise to recipient sites (Figure 4-1, below) based on scientific evaluation of population density estimates, habitat quality, and habitat potential for supporting augmented tortoise populations (Table 4-1, below). Final health assessments were conducted and radio transmitters were attached to tortoises before translocation. Recipient and control site tortoises were also assessed (for health) and monitored before translocation, with subsets fitted with radio transmitters. Annually, the Combat Center will report post-translocation monitoring results (e.g., survivorship, health, assimilation and habitat effects) for the translocatee, control and resident tortoises, and their sites, to the USFWS

as required in the LandEx BO, and present an annual summary to the public. Short-term (up to 5 years) and long-term (up to 50 years) metrics of translocation success will be evaluated and published in peer-reviewed, scientific journals. Before each MEB exercise, high- and moderate impact areas will be surveyed to clear remaining desert tortoises to translocation sites where short- and long-term monitoring will be conducted.

**Table 4-1 Recipient Sites Post-Translocation Densities**

| Alternative 2 Recipient Site | Initial Density (tortoises per $km^2$) | Projected Density (tortoises per $km^2$) | Planned Number of Translocatees | Post-Translocation Density (tortoises per $km^2$) |
|---|---|---|---|---|
| Lucerne-Ord | 5.2 | 4.0 | 447 | 8.2 |
| Rodman-Sunshine Peak North | 4.9 | 3.8 | 341 | 8.2 |
| Siberia[2] | 2.6 | 2.1 | 155 | 5.5 |
| Broadwell | 5.1 | 4.1 | 18 | 5.5 |
| Cleghorn | 6.5 | 5.2 | 37 | 10.4 |

*Notes:* [1]Based on draft USFWS translocation guidance (USFWS 2016); assumes 8.3% decrease per year for the Lucerne-Ord and Rodman-sunshine Peak recipient site and a 7.1% decrease per year for remaining sites over 3 years.
[2]Value represents the 62% of 21,612 acre site (13,999 acres) that has a habitat suitability index of 0.6 or greater, derived from Barrows *et. al.* (2016).

**Figure 4-1: Translocation Recipient and Control Sites**

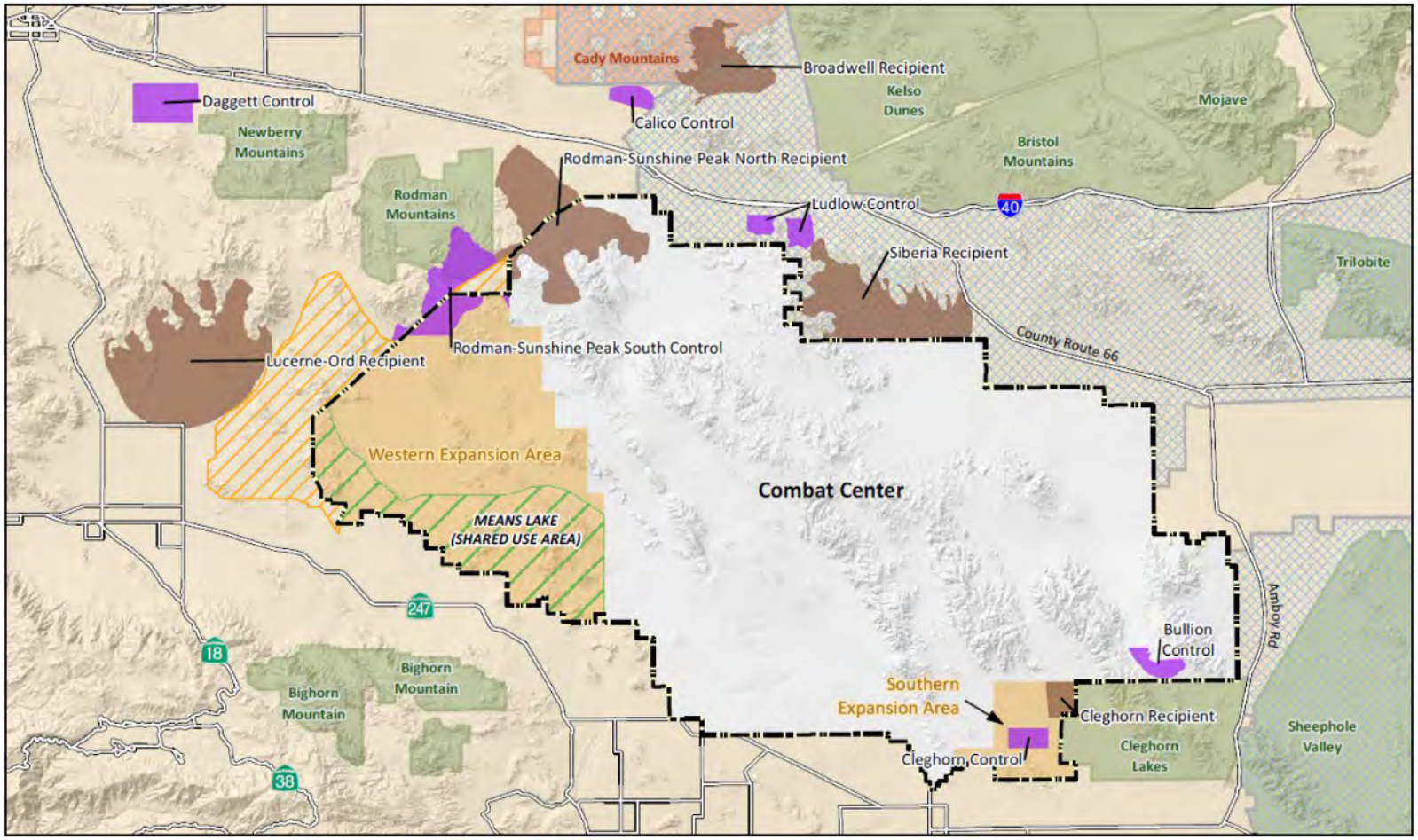



**Figure 2.3-1. Recipient and Control Sites under Alternative 2**

***Environmental Awareness*** - The Environmental Affairs Mission Awareness program develops an awareness of values and requirements of natural and cultural resources protection on the Combat Center to support sustained military training. The primary target audience for this program is those who train or in some way affect training at the Combat Center. A secondary audience is those who are interested in the impacts of training on the Combat Center. Experienced Environmental Affairs personnel deliver verbal briefings to military personnel, and encourage awareness of the value of protecting natural resources via programs, initiatives and other messaging. The core information delivered by the program addresses the five specific awareness actions identified in the Biological Assessments to ensure protection of the desert tortoise on the Combat Center. More detail on these activities can be found under Goal 4, Element 4.3 – Environmental Awareness, found later in this chapter.

***Tortoise Studies*** at the Combat Center have emphasized desert tortoise population health and headstart research, and have sponsored numerous studies aboard the Combat Center since 1983 (USMC 2000; 2011 INRMP). Earlier studies also emphasized population size and demographics (UCR 1993; Jones & Stokes Associates, Inc. 1998, Gardner and Brodie 2000, and Woodman *et al.* 2001), including three permanent plots and base-wide surveys of tortoise density (Woodman *et al.* 2001). The three plots are located in the Sandhill Training Area (one established 1985 & 1986 and now part of the Restricted Area), Emerson Lake TA and Bullion TA (the latter two were established in 1990 & 1991). Two studies (Boarman and Chamblin 2005; Boarman 2014) used point count surveys to assess the relative abundance of common ravens aboard the Combat Center, finding relatively high indices of ravens at or near subsidies in the Cantonment area, and relatively few ravens in the training areas. The earlier survey documented a nighttime roost of 2000 ravens on a power line near Camp Wilson; that power line was removed during the second study, with subsequent raven numbers greatly reduce, but not zero, at Camp Wilson.

***Tortoise Health Assessments -*** the Combat Center has performed more than seven years of health and disease research aimed at understanding the incidence, distribution, causes, and effects of diseases on the Combat Center's desert tortoises. Complete health assessments, Berry and Christopher 2001 and USFWS 2011, have been completed on more than 100 tortoises in at least ten training areas. In general, it appears that most disease-affected tortoises are found adjacent to areas of the installation bounded by urbanization. Given that the percentage of infected individuals decreases with distance from the base boundary, it is assumed that the disease enters the base from urbanized areas and spreads towards the interior of the facility. This phenomenon is thought to occur from the release of captive tortoises and turtles back into the wild, which then transfer the diseases to the wild population.

The Combat Center has been tracking the incidence of URTD aboard the installation since 1998. Testing for the presence of URTD is accomplished by taking blood and plasma samples from tortoises in the field and sending them to a testing laboratory at the University of Florida. It currently requires approximately six weeks to get test results. See section 3.7.6 for technical information about disease monitoring.

***Tortoise Mortality Minimization*** - Injury or death of desert tortoises can occur as a result of training activities; however, a number of rules are in place to minimize potential adverse effects to the tortoise population at the Combat Center. A significant proportion of training lands are not intensively used because of topography and other limiting factors such as the one-kilometer buffer around the entire base boundary to reduce trespass on neighboring lands. Desert tortoises in areas not used for land-based training are rarely affected by activities associated with training. Additionally, each unit that trains on the Combat Center, and contractors that work on the Combat Center in construction or in target maintenance, are given BO-mandated tortoise protection briefs before entering the ranges. These briefs provide sufficient information to avoid inadvertent take as well as providing options, including moving tortoises out of harms way, to allow mission or action to continue without undue delays.

***Predation Control –*** Coyotes and ravens are the two desert tortoise predators upon which the Combat Center focuses. Mortality due to predation is a naturally occurring event, but increases in the presence of anthropogenic subsidies to predators. A subsidy reduction program is discussed in Chapter 4, Goal 1 due to the significance of these predators not only to tortoise but to the well-being of the Marine community. Generally, the Combat Center reduces strives to reduce subsidies for ravens and coyote populations through a variety of targeted means. Trash serves as a food source and access is reduced through on-base rules regarding the disposition of refuse and handling of refuse containers, which is supported by Environmental Affairs' compliance inspectors. Water availability is also reduced incidental to the installations water conservation efforts, which have seen drastic reduction in water use over the last decade.

The Conservation Law Enforcement Officers (CLEOs) regularly patrol training areas around Mainside and Camp Wilson, such as Sandhill, that may be subject to increased coyote populations as a result of anthropogenic subsidies. Depredation of coyotes is being implemented by the CLEOs and volunteer-based hunting will be coordinated at a later time. The CLEOs also perform targeted patrols of translocation recipient sites in the Cleghorn Lake TA and off-base in the Ord-Rodman area of Critical Concern (ACEC). The Combat Center conducts raven monitoring in key areas on and around the installation. Raven roosting and nesting subsidies are reduced through modifications to new utility poles, and incidentally by the recent focus on demolition of unused shade and other structures. Environmental Affairs also conducted an in-house test that found inexpensive, single-strand wire was effective as a roosting deterrent when strung above support beams in shade structures. The Combat Center had previously worked with the DMG interagency Raven Management Subgroup and stands ready to continue that collaboration should the group reconvene. In addition, Environmental Affairs staff have recently begun coordinating with their counterparts at other military installations in the desert on raven management issues. While these measures help reduce raven issues aboard the installation, the Combat Center will be seeking a raven depredation permit under the MBTA to address acute raven predation concerns through lethal control means.

***The TRACRS facility*** at the Combat Center is a Captive Rearing ("Head Start") Facility for the desert tortoise that began operating in the fall of 2005. The purpose of the facility, called the "Tortoise Research and Captive Rearing Site" or "TRACRS," is to contribute to the recovery and eventual delisting of the desert tortoise. The facility is intended to protect nests, hatchling, and juvenile tortoises from predation for a period of three to seven years. When captive reared tortoises are of sufficient size, they will be released from the facility.

To "Head Start" tortoises, gravid (egg-carrying) females will be transported to the facility for egg deposition and then returned to their original location. Native vegetation within the enclosures will be irrigated, providing more and better-quality forage. This will allow individual tortoises to grow faster, hardening their shells and becoming more resistant to predation sooner in life.

While in captivity, growth rates and health status of juveniles is closely monitored. Many other research questions may be answered by activities at TRACRS, including the potential of vertical transmission of URTD and determination of juvenile sex ratios. The degree of multiple paternity within clutches is 50 to 80% (Davy *et al.* 2011). Upon release into the wild, subject animals will be monitored by radio telemetry for at least one year, and a percentage will be monitored for five or more years.

The captive rearing facility includes a fenced compound, enclosing four fenced pen structures in various configurations. Additional pens may be installed in the future. Each enclosure consists of a nylon netting canopy and a chain-link or hard-side fence buried 12 inches into the ground to prevent animals from digging under and into the enclosure. Additional barriers attached to the lower portion of the fence prevents entry by rodents. A third fence, constructed of fine mesh, will surround the enclosures to prevent any contact between wild and subject animals in the event of primary fence failure.

***Critical Habitat -*** On February 8, 1994 the USFWS published a final rule in the Federal Register (59 CFR 5820) designating 6.4 million acres of Critical Habitat for the Mojave population of desert tortoise. No critical habitat was designated on the Combat Center. However, the Ord-Rodman Critical Habitat unit was designated adjacent to the installation and the Combat Center used this critical habitat for the placement of some of the translocated tortoises related to the expansion.

***Special Use Areas -*** Special Use Areas are designated as Category 1 (no mechanized maneuver) or Category 2 (bivouacs, OHV use, or training involving vehicle activity are discouraged but not prohibited [MAGTFTC 2009]). A Special Use Area of approximately 7,900 acres was established in 1991 in the northeastern portion of Sandhill Training Area where off-road travel is not authorized and other types of military operations are limited. Signs are located at regular intervals along the MSR's in that area, warning "No off-road travel permitted", which have significantly reduced off-road violations. New signage was erected in this area during 2008-2009 and maintained. An additional, nearby area (to the south in the Sandhill Training Area) was designated as

"ecologically sensitive," for which there are no training restrictions but the area is posted with "Off-road travel is discouraged" signage, to reduce vehicle and foot impacts.

The Combat Center has designated Special Use Areas within the boundaries of recently acquired lands for the conservation of desert tortoises. A portion at the northern end of the Exclusive Military Use Area was designated as a Category 1 special use area. The southern portion of Bullion TA, containing a high-density desert tortoise population, was similarly designated. These areas are being fenced and signed and will be maintained to prevent military vehicle transit into Special Use Areas and, where relevant, prevent tortoises from homing back to the high- and medium-impact areas.

***On the Horizon***

*Desert Tortoise "Headstarting" and Population Augmentation*. Based on survey, monitoring, and analysis of translocated desert tortoises, the Combat Center would devise a strategy for population augmentation supported by the Combat Center's ongoing headstart program based at the TRACRS. Population augmentation strategies would be developed with USFWS and CDFW, as appropriate, and would be integrated with translocation and monitoring efforts to provide a comprehensive population sustainment and recovery strategy.

**Element 3.2 – Other Sensitive Species Management**

Objectives:

3.2.1 - Comply with the Migratory Bird Treaty Act and its implementing regulations while meeting mission requirements

3.2.2 - Comply with the Bald Eagle and Golden Eagle Protection Act and its implementing regulations

3.2.3 - Ensure conservation benefits can be provided for candidate species which occur on base and are proposed for federal listing by developing species-specific conservation plans

***The Migratory Bird Treaty Act*** of 1918 (MBTA) protects most birds found in North America, excluding non-native species such as the house sparrow (*Passer domesticus*), European starling (*Sturnus vulgaris)*, and rock pigeon (*Columba livia*). The Act was originally developed to protect birds migrating across international borders but over time the list of covered species grew to include non-migratory species. The MBTA specifically prohibits actions that may have negative effects on individuals or populations of covered species. Prohibitions include but are not limited to the killing, collection and transport of covered species, and relocation or transport of migratory birds must be authorized by the USFWS on a case-by-case basis under certain conditions through the issuance of special purpose permits. Recently, legal clarifications pertaining to the definition of incidental take have generated the potential to change in the way the Act may be applied at the Combat Center; however, a memo issued by the Office of the

Assistant Secretary of Defense on February 6, 2018 directs installations to follow existing guidance and policies until further notice.

The Combat Center provides limited habitat for migrating species but ample and varied habitat for resident bird species covered under the MBTA. As discussed in section 3.7.7, seasonal harborage for migratory birds is localized primarily in areas with surface waters, which include the man-made ponds within Mainside and ephemeral catchments, basins, and lake beds distributed across the built and natural environments (Cutler *et al.* 1999). Resident birds however exhibit a variety of roosting and breeding habitat preferences, across the urban habitat within the Mainside Cantonment area as well as native habitats in the training areas. As discussed in the afore mentioned section, periodic bird surveys are performed by specialists via contract, and by the marine community via the natural resources volunteer program, to investigate species richness, overall abundance, and frequency of habitat use by resident and migratory birds.

Conserving the natural state of existing aquatic resources and minimizing vegetation disturbance during military training, transit, and construction benefits MBTA covered species, and this management strategy is incorporated into various Natural Resources Program elements such as disturbance minimization identified under Goal 1. The Natural Resources Program also prescribes three specific measures by which the installation avoids or otherwise minimizes impacts to MBTA covered species – the NEPA Program, an MBTA Special Use Permit, and Standard Operating Procedures provided in the Environmental Protection Instruction Manual for CCO 5090.1F. The NEPA program ensures subject matter experts have the ability to influence all proposed actions aboard the Combat Center prior to implementation to ensure take of MBTA covered species is avoided. The Combat Center's MBTA Special Use Permit #MB053740-3 ensures military mission readiness at all times by authorizing specially trained staff to remove avian species from wildlife conflict situations when those species cannot avoid the conflict on their own. The permit also authorizes the relocation of a total of 10 active nests of particular species per year. Finally, Standard Operating Procedures outline provide wildlife response guidance to assist the Marine community in appropriately responding to wildlife issues and maintaining MBTA compliance. An animal response matrix identifies appropriately trained staff who may be contacted to respond to and diffuse conflicts between humans and wildlife (including MBTA covered species). Tree-trimming guidance is provided to ensure gardeners request surveys of potential nesting habitat prior to scheduled work events during the avian breeding season (February through September). Finally, a bird nest decision flowchart outlines who Marines and residents can contact, and what they can do under certain circumstances, when nesting activity is of concern (see Appendix F). The 5 Year Workplan presented in Appendix A outlines additional specific measures the Combat Center will take to maintain current information and protections for species protected under this Act.

***Bald and Golden Eagle Protection Act -*** Golden eagles have been observed on several different occasions, and it is believed that a nesting pair lives in the western Range Training Areas. The golden eagle is afforded protection under the Bald Eagle Protection Act of 1940, which provides for the protection of both the bald eagle (*Haliaeetus*

*leucocephalus*) and the golden eagle (*Aquila chrysaetos*) by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds.

BGEPA provides for the protection of the bald eagle (the national emblem) and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds. The 1972 amendments increased penalties for violating provisions of the Act or regulations issued pursuant thereto and strengthened other enforcement measures. Rewards are provided for information leading to arrest and conviction for violation of the Act.

### 4.2.4 Goal 4: Support Other Uses and Engagement

As per DoD Instruction 4715.03, DoD lands, waters, and coastal resources shall be made available to the public for the educational or recreational use of natural resources when such access is compatible with military mission activities, ecosystem sustainability, and with other considerations such as security, safety, and fiscal soundness. Therefore, the Combat Center shall identify and make available areas and conditions appropriate for public access. These may include coordinating with Federal or State conservation officials to allow access to DoD-controlled natural resources for their official business, allowing active and retired Service members and disabled veterans to access to its lands and waters for hunting, fishing, and/or non-consumptive use of wildlife; allowing Native Americans to use DoD sites and resources of cultural value; facilitate hunting opportunities when not in conflict with mission or Natural Resource Conservation goals; and facilitate public awareness and outreach programs to educate the public regarding resources on military lands and DoD conservation efforts.

### Element 4.1 – Outdoor Recreation

Outdoor recreation enhances the quality of life for military and civilian personnel. The Sikes Act requires that Marine Corps lands with suitable natural resources be managed to allow outdoor recreational opportunities. For the purposes of this INRMP, outdoor recreation is defined as recreational programs, activities or opportunities that depend on the natural environment. Outdoor recreational opportunities associated with natural resources are currently limited at the Combat Center and include some horseback riding and hiking areas in the outlying areas of Mainside, away from facilities and housing but not part of the active training ranges. There is an OHV course accessible to the greater Marine community at certain times of the year, located within the Mainside area but away from most development. OHV activities are also supported for 10 months a year in the Means Lake Shared Use Area, which is co-managed with the BLM. A Wildlife Viewing Area is also a recreational feature located in Mainside; it includes natural riparian habitat around a managed drainage basin, and offers a walking trail, natural resources educational information in the form of signage, a bat house, and viewing points. There is also a skeet range near the water treatment ponds. Interest has been expressed by the Marine community in creating additional opportunities.

<u>Objectives:</u>

4.1.1 – Support the access and sustainable use of on-base natural resources by the general public and military interest groups by establishing a hunting program

4.1.2 - Support the access and sustainable use of on-base natural resources by the general public and military interest groups by identifying and developing other outdoor recreational opportunities on the Combat Center

The nature of the military mission, with its rapidly changing maneuver and firing activities, combined with inherent dangers associated with unexploded munitions, make public access for outdoor recreation in training areas difficult. The Combat Center is also situated near to many outstanding opportunities off-base, such as hiking, rock climbing and off-highway driving in Joshua Tree National Park, Johnson Valley Off-Highway Vehicle Area, Amboy Crater, and other public recreation areas. However, the Sikes Act does require special consideration be given to disabled sportsmen and there is significant interest in developing a hunting program and multi-use recreational area situated within the Mainside boundary. An outdoor recreational plan will be developed that focuses on the limited opportunities available on the Combat Center.

**Element 4.2 – Conservation Law Enforcement Program**

U.S.C. Title 16, Chapter 5C of the Sikes Improvement Act and MCO 5090.4a require military installations operate a Federal Conservation Law Enforcement Program comprised of specialized professionals trained in federal natural and cultural resources law (CLEOs). These Federally uniformed officers are mandated to enforce federal environmental laws and regulations pertaining to the Endangered Species Act, Migratory Bird Treaty Act, Antiquities Act of 1906, Archeological Resources Protection Act and the Lacy Act. The Combat Center maintains a staff of six CLEOs who perform a wide range of complex law enforcement activities, including arrest and detention, to reduce the exploitation of plant and animal species and protect the abundant cultural resources found here. CLEOs provide direct and indirect benefits to the installation – they discourage environmental lawlessness, such as illegal trespassing and scrapping; and facilitate the sustained use of the military lands for readiness activities. Changing social, natural and political landscapes require a flexible program; current objectives of this element are provided below.

<u>Objective:</u>

*4.2.1 - Operate a Conservation Law Enforcement Program to prevent exploitation of the natural resources from occurring on the installation*

In addition to regular ongoing program operations, new emphases have been added to the CLEO program addressing Combat Center responsibilities resulting from the recent Land and Airspace Acquisition. These new requirements include the; development and implementation of strategies intended to discourage subsidized predators, particularly around Mainside and Camp Wilson; education of military and civilian personnel on the importance of proper trash disposal, especially food items, discouragement of pest proliferation, leadership and oversight of the coyote depredation management plan, support of integrated pest management activities, and investigations of trespass and resources degradation aboard newly acquired range training lands.

**Element 4.3 – Environmental Awareness**

The Combat Center Natural Resources Program is founded on the principle of using stewardship to provide both user benefits and resources protection while meeting the requirements of the military mission. The U.S. Marine Corps has a long tradition of leadership in natural resources management and the Combat Center builds and enhances this reputation through the Natural Resources Management Program. Cultivating and maintaining an understanding of the need for conservation in both the Marine and external communities is a critical aspect of this program. Ultimately, environmental awareness and enforcement of environmental regulations prevents damages to the natural resources base, and violations of environmental laws. Making users of the Combat Center natural resources understand why it is important to protect and conserve natural resources is the first step in enlisting support. Ensuring public familiarity with installation resources and activities further improves regional understanding and impacts from management efforts. The Combat Center environmental awareness element addresses both installation and external interests, to maximize reach and effectiveness.

Objectives:

*4.3.1: Encourage awareness of natural resources for internal stakeholders*

*4.3.2 - Encourage awareness of natural resources for external stakeholders*

The term "environmental awareness" is used here to reflect a general knowledge, perception, or understanding of environmental issues, including but not limited to the fragility of natural resources to impacts from human actions. Efforts to cultivate environmental "awareness" outside of the Natural Resources Program use various forms of planned communication. Subject matter knowledge is critical to identifying needs and objectives for communication, therefore natural resources staff must be kept knowledgeable on all aspects of the Natural Resources Program in order to plan and relay content. Objectives (need) for communication must be well identified in advance and appropriate strategies developed to meet those objectives. Available channels for communication must be reviewed and those most appropriate selected to maximize the effectiveness of message delivery. Information must then be delivered clearly, concisely and in the most relatable way possible to ensure information is received and understood as intended. Different communication objectives and delivery methods are identified for internal and external stakeholders.

***Internal Stakeholders and Environmental Mission Awareness –*** Internal stakeholders who use installation resources are required to have an understanding of environmental regulations. Programs such as cultural resources, protection, hazardous materials storage, spill prevention and cleanup, pollution prevention, and NEPA requirements all depend on awareness in order to succeed. The primary communication tool that provides environmental requirements to internal stakeholders is briefings. Additional tools that cultivate awareness include educational outreach at Marine community events, the promotion of Earth Day, provision of notices in media such as installation-wide speedcall emails and facebook pages for the Marine community, direct production or contribution of informational phamplets and brochures, and producing articles in the combat camera newspaper.

*Educational briefings* are the primary means of promoting environmental awareness aboard the Combat Center. They are delivered verbally by trained Environmental Affairs personnel, and by video. Briefing content includes all environmental requirements that must be followed to achieve mission success. Environmental mission awareness briefings are targeted toward all levels of military personnel and the planners who either use or affect military training activities. Other audiences who also receive an environmental awareness briefing include military family members, civilian employees, and external organizations or individuals who have a demonstrated interest in training activities aboard the Combat Center. The purpose of these briefings is to develop an understanding of how protecting natural resources supports the military training mission, what actions military users can take to minimize their impacts to the land and natural resources, and how the actions help to sustain and enhance the military training program.

All military units (both permanent and visiting) must be briefed prior to using training lands. These briefings are considered annual training requirements and must be received every year. Topics covered include safety precautions for working around unexploded ordnance, desert survival techniques, and the Environmental Mission Awareness. Approximately 30,000 to 40,000 Marines receive these briefings annually. The Environmental mission awareness reviews pertinent environmental laws, land management prescriptions such as restricted use areas, hazardous material compliance, cultural resources protections, venomous animals, desert tortoise conservation measures, and other general desert safety issues. In addition to the annual briefing requirement, Marine units permanently stationed aboard the Combat Center (tenant units) also receive natural resources briefs from Environmental Affairs when conducting Safety Stand-downs or "New Join" briefs. Approximately 2,000 to 5,000 tenant Marines are briefed in this manner each year.

In the past, Environmental Affairs has supplemented the verbal instruction provided in the brief with handouts. An informational field card had been produced and distributed which was a fold-out pamphlet that included a map of restricted, limited use, and sensitive areas aboard the legacy base, as well as procedures for dealing with hazardous materials (including contact information and measures to take in the field for spill responses and disposal). This field card also reviewed vehicle and training activities, and procedures for wildlife and desert tortoise encounters. At another point in time, a shorter, biology-focused "Green Card" was distributed by Environmental Affairs which contained abbreviated guidance on what to do if a desert tortoise was encountered in the field. Both materials are out of date and no longer distributed, however a new informational handout of some kind may be generated during the coverage of this INRMP.

The Combat Center Order addressing Environmental Protection, CCO 5090.1F, is the most important environmental management tool for the installation and Environmental Affairs. CCO's are signed by the Commanding General and are lawful orders that all Marines must follow while aboard the Combat center. In recent years, the awareness value of CCO 5090.1F has been enhanced through the inclusion of maps of areas valuable to natural and cultural resources.

***External Stakeholders/Public Awareness*** efforts aim to keep those outside the immediate Combat Center community informed about a variety of topics related to the Natural Resources Program. Public information needs and communication strategies are typically project or activity-specific in nature, with a few exceptions. One example includes the installation land and airspace expansion action, which is a complex regional-scale undertaking for which public awareness efforts involved significant pre-planning between different directorates and multiple outreach methods employed over a sustained period of time, maximizing opportunities for public involvement and discussion. Another example is addressing unauthorized OHV trespass, which is an ongoing issue again requiring coordination with other directorates, neighboring landowners and the OHV community.

The Natural Resources Branch of Environmental Affairs works to address public information needs in many ways. Some personnel maintain direct personal communication with high ranking enlisted or officer personnel, environmental organization officers, outside agency personnel and civic leaders as appropriate. Environmental Affairs staff have also given prepared talks to schools, boy and girl scouts, civic organizations, and other federal agencies such as Joshua Tree National Park (both staff and visitors). Over time, several educational brochures and fliers have been produced to inform readers of Native American Rock Art found aboard the base and efforts aimed to conserve and protect desert tortoises. Posters are produced and distributed to highlight natural and cultural resources. Information requests from external news media are supported by the Public Affairs division. Electronic media like Facebook, Twitter and the Combat Center website are being increasingly utilized for communications. Opportunities to represent the Natural Resources Program at community events are also well-supported by EA personnel.

**Element 4.4 – Cultural Resources**

The Cultural Resources Program is part of the Conservation Branch of Environmental Affairs and is responsible for all Cultural Resources Management aboard the installation. Cultural Resources are managed through the implementation of the ICRMP, thus specific objectives and projects for cultural resources are not presented in this INRMP. However, Cultural and Natural Resources Programs work closely together, recognizing that Native American Tribes view many of the resources managed under the Natural Resources Program as cultural resources.

MCAGCC is located in a traditional use area for several Tribes and many of the flora and fauna collected and used by their ancestors are still present and collected by Tribes today. The Natural Resources Program recognizes there is an interest with tribal members to access the installation and collect natural resources that are of particular significance. No formal policy has been developed supporting this process, however requests shall be handled on a case by case basis and may be made by contacting the Cultural Resources Specialist within the Environmental Affairs Division.

## 4.3 Implementation

The cost to implement this INRMP is estimated at $37,426,291 for FY 2018-2022. Funding will come primarily from Operations and Maintenance Marine Corps Funds. Budgets will be adjusted as needed each year. Not included in the estimate are costs specific to water and air quality management, pest management, the NEPA program, pollution prevention, and in-house salaries.

**Table 4-2 Summary Budget Request for Natural Resources Across FYs 2018-2022**

| | FY 18 | FY 19 | FY 20 | FY 21 | FY 22 |
|---|---|---|---|---|---|
| **COLS 3 Totals** | $ 9,832,048 | $ 9,000,194 | $ 8,413,924 | $ 4,155,280 | $ 4,622,445 |
| **COLS 2 Totals** | $ 599,600 | $ 243,500 | $ 109,000 | $ 337,100 | $ 113,200 |
| **COLS 1 Totals** | $ - | $ - | $ - | $ - | $ - |
| ***Total Request*** | ***$ 10,431,648*** | ***$ 9,243,694*** | ***$ 8,522,924*** | ***$ 4,492,380*** | ***$ 4,735,645*** |

The budget is skewed towards COLS 3 and 2 priority levels due to funding limitations, and not all projects identified in the 5-Year Workplan are included in Table 4-2. There are 5 are COLS 3 projects and 2 COLS 2 projects that have not been costed, and 3 projects requiring funding have not been ranked yet. These are anticipated to be costed out in the coming years.

### 4.3.1 Staffing

The Natural Resources Program has the following authorized billets:

**Natural Resources Branch**

| | | |
|---|---|---|
| 1 | Conservation Branch Head | GS 13 |

**Positions Filled in the Natural Resources Section**

| | | |
|---|---|---|
| 1 | Wildlife Ecologist | GS 12 |
| 1 | Natural Resources Specialist | GS 12 |
| 1 | Natural Resources Specialist | GS 11 |
| 1 | Biologist | GS 11 |
| 1 | Biological Technician | GS 7/9 |
| 5 | Conservation Law Enforcement Officers | GS 7/9/11 |
| 1 | Conservation Law Enforcement Officer Supervisor | GS 12 |

Contract staff also contribute to the implementation of this INRMP. GIS support is not listed but is critical to plan implementation. Not all positions may be filled at all times. Currently, the branch has lost a GS 7/9/11 Natural Resources Specialist position, and the GS 7/8/9 Biological Sciences Technician is vacant. In light of the additional requirements imposed by the land expansion there is now a need for two additional

positions, including a lower-grade Natural Resources Specialist as well as a Biological Technician. INRMP tasks and objectives were built assuming full staffing levels.

Congress, in reauthorizing the Sikes Act (16 USC 670a-670f) as part of the Fiscal Year 2004 Defense Authorization Act, endorsed natural resource management positions, such as those at the Combat Center as “Inherently Governmental positions” in a "Sense of Congress" section.

### 4.3.2 Funding Sources

Natural resources management relies on a variety of funding mechanisms. Below are general discussions about the various funding sources used to implement this INRMP.

#### *Operations and Maintenance Marine Corps Funds*

Operations and Maintenance Marine Corps (OMMC) Funds are provided to the Combat Center Commander for base operations. Virtually any project or program within this INRMP can compete for these discretionary funds. The majority of the EA program is funded from this avenue and is critical to the success of INRMP implementation.

#### *Legacy Funds*

The DoD Legacy Resources Management Program was instituted by Congress in 1991 to promote stewardship of natural and cultural resources. The Legacy Program is managed through special Legacy project proposal and reporting procedures. Legacy funds are generally for nonrecurring items that are neither routine operations nor compliance driven. They are typically used for projects that provide valuable information but are lower on the priority list. Funding levels from Legacy are highly variable and unreliable for planning purposes.

#### *Headquarters Marine Corps Environmental Management Funds*

Headquarters Marine Corps Environmental Management Funds are a special category within OMMC dollars and are managed by HQMC. These funds are "fenced" by Defense but are still subject to the restrictions of OMMC funds. The program heavily favors high priority funding for projects that are out of compliance with federal or state laws, especially if Notices of Violation or other enforcement agency actions have been issued.

### 4.3.3 Command Support

Command support is essential to implementation of this Plan. Many priority projects for natural resources management within the next five years require command support. The Commanding General is personally liable for noncompliance with environmental laws, and therefore has a personal interest in ensuring this Plan is properly implemented. This Plan has the support of the Combat Center Commanding General and other personnel in command positions that are needed to implement it. The Command is dedicated to implementation of this Plan as required by the Sikes Act Improvement Act and other Federal laws. The Command is also dedicated to maintaining and improving the military mission at the Combat Center. Implementation of this Plan facilitates that end.

INRMP Projects, Goals and Objectives are presented in the 5-Year Workplan in Appendix A. Projects are identified as ongoing, occurring annually, at some fixed recurring multi-year frequency, or specific and timebound in nature. Natural Resources Program Goals Elements and Objectives are summarized in the tables, and full explanations of each project can be found within this chapter.

***This page is left intentionally blank.***

# 5.0 REFERENCES


Agri-Chemical and Supply, Inc. 2005. *Invasive Non-native Plant Survey*. Prepared for Marine Air Ground Task Force Training Command and Natural Resources & Environmental Affairs Division Marine Corps Air Ground Combat Center Twentynine Palms, California. Oceanside, CA.

Agri-Chemical and Supply, Inc. 2008. Vegetation Classification and Mapping of Marine Corps Air Ground Combat Center Twentynine Palms, CA. Final Report. August.

Anteon Corporation. 2001. *Preliminary Survey of Nonnative Plant Species at Marine Corps Air Ground Combat Center, Twentynine Palms, California.* Prepared for Marine Air Ground Task Force Training Command, Natural Resources and Environmental Affairs Division, Twentynine Palms, California. San Diego, CA.

Barrows, C.W. 2011. Sensitivity to climate change for two reptiles at the Mojave–Sonoran Desert interface. Journal of Arid Environments 75:629–635.

Barrows, C. W., B.T. Henen, and A.E. Karl. 2016. Identifying climate refugia: A framework to inform conservation strategies for Agassiz's desert tortoise in a warmer future. Chelonian Conservation and Biology. 15: 2–11.

Beck, R.W., Inc. 2004. *Water Conservation Study*, Project # 103-02. Unpublished report.

Berry, K.H., and M.L. Christopher. 2001. *Guidelines for the field evaluation of desert tortoise health and disease*. Journal of Wildlife Diseases 37(3): 427-450

Boarman W.I. 2014. Assessing Common Raven Abundance, Subsidies and Impacts to Agassiz's Desert Tortoises at the Marine Corps Air Ground Combat Center, Twentynine Palms, California. Conservation Science Research & Consulting, Spring Valley California. Unpublished report for United States Navy Southwest Division Contract N6871105D3605 Task Order 0045.

Boarman, W.I. and H.D. Chamblin. 2005. Ecology of Common Ravens at the Marine Corps Air Ground Combat Center, Twentynine Palms, California. U.S. Department of the Interior, U.S. Geological Survey, Biological Resources Discipline, Western Ecological Research Center. Unpublished Report completed for U.S. Navy Southwest Division, Naval Facilities Engineering Services Command

Braun, J., M. Screnzel, C. Whitte, L. Gokool, J. Curchell, and B.A Rideout. 2014. *Molecular Methods to Detect* Mycoplasma spp. and testudinid herpesvirus II *in Desert Tortoises and Implications for Disease Management.* Journal of Wildlife Diseases, Volume 50: 757-766.

Brown, P., and R. Berry. 1998. *Bat Survey at Marine Corps Air Ground Combat Center, Twentynine Palms, California*. Draft unpublished report. 19pp.

Brown, D. R., I.M. Schumacher, G.S. McLaughlin, L.D. Wendland, M.E. Brown, P.A. Klein, and E.R. Jacobson. 2002. Application of diagnostic tests for mycoplasmal infections of desert and gopher tortoises with management recommendations. Chelonian Conservation and Biology, 4:497-507.

Bureau of Land Management (BLM). 1997. *Legislation Impacting the California Desert.* From the California BLM home page, www.ca.blm.gov.

_____. 2005. Final Environmental Impact Report and Statement for the West Mojave Plan, A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment, Volume 1. January.

California Department of Water Resources (DWR). 2004. California's Groundwater Bulletin 118, Basin Descriptions. Last update February 27, 2004.

Cutler, T.L., D.J. Griffin, and P.R. Krausman. 1999. *A Wildlife Inventory and Management Recommendations for the Marine Corps Air Ground Combat Center, Twentynine Palms, California*. Prepared for MCAGCC and Southwest Division, Naval Facilities Engineering Command, San Diego, CA under Contract N68711-96-LT-60025. University of Arizona, Tucson, AZ. 142 pp.

Davy, C.M., T. Edwards, A. Lathrop, M. Bratton, M. Hagan, B. Henen, K. A., Nagy, J. Stone, L. S. Hillard, and R.W. Murphy. 2011. *Polyandry and multiple paternities in the threatened Agassiz's desert tortoise, Gopherus agassizii*. Conservation Genetics (2011) 12:1313-1322.

Department of Defense (DoD). 2011. Department of Defense Instruction 4715.03, Natural Resources Conservation Program. Available from http://www.dtic.mil/whs/directives/corres/pdf/471503p.pdf (accessed November 1, 2016).

DoD. 2013. Department of Defense Manual 4715.03, Integrated Natural Resources Management Plan (INRMP) Implementation Manual. Available from http://www.dtic.mil/whs/directives/corres/pdf/471503m.pdf (accessed November 1, 2016).

Department of the Navy (DoN) Geothermal Program Office. 2011. Geothermal field investigations of the Sand Hill – West Prospect Area, Marine Corps Air Ground Combat Center, Twentynine Palms, California. DON Geothermal Program Office, China Lake, California.

Drake, K.K., L. Bowen, K.E. Nussear, T.C. Esque, A.J. Berger, N.A. Custer, S.C. Waters, J.D. Johnson, A.K. Miles, and R.L. Lewison. 2016. Negative impacts of invasive plants on conservation of sensitive desert wildlife. Ecosphere 7(10):e01531. 10.1002/ecs2.1531

Duck, T.A., T.C. Esque, and T.J. Hughes. 1997. *Fighting Wildfires in Desert Tortoise Habitat: Considerations for Land Managers*. In Proceeding for Fire Effects on Range and Endangered Species Habitats Conference, Nov. 13-16. 1995, Coeur D'Alene, ID. International Wildland Fire Association.

EDAW, Inc. 1994. *MCAGCC, Marine Corps Air Ground Combat Center, Training Range Study*. Prefinal, prepared for Southwest Division, Naval Facilities Engineering Command, San Diego, CA under Contract N68711-93-D-1529.

Elvin, M.A. 2000. *Rare Plant Survey and Floristic Inventory*. 1999 Year-end report: Year Three of Three, Final Report. Prepared for Tierra Data Systems for NREA Directorate, MCAGCC, Twentynine Palms, CA. 21 pp.

Gardner, T.J., and E.D. Brodie. 2000. *The Occupation of Steep Slopes by Desert Tortoise (Gopherus agassizii) in the Western Mojave Desert: A Description of Occupied Habitats, Habitat Use, and Desert Tortoise Density.* Final Report. Utah State University. 61 pp + appendices.

Headquarters Marine Corps (HQMC). 2008. Range Environmental Vulnerability Assessment. Marine Corps Air Ground Combat Center Twentynine Palms. Prepared by Malcolm Pirnie.

Henen, B.T. 2012. Re-analysis of 1997 & 1999 Disturbance and tortoise abundance data for MCAGCC, the Marine Corps Air Ground Combat Center, Twentynine Palms California. Marine Corps Air Ground Combat Center. Twentynine Palms, California. 8 pages.

Izbicki, J.A. and R.L. Michel. 2004. Movement and Age of Ground Water in the Western Part of the Mojave Desert, Southern California, USA. United States Geological Survey Water-Resources Investigations Report 03-4314.

Jones & Stokes, Inc. 1998. *Technical Synthesis Report for a Desert Tortoise Survey on the Marine Corps Air Ground Combat Center.* Submitted to U.S. Army Corps of Engineering, Sacramento District, Sacramento, CA under Contract No. DACW05-95-D-003, Task Order no. 0039.

Karl, A. 2001. Desert Tortoise Abundance in the Fort Irwin National Training Center Land Acquisition Area: A Review. Unpublished report to Chambers Group, Inc., Irvine, CA. 44 pp plus appendices.

_____. 2009. Marine Corps Air Ground Combat Center Land Acquisition Study: Distribution and Abundance of Four Vertebrate Species in the Western and Southern Study Areas. Unpublished report submitted 4 September 2009 to United States Department of the Navy, Naval Facilities Engineering Command Southwest, San Diego, California.

_____. 2010. Marine Corps Air Ground Combat Center Desert Tortoise Density in the Land Acquisition Study Areas. Unpublished report submitted 13 August to United States

Department of Navy, Naval Facilities Engineering Command Southwest, San Diego, California.

_____. 2017. Desert tortoise density in the Bullion Training Area in 2012. Unpublished report to Naval Facilities Engineering Command Southwest, San Diego, California. 54 pages.

Katzenstein, A.M., and J.A. Whelan. 1987. *Preliminary Geothermal Exploration at the Marine Corps Air Ground Combat Center, Twentynine Palms, California.* Naval Weapons Center, China Lake, CA.

Kennedy/Jenks/Todd LLC. 2007. Basin Conceptual Model and Assessment of Water Supply and Demand for Ames Valley, Johnson Valley, and Mean Valley Groundwater Basins. Prepared for Mojave Water Agency. April 2007

Keystone Center. 1996. *A Department of Defense (DoD) Biodiversity Management Strategy.* Keystone Center Policy Dialogue on Department of Defense (DoD) Biodiversity, Final Report. Keystone, CO. 37 pp.

Koehler, J.H. 1983. Ground water in the northeast part of Twentynine Palms Marine Corps Base, Bagdad Area, California. USGS Water Resources Investigation Report 83-4053.

Krzysik, A.J., and V.L. Trumbull. 1996. *Biodiversity and Wildlife Management Plan: An Ecosystem Approach, Marine Corps Air Ground Combat Center, Twentynine Palms, California*. Prepared for MCAGCC, Twentynine Palms, CA, by U.S. Army Corps of Engineers, Construction Engineering Research Lab, Champaign, IL and University of Illinois, Urbana, IL. 181 pp.

LaRue Jr., E.L. 2013. Vertebrate Inventory, Human Impacts Analysis, and Management Recommendations for the Marine Corps Air Ground Combat Center, Twentynine Palms, San Bernardino County, California. Unpublished report submitted February 2013 to Naval Facilities Engineering Command, San Diego, California. 50 pages.

Lato, L.J., P.B. Fahnestock, and P. Novak-Echenique. 1999. *Soil Survey of Marine Corps Air Ground Combat Center, Twentynine Palms, California.* Draft. U.S. Department of Agriculture, Natural Resources Conservation Service, in cooperation with NREA, MCAGCC, Twentynine Palms, CA, and the Mojave Desert Resource Conservation District.

Li, Z., and P. Martin, 2011, Geohydrology, simulation of regional groundwater flow, and assessment of water management strategies, Twentynine Palms area, California: U.S. Geological Survey Scientific Investigations Report 2010–5249, 106 p.

Londquist, C.J. and P. Martin. 1991. Geohydrology and Groundwater Flow Simulation of the Surprise Spring Basin Aquifer System, San Bernardino County, CA. United States Geological Survey Water- Resources Investigations Report 89-4099.

Marine Air Ground Task Force Training Command (MAGTFTC). 2009. Combat Center Order 5090.1D.

Marine Corps Air Ground Combat Center (MCAGCC). 2003. Final Programmatic Environmental Assessment, Ongoing and Proposed Training Activities at Marine Corps Air Ground Combat Center, Twentynine Palms CA. May 2003.

MCAGCC. 2012. Final Environmental Impact Statement, Land Acquisition and Airspace Establishment to Support Large-Scale Marine Air Ground Task Force Live Fire and Maneuver Training. July 2012.

MCAGCC. 2016. Update of Vegetation Map and Non-Native Invasive Species Mapping: 2013–2015. Final. Marine Corps Air Ground Combat Center, Twentynine Palms, California. Contract No. N62473-13-D-4811, Task Order No. 0006. April.

McKernan, R.L. 1998. Draft: Neotropical bird use at the U.S. Marine Corps Air Ground Combat Center, Twentynine Palms, California, 1994 and 1995. Report prepared for U.S. Marine Corps Air Ground Combat Center, NREA Division, Twentynine Palms, CA. 41 pp.

Mendez, G.O. and A.H Christensen. 1997. Regional Water Table (1996) and Ground Water Level Changes in the Mojave River, the Morongo, and Fort Irwin Ground-Water Basins, San Bernardino County, California. U.S. Geological Survey Water Resources Investigations Report 97-4160. 34p.

Nagy, K.A. and P.A. Medica. 1986. Physiological ecology of desert tortoises in southern Nevada. Herpetologica 42: 73-92.

Nagy, K.A., B.T. Henen, and D.B Vyas. 1998. Nutritional Quality of Native and Introduced Food Plants of Wild Desert Tortoises. Journal of Herpetology 32:260-267.

Natural Resources Conservation Service (NRCS). 2018. Natural Resources Conservation Service <http://websoilsurvey.nrcs.usda.gov/> Website accessed February 2018.

Naval Facilities Engineering. 2017. *Integrated Pest Management Plan.* Prepared for MCAGCC, Twentynine Palms, CA.

Pratt, G.F. 2005. *Terrestrial Arthropods of the Marine Corps Air Ground Combat Center, Twentynine Palms, California*. 92 pp, plus appendices.

Rowlands, P.G., Johnson, E. Ritter, and A. Endo. 1982. *The Mojave Desert.* In G.L. Bender (ed.), *Reference Handbook on the Deserts of North America.* Greenwood Press, Westport, CT.

Simovich, M. 2006. Survey and Management Considerations for the Crustacean Communities: The Dry Lakes of the Marine Corps Air Ground Combat Center, Twentynine Palms, California. 38 pp.

Skinner, M., and B. Pavlik. 1994. *Inventory of Rare and Endangered Vascular Plants of California (fifth edition).* California Native Plant Society Special Publication No. 1. 338 pp.

Snover, S.A., and E.M. Kellogg. 1999. *Biological Assessment: Effects of training and Land Use at Marine Corps Air Ground Combat Center, Twentynine Palms, on the Desert Tortoise (Gopherus agassizii*). Prepared for Southwest Division, Naval Facilities Engineering Command Contract, San Diego, CA. Contract N68711-95-D-7605/0029. MCAGCC, Twentynine Palms, CA.

Twentynine Palms Water District (TPWD). 2008. Groundwater Management Plan Update. Final Report. Prepared Kennedy/Jenks Consultants. December 29, 2008.

U.S. Army Corps of Engineers. 1994. *Identification and Characterization of "Waters of the United States" at the Marine Corps Air-Ground Combat Center, Twentynine Palms, California.* Waterways Experiment Station, Environmental Laboratory. 3909 Halls Ferry Road, Vicksburg, MS.

U.S. Fish and Wildlife Service (USFWS). 1990. *Endangered and Threatened Wildlife and Plants: Determination of Threatened Status for the Mojave Population of the Desert Tortoise*. Federal Register 55:12, 178-12, 191.

_____. 1994. *Desert Tortoise (Mojave Population) Recovery Plan*. Portland, OR. 73 pp. + appendices.

_____. 2002. Biological Opinion for the Base-Wide Training Operations and Routine Maintenance Program at the United States Marine Corps Air Ground Combat Center, Twentynine Palms, San Bernardino County, California (1-8-99-F-41). Ventura Fish and Wildlife Office, Ventura, CA. March 7.

_____. 2011. Health Assessment Procedures for the Desert Tortoise (*Gopherus agassizii*): A Handbook Pertinent to Translocation. Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada

_____.2015. Range-Wide Monitoring of the Mojave Desert Tortoise (*Gopherus agassizii*): 2013 and 2014 Annual Reports. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada.

_____. 2016. Summary of U.S. Fish and Wildlife Service Translocation Guidance for the Marine Corps Air Ground Combat Center Land Acquisition, Twentynine Palms, California. 12 September 2016. U.S. Fish and Wildlife Service, Palm Springs, CA.

U.S. Geological Survey (USGS). 2003. Regional Water Table (2000) and Ground-Water-Level Changes in the Mojave River and Morongo Ground-Water Basin, Southwestern Mojave Desert, California. Available at http//water.usgs.gov/pubs/wri/wri024277/

U.S. Marine Corps (USMC). 1976. *Multiple-Use Natural Resources Management Plan*. Marine Corps Air Ground Combat Center, Twentynine Palms, CA.

_____. 1990. *Restricted Area/Military Operations Area Utilization Report*. Marine Corps Air Ground Combat Center, Twentynine Palms, CA.

_____. 1991. *Restricted Area/Military Operations Area Utilization Report*. Marine Corps Air Ground Combat Center, Twentynine Palms, CA.

_____. 1993. *Restricted Area/Military Operations Area Utilization Report*. Marine Corps Air Ground Combat Center, Twentynine Palms, CA.

_____. 1997. *Environmental Quality Installation Award Submission*. Report submitted to the Secretary of the Navy for Fiscal Year 97 award competition. Natural Resources and Environmental Affairs, Marine Corps Air Ground Combat Center, Twentynine Palms, CA.

_____. 1999. *Handbook for Preparing Integrated Natural resources Management Plans for Marine Corps Installations*. Headquarters, Marine Corps, Washington, D.C. 44 pp.

_____. 2000. *United States Marine Corps, Installations Campaign Plan (ICP)*. Draft, Installations and Logistics, Headquarters, U.S. Marine Corps, Washington, D.C.

_____. 2003. Final Programmatic Environmental Assessment, Ongoing and Proposed Training Activities at Marine Corps Air Ground Combat Center, Twentynine Palms CA. May 2003.

_____. 2001. Programmatic Environmental Assessment, Ongoing and Proposed Training Activities at the Marine Corps Air Ground Combat Center, Twentynine Palms, CA.

_____. 2012. Final Environmental Impact Statement, Land Acquisition and Airspace Establishment to Support Large-Scale Marine Air Ground Task Force Live Fire and Maneuver Training. July 2012.

_____. 2013. Environmental Compliance and Protection Manual. MCO P5090.2A. Headquarters, US Marine Corps. Available from http://www.marines.mil/Portals/59/MCO%20P5090.2A%20W%20CH%201-3.pdf

_____. 2016. Update of Vegetation Map and Non-Native Invasive Species Mapping: 2013–2015. Final. Marine Corps Air Ground Combat Center, Twentynine Palms, California. Contract No. N62473-13-D-4811, Task Order No. 0006. April.

_____. 2017. Supplemental Environmental Impact Statement for Land Acquisition and Airspace Establishment to Support Large-Scale Marine Air Ground Task Force Live-Fire and Maneuver Training, Marine Corps Air Ground Combat Center, Twentynine Palms, California. 289 pages.

_____. 2018a. Final Biological Assessment for Ongoing Training at Marine Corps Air Ground Combat Center, Twentynine Palms, California. February 2018.

_____. 2018b. Final Environmental Assessment for Ongoing Training at Marine Corps Air Ground Combat Center, Twentynine Palms, California. January 2018.

University of California Riverside (UCR). 1993. M*arine Corps Air Ground Combat Center Natural Resources Management Plan, 1992*. Departments of Earth Science and Botany and Plant Sciences, Riverside, CA. Prepared for MCAGCC, Twentynine Palms, CA. through Naval Facilities Engineering Command, Southwestern Division, San Diego, CA. 16 pp + app.

Webb, R.H., J.W. Steiger, and H.G. Wilshire. 1986 *Recovery of Compacted Soils in Mojave Desert Ghost Towns*. Soil Science of America Journal 50(5): 1341-1344.

Woodman, A. P. 2001. Distance Sampling for the Desert Tortoise on the Marine Corps Air Ground Combat Center, Twentynine Palms, California. Report prepared for Southwest Division, Naval Facilities Engineering Command, San Diego, California. 14 pp. plus Appendices.

Woodman, A.P. 2012. Summary report for two demographic plots and health assessments conducted on desert tortoises at the Marine Corps Air Ground Combat Center, Spring and Fall 2009. 26 pages.

Woodman, A. P., G. Goodlett, and J. Westermeier. 2001. Technical Synthesis Report for Desert Tortoise Surveys at Marine Corps Air Ground Combat Center, Twentynine Palms, California. Submitted by Kiva Biological Consulting, in association with Jones & Stokes Associates, Inc. 77 pp. March

# 6.0 LIST OF PREPARERS

**CHRISTENSEN, Walter J.; Editor;** Conservation Branch Head, Environmental Affairs Division, Marine Air Ground Task Force Training Command, Twentynine Palms, California. 3 years of experience working at this location. B.S. in Biogeography.

**SEGOVIANO, Ilima R.; Contributor/Reviewer/Editor**; Natural Resources Specialist, Environmental Affairs, Division, Marine Air Ground Task Force Training Command, Twentynine Palms, California. 2 years of experience working at this location. M.S. in Natural Resources and Environmental Management

**HENEN, Brian T.; Contributor / Reviewer;** Ecologist, Environmental Affairs Division, Marine Air Ground Task Force Training Command, Twentynine Palms, California. 13 years' experience at this location. PhD Biology.

**HUSUNG, Martin B.; Contributor;** Natural Resources Specialist, Environmental Affairs Division, Marine Air Ground Task Force Training Command, Twentynine Palms, California. 15 years' experience at this location. B.A Wildlife Biology.

**HOTCH, Nora; Contributor;** Biological Science Technician, Environmental Affairs Division, Marine Air Ground Task Force Training Command, Twentynine Palms, California. 7 years' experience at this location. B.A. Environmental, Population and Organismic Biology

**HARRISON, Janelle L.; Contributor / Reviewer;** Cultural Resources Specialist, Environmental Affairs Division, Marine Air Ground Task Force Training Command, Twentynine Palms, California. 1 year of experience at this location.

**ELLIOTT, Chris T.; Contributor / Reviewer;** Environmental Protection Specialist, Environmental Affairs Division, Marine Air Ground Task Force Training Command, Twentynine Palms, California

**VALLS, Joe E.; Contributor / Reviewer;** Environmental Compliance Support, Marine Air Ground Task Force Training Command, Environmental Affairs Division, Twentynine Palms, California

**KERR, Scott A; Contributor / Reviewer;** NEPA Program Manager, Marine Air Ground Task Force Training Command, Environmental Affairs Division, Twentynine Palms, California

**BOWLING, Leon J.; Contributor /Reviewer;** Officer and RPAO, Marine Air Ground Task Force Training Command, Department of Public Works, Planning Department, Twentynine Palms, California

**LEGARDA, Ken; Contributor / Reviewer;** MBA Planning Branch/PWD - G4, Marine Air Ground Task Force Training Command, Twentynine Palms, California

**BURTON, Mark A.; Contributor;** Facilities Planning Specialist, PWD Planning Department, Marine Air Ground Task Force Training Command, Twentynine Palms, California

**GELINAS, Timothy K.; Contributor / Reviewer;** Range Development Officer, Marine Air Ground Task Force Training Command, Marine Training Directorate, Twentynine Palms, California

**FISCHER, Kylie; Contributor / Reviewer;** Senior Biologist, MultiMAC Joint Venture, 24 years of experience working with Flora and Fauna in Southern California. B.A. Psychology with Minor in Ecology.

**KIMBALL, Nicole; Contributor / Reviewer;** Senior Biologist, MultiMAC Joint Venture, 12 years of experience working with flora and fauna in Southern California. B.S. Biology.

**EIDSON, Erika; Contributor / Reviewer;** Senior Biologist, MultiMAC Joint Venture, 14 years of experience working with flora and fauna in Southern California. B.S. Ecology, Behavior, and Evolution.

**ERLICH, Jason; Contributor;** Biologist, MultiMAC Joint Venture. B.S. Geography, emphasis in Natural Resources and Environmental Geography.

**MASTRELLI, Emily; Contributor;** Biologist, MultiMAC Joint Venture. B.A. Biology.

# 7.0 LIST OF ACRONYMS

The following table presents acronyms used within this document.

| | |
|---|---|
| AAV | Amphibious Assault Vehicle |
| ACV | Amphibious Combat Vehicle |
| ACEC | Area of Critical Environmental Concern |
| AC/S | Assistant Chief of Staff |
| AF | Acre Feet |
| BASH | Bird Airstrike Hazard |
| BCC | Bird of Conservation Concern |
| BEARMAT | Range Management Section |
| BEQ | Bachelor Enlisted Quarters |
| BGEPA | Bald and Golden Eagle Protection Act of 1940 |
| bgs | Below Ground Surface |
| BIA | Bureau of Indian Affairs |
| BLM | Bureau of Land Management |
| BLS-S | Bureau of Land Management Sensitive |
| BO | Biological Opinion |
| BZO | Battle Site Zero |
| CAMOUT | Combined Arms Military Operations in Urban Terrain |
| CARB | California Air Resources Board |
| CATEX | Categorical Exclusion |
| CAX | Combined Arms Exercise |
| CCB | Combat Center Bulletin |
| CCO | Combat Center Order |
| CDFW | California Department of Fish and Wildlife |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| CLEO | Conservation Law Enforcement Officer |
| CLEP | Conservation Law Enforcement Program |
| cm | Centimeter |
| COGEN | Cogeneration |
| Combat Center | Marine Air Ground Task Force Training Command Marine Corps Air Ground Combat Center |
| CRPR | California Rare Plant Ranks |
| CSC | California Species of Special Concern |
| CVOT | Combat Vehicle Operator Training Course |
| CWA | California Water Authority |
| CY | Calendar Year |
| DESIFREX | Desert Fire Exercise |
| DoD | Department of Defense |
| DMG | Desert Managers Group |
| EA | Environmental Affairs |
| EIS | Environmental Impact Statement |
| ECE | Environmental Compliance Evaluation |
| EAF | Expeditionary Airfield |
| EFV | Expeditionary Fighting Vehicle |
| EIRB | Environmental Impact Review Board |
| EIS | Environmental Impact Statement |
| ELCC | Exercise Logistical Coordination Center |

| | |
|---|---|
| EO | Executive Order |
| EOD | Explosive Ordinance Device |
| ELISA | Enzyme-Link Immunosorbent Assay |
| EMUA | Exclusive Military Use Area |
| ESA | Endangered Species Act |
| EPA | Environmental Protection Agency |
| F | Fahrenheit |
| FAA | Federal Aviation Administration |
| FARP | Forward Ammunition Resupply Point |
| FE | Federally Endangered |
| FEAD | Facilities Engineering & Acquisition Division |
| FT | Federally Threatened |
| FINEX | Final Exercise |
| FLETC | Federal Law Enforcement Training Center |
| FMF | Fleet Marine Forces |
| FLB | Forward Logistics Base |
| FONSI | Finding of No Significant Impact |
| FP | Fully Protected |
| FPA | Free Production Allowance |
| FSC | Facilities Support Contracts |
| FSCAC | Fire Support Coordination Application Course |
| FSCEX | Fire Support Coordination Exercise |
| FSRM | Facilities sustainment, restoration, and modernization |
| Ft | Feet |
| FY | Fiscal Year |
| GIS | Geographical Information System |
| HQMC | Headquarters, U.S. Marine Corps |
| HIMARS | High Mobility Artillery Rocket System |
| HMMWV | High Mobility Multi-Purpose Wheeled Vehicle |
| ICRMP | Integrated Cultural Resources Management Plan |
| IED | Improvised Explosive Device |
| INRMP | Integrated Natural Resources Management Plan |
| IPMP | Integrated Pest Management |
| ISD | Installation Support Directorate |
| ISMP | Invasive Species Management Plan |
| ITX | Integrated Training Exercise |
| JDAM | Joint Directed Attack Munitions |
| JLTV | Joint Light Tactical Vehicle |
| Km | Kilometer |
| LandEx | Land Expansion |
| LAV | Light Armored Vehicles |
| m | Meter |
| MAGTF | Marine Air Ground Task Force |
| MAGTFTC | Marine Air Ground Task Force Training Command |
| MBTA | Migratory Bird Treaty Act |
| MCAGCC | Marine Corps Air Ground Combat Center |
| MCCES | Marine Corps Communications Electronics School |
| MCO | Marine Corps Order |
| MDAQMD | Mojave Desert Air Quality Management |
| MEB | Marine Expeditionary Brigade |
| mg/L | milligrams per liter |

| | |
|---|---|
| Mi | Mile |
| ML | Megaliters |
| MLRS | Multiple Launch Rocket System |
| MOUT | Military Operations in Urban Terrain |
| MPH | miles per hour |
| MPRC | Multi-Purpose Range Complex |
| MRAP | Mine Resistant Ambush Protected |
| MSR | Main Supply Route |
| MTD | MAGTF Training Directorate |
| NAGPRA | Native American Graves Protection and Repatriation Act |
| NAVFAC | Naval Facilities Engineering Command |
| NCRB | Natural and Cultural Resources Branch |
| NECO | Northern and Eastern Colorado Desert Coordinated Management Plant |
| NEMO | Northern and Eastern Mojave Planning Effort |
| NEPA | National Environmental Policy Act |
| NGO | Non-Governmental Organizations |
| NHPA | National Historic Preservation Act |
| NR | Natural Resources |
| NRCS | Natural Resources Conservation Service |
| NTC | National Training Center |
| OHV | Off Highway Vehicles |
| OMMC | Operations and Maintenance Marine Corps |
| PA | Programmatic Agreement |
| PLO | Public Land Order |
| PRTSS | Pre-designated Range Training Support Site |
| PTE | Potential to Emit |
| PTO | Permit to Operate |
| PWD | Public Works Division |
| PWO | Public Works Officer |
| PZ | Precipitation Zone |
| qPCR | Quantitative Polymerase Chain Reaction |
| REIR | Request for an Environmental Impact Review |
| RMB | Resource Management Branch |
| RMD | Range Management Division |
| RTAA | Range Training Area and Airspace |
| RTAMS | Range Training Area Maintenance Section |
| SAIA | Sikes Act Improvement Act |
| SE | State Endangered |
| SELF | Strategic Expeditionary Landing Field |
| SHPO | State Historic Preservation Officer |
| SOP | Standard Operating Procedures |
| ST | State Threatened |
| SUA | Special Use Area |
| SWAP | State Wildlife Action Plan |
| T1 | Tribal Species of Special Concern |
| TA | Training Area |
| TACP | Tactical Air Control Party |
| TCP | Traditional Cultural Properties |
| TDS | Total Dissolved Solids |
| TP | Training Program |

| | |
|---|---|
| TTECG | Tactical Training Exercise Control Group |
| TRACRS | Tortoise Research and Captive Rearing Site |
| TRED | Tortoise Regional Estimate of Density |
| UAE | United Arab Emirates |
| UAV | Unmanned Aerial Vehicle |
| UCLA | University of California at Los Angeles |
| UCR | University of California, Riverside |
| UEM | Utilities/Energy Management |
| URTD | Upper Respiratory Tract Disease |
| USC | United States Code |
| USFWS | U.S. Fish and Wildlife Service |
| USGS | U.S. Geological Survey |
| USMC | United States Marine Corps |
| UTL | Utilities |
| UTM | Universal Transverse Mercator |
| WEA | Western Expansion Area |
| WFMP | Wildland Fire Management Plan |

# APPENDIX A

# Workplan and Budget

| Table A-1 Natural Resources Program 5-Year Workplan | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **GOAL 1: Strengthen the Combat Center's Operational Capabilities** | | | | | | | | | |
| **Element 1.1 - Align Natural Resources Management and Mission Sustainment** | | | | | | | | | |
| **Objective 1.1.1 - Reduce the regulatory burden on mission implementation** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY19** | **FY20** | **FY21** | **FY 22** |
| 1.1.1-A | Develop a plan that uses the Encroachment Program to minimize impacts from environmental management on the military mission, while maintaining the quality of the Natural Resources Program. | GEA | TBD | COVERED | X | | | | |
| 1.1.1-B | Investigate recovery crediting system with USFWS for use in REPI. | EA | FY 18 | COVERED | X | | | | |
| 1.1.1-C | Maintain a preemptive conservation planning strategy to minimize impacts to the military mission from the federal listing of new species. | EA | ONGOING | COVERED | X | X | X | X | X |

| Objective 1.1.2 - Continue using the Integrated Natural Resources Management Planning process for natural resources management | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY19** | **FY20** | **FY21** | **FY 22** |
| 1.1.2-A | Annually report INRMP implementation and effectiveness to USFWS and CDFW. Report due 01 Jan each year, content to cover previous fiscal year. | EA | ANNUALLY | COVERED | X | X | X | X | X |
| 1.1.2-B | Review and revise the INRMP annually in coordination with USFWS, CDFW, and HQMC. | EA | ANNUALLY | COVERED | X | X | X | X | X |
| 1.1.2-C | Formally revise the INRMP every 5 years in coordination with USFWS, CDFW and HWMC as necessary. | EA | 5 YEAR | COVERED | | | | X | X |
| **Objective 1.1.3 - Coordinate installation resources management with training area users** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY19** | **FY20** | **FY21** | **FY 22** |
| 1.1.3-A | Coordinate guideline establishment for disturbance minimization. | EA | ONGOING | COVERED | X | X | X | X | X |
| 1.1.3-B | Implement the EA Mission Awareness Program. | EA | ONGOING | COVERED | X | X | X | X | X |
| **Objective 1.1.4 - Coordinate installation resources management with regional initiatives and management strategies** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY19** | **FY20** | **FY21** | **FY 22** |
| 1.1.4-A | Participate in regional land manager groups such as the Desert Manager's Group and Mojave Weed Management Area, and other desert advisory/management groups, to maintain presence, open communication and ensure alignment of management and monitoring, as applicable, with the larger context of regional issues. | EA | ONGOING | COVERED | X | X | X | X | X |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1.1.4-B | Provide support to regional military planning groups. | EA | ONGOING | COVERED | X | X | X | X | X |
| 1.1.4-C | Revise the MOA between the installation and CDFW for cooperative management of Desert Bighorn Sheep on base. | EA | FY 18 | COVERED | X | | | | |
| 1.1.4-D | Establish policies and procedures related to tribal access to natural resources aboard the Combat Center | | | | | X | | | |
| **Objective 1.1.5 - Reduce wildlife conflicts** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY 19** | **FY 20** | **FY 21** | **FY 22** |
| 1.1.5-A | Revise wildlife conflict SOPs and CCOs. | NR | FY 18 | COVERED | X | | | | |
| 1.1.5-B | Respond to requirements for wildlife control aboard the Combat Center and maintain actions in a log. | NR | ONGOING | COVERED | X | X | X | X | X |
| 1.1.5-C | Identify and take appropriate actions to control Africanized honey bees. | PWD | ONGOING | COVERED | X | X | X | X | X |
| 1.1.5-D | Develop a Canid Management Plan. | NR | FY 19 | COVERED | | X | X | | |
| 1.1.5-E | Develop a coyote depredation CCO. | CLEP | FY 18 | COVERED | X | | | | |
| 1.1.5-F | Implement targeted canid depredation (e.g. trapping and shooting). | NR | ONGOING | COVERED | X | X | X | X | X |
| 1.1.5-G | Develop and implement an annual, on-base community outreach plan for wildlife safety. | NR | ONGOING start FY 18 | COVERED | X | X | X | X | X |

| Objective 1.1.6 - Provide for adequate staff support to the Natural Resources Program | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY19** | **FY20** | **FY21** | **FY 22** |
| 1.1.6-A | Ensure staffing levels are adequate to implement the Combat Center Natural Resources Management Program. | CG | ONGOING | COVERED | X | X | X | X | X |
| 1.1.6-B | Maintain an official representative who is designated responsible for ensuring ongoing compliance with all protective measures in the basewide training and expansion BOs. | EA | ONGOING | COVERED | X | X | X | X | X |
| 1.1.6-C | Ensure annual Individual Development Plans are generated for each NR staff person, and quality trainings are included, to assist with INRMP implementation. | NR | ANNUAL | COVERED | X | X | X | X | X |
| 1.1.6-D | Ensure attendance at relevant Desert Tortoise Council Workshops is included in all NR individual development plans. | EA | AS NEEDED | COVERED | X | X | X | X | X |
| 1.1.6-E | Support, as funding allows, implementation of individual IDPs. | NR | ONGOING | COVERED | X | X | X | X | X |
| **Element 1.2 Training Lands Degradation Minimization** | | | | | | | | | |
| **Objective 1.2.1 - Minimize damage to training lands, disturbance to natural resources and ensure ongoing coordination with military planners** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY 19** | **FY 20** | **FY 21** | **FY 22** |
| 1.2.1-A | Consider natural resources when developing and executing cleanup and restoration projects. | EA | ONGOING | COVERED | X | X | X | X | X |
| 1.2.1-B | Create additional Predesignated Range Training Support Sites. | MTD | FYs 19-20 | NFA | | X | X | | |

| Objective 1.2.2 - Design roads to benefit both military use and conservation | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY 19** | **FY 20** | **FY 21** | **FY 22** |
| 1.2.2-A | Identify future road network requirements. | MTD | TBD | COVERED | | TBD | TBD | TBD | TBD |
| 1.2.2-B | Identify opportunities for road realignments to reduce resources impacts. | NR | FY 19 | COVERED | | X | | | |
| 1.2.2-C | Identify and add road design elements to existing and planned roads to minimize erosion and facilitate safe passage of Desert Tortoise across the landscape. | NR | FY 20 | COVERED | | | | | X |
| 1.2.2-D | Assess whether recurring storm damage to roads results from training impacts to adjacent lands (e.g... via veg, soil structure alterations, berm placement, etc...). | EA | FYs 19-20 | COVERED | | | | X | X |
| **Objective 1.2.3 - Prevent damage to sensitive areas** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY 19** | **FY 20** | **FY 21** | **FY 22** |
| 1.2.3-A | Develop and implement a uniform conservation marking system for signage and boundary delineation (e.g. fencing) to support requirements of military training. | EA | FY 18 | COVERED | X | | | | |
| 1.2.3-B | Identify sensitive areas where damage will trigger future encroachment. | NR | EVERY OTHER YEAR | COVERED | | X | | X | |
| 1.2.3-C | Ensure Special Use Areas are incorporated into Combat Center Orders and MIM. | MTD | EVERY OTHER YEAR | COVERED | | X | | X | |

## Element 1.3 - Ensure NEPA Compliance

**Objective 1.3.1 - Use an established NEPA review process to identify projects and activities on the Combat Center that might impact natural resources and work with project planners to resolve issues early in the planning process.**

| Task No. | Task Description | Lead Entity | Timeframe | NEPA Status | FY 18 | FY 19 | FY 20 | FY 21 | FY 22 |
|---|---|---|---|---|---|---|---|---|---|
| 1.3.1-A | Within 2 weeks of the request, review and respond to Requests for Environmental Impact Reviews (REIRs) in the NEPA PAMS system. | EA | ONGOING | COVERED | X | X | X | X | X |
| 1.3.1-B | Develop a Natural Resource Reference Manual for Environmental Assessments and Environmental Impact Statements to reference. | NR | FY20 | COVERED | | | X | X | |

**Objective 1.3.2 - Maintain and acquire any necessary environmental reviews, permits and other legal authorizations to operate the Natural Resources Program**

| Task No. | Task Description | Lead Entity | Timeframe | NEPA Status | FY 18 | FY 19 | FY 20 | FY 21 | FY 22 |
|---|---|---|---|---|---|---|---|---|---|
| 1.3.2-A | Develop a schedule for all natural resources permit reporting requirements, points of contact, and data needs. Incorporate and validate this information in the INRMP and ensure timely submissions. | NR | FY 18 | COVERED | X | | | | |

## GOAL 2: Support Natural Systems on the Landscape

### Element 2.1 Coordinated Ecosystem Management

**Objective 2.1.1 - Develop management strategies and projects that provide local as well as regional benefits**

| Task No. | Task Description | Lead Entity | Timeframe | NEPA Status | FY 18 | FY 19 | FY 20 | FY 21 | FY 22 |
|---|---|---|---|---|---|---|---|---|---|
| 2.1.1 - A | Consider regional resource planning groups priorities (e.g. DMG, MOG, RIT, etc.) when developing resources management projects. | NR | ONGOING | COVERED | X | X | X | X | X |
| 2.1.1 - B | Maintain a current list of regional contacts relevant to natural resources management. | NR | ONGOING | COVERED | X | X | X | X | X |
| 2.1.1-C | Coordinate Natural Resources Program operations with local stakeholders (JTNP, BLM, MDLT, USFWS, CDFW) to enhance management and monitoring activities. | NR | ONGOING | COVERED | X | X | X | X | X |
| 2.1.1-D | Work with BLM to develop a cooperative resources management strategy for the SUA. | NR | FYs 18 -19 | COVERED | X | X | | | |
| 2.1.1-E | Evaluate the application of appropriate land use restrictions for the conservation of natural resources | NR | FYs 18 -19 | COVERED | X | X | | | |

## Element 2.2 - Landscape Level Planning

### Objective 2.2.1 - Use landscape level planning to alter limiting factors and promote priority endemic species

| Task No. | Task Description | Lead Entity | Timeframe | NEPA Status | FY 18 | FY 19 | FY 20 | FY 21 | FY 22 |
|---|---|---|---|---|---|---|---|---|---|
| 2.2.1-A | Update the natural resources library and build a digital, geospatial database of all data associated with natural resources management. | NR | FY 18 | COVERED | X | X | X | X | X |
| 2.2.1-B | Develop and implement a method to inventory and assess baseline trend data of ecological conditions for all washes and canyons. | NR | FY 19; then ONGOING | COVERED | | X | X | X | X |
| 2.2.1-C | Develop a study to determine the effects of aquifer use on vegetation communities. | NR | FYs 19-20 | COVERED | | X | X | | |

### Objective 2.2.2: Manage for climate change by ensuring suitable habitat exists for species, including habitat connectivity across and beyond the base boundaries as appropriate, and is maintained under an altered climate regime.

| Task No. | Task Description | Lead Entity | Timeframe | NEPA Status | FY 18 | FY 19 | FY 20 | FY 21 | FY 22 |
|---|---|---|---|---|---|---|---|---|---|
| 2.2.2-A | Develop element and task-level priorities for addressing climate change in the INRMP. | NR | FY 18 | COVERED | X | | | | |
| 2.2.2-B | Develop climate change refugia models for sensitive species on base (other than desert tortoise). | NR | 3 YEARS | COVERED | X | X | TBD | | |
| 2.2.2-C | Study existing and potential corridors for bighorn sheep; investigate where improvements in habitat resources would minimize conflicts with training exercises and maintain adequate geneflow across the installation under an altered climate regime. | NR | FY 20 | COVERED | | | | TBD | |

| Element 2.3 Habitat Management | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Objective 2.3.1 - Survey and monitor habitat to assess trends in quality over time** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY 19** | **FY 20** | **FY 21** | **FY 22** |
| 2.3.1-A | Revise and maintain a floral management plan which identifies priority species (including but not limited to rare plants), regular monitoring frequencies for priority habitat features. Monitor to ensure trends in health and quality over time. Incorporate adaptive management into monitoring after the second year. | NR | ONGOING | COVERED | X | X | X | X | X |
| 2.3.1-B | Maintain a database of survey and monitoring findings, including Federal and State status as appropriate. | NR | ONGOING | COVERED | X | X | X | X | X |
| 2.3.1-C | Map plant associations in expansion areas using the base's 2016 standardized protocol and integrate GIS data into the existing database. | NR | EVERY 5 YEARS | COVERED | X | X | X | X | X |
| 2.3.1-D | Conduct sensitive plant surveys. | NR | ANNUALLY | COVERED | X | X | X | X | X |
| 2.3.1-E | Update herbarium mounts. | NR | ONGOING | COVERED | X | X | X | X | X |
| **Objective 2.3.2 - Monitor training related changes to vegetation** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY 19** | **FY 20** | **FY 21** | **FY 22** |
| 2.3.2-A | Identify long-term monitoring locations and controls within the expansion area. | NR | FY 19 | COVERED | | X | | | |
| 2.3.2-B | Collect baseline data at monitoring locations and control locations. | NR | EVERY 3 YEARS | COVERED | | X | | | X |

| Objective 2.3.3 - Maintain and modify existing habitat as necessary to support healthy floral and faunal population sizes and biodiversity | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY 19** | **FY 20** | **FY 21** | **FY 22** |
| 2.3.3-A | Annually maintain existing guzzlers and coordinate efforts with the Society for the Conservation of Bighorn Sheep. | NR | ANNUALLY | COVERED | X | X | X | X | X |
| 2.3.3-B | Install new guzzlers to support wildlife transit across the full extent of mountains on base, and monitor new guzzlers to confirm wildlife usage. | NR | FY 18 | NFA | X | X | | | |
| 2.3.3-C | Monitor bat gates to inspect for trespass and condition. | NR | FY 19 | COVERED | | | X | | |
| 2.3.3-D | Evaluate mine entrances, caves, adits, shafts, tunnels and pits for wildlife activity to identify where the installation of bat gates and other barriers may benefit existing wildlife populations. | NR | FYs 20-21 | COVERED | | | X | X | |
| 2.3.3-E | Develop an annual fencing/signage/cleanup plan, with assistance from CLEOs. | NR | ANNUALLY | COVERED | X | X | X | X | X |
| 2.3.3-F | Maintain existing and install new fencing and signage in pre-identified areas, including the base boundary, to reduce encroachment and enforce management prescriptions. | NR | ANNUALLY | NFA | X | X | X | X | X |
| **Element 2.4 - Wildlife Management** | | | | | | | | | |
| **Objective 2.4.1 - Perform general wildlife inventories and monitoring to support self-sustaining populations while maintaining training lands** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY 19** | **FY 20** | **FY 21** | **FY 22** |
| 2.4.1-A | Develop a faunal monitoring plan. | NR | ANNUALLY | COVERED | X | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.4.1-B | Update the combat center species database with grey literature produced here on base after Cutler 1999. | NR | ONGOING | COVERED | X | X | X | X | X |
| 2.4.1-C | Jointly survey and monitor the Combat Center's bighorn sheep population with CDFW to determine status, distribution and abundance. | NR | 2 YEARS, EVERY 5 YEARS | NFA | | | | X | X |
| 2.4.1-D | Resurvey for bats. | NR | FYs 19-20 | COVERED | | X | X | | |
| 2.4.1-E | Resurvey for Pallid San Diego pocket mouse in expansion area. | NR | FYs 18-19 | COVERED | X | X | | | |
| 2.4.1-F | Map suitable habitat for chuckwalla and identify survey gaps. | NR | FY 22 | COVERED | | | | | X |
| 2.4.1 - G | Map suitable Mojave Fringe-Toed Lizard habitat on base and identify survey gaps. Fill some of the identified survey gaps for MFTL. | NR | FYs 21-22 | COVERED | | | | X | X |
| **Objective 2.4.2 - Ensure state-listed species are considered in the Combat Center actions** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY 19** | **FY 20** | **FY 21** | **FY 22** |
| 2.4.2-A | Annually update the state sensitive species list. | NR | ANNUALLY | COVERED | X | X | X | X | X |
| 2.4.2-B | Develop special conservation measures for use in NEPA Project Review for State-Listed Species. | NR | FY 19 | COVERED | | X | | | |
| **Objective 2.4.3 - Provide other general, or otherwise miscellaneous, wildlife management support services** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY 19** | **FY 20** | **FY 21** | **FY 22** |
| 2.4.3-A | Obtain access to a wildlife rehabilitation facility for rehab services. | NR | FY 18 | COVERED | X | X | X | X | X |
| 2.4.3-B | Monitor and report on Bird Air Strike Hazards. | SELF | ONGOING | COVERED | X | X | X | X | X |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.4.4-C | Review and revise the BASH to evaluate landing areas outside of Camp Wilson. | NR | FY 20 | COVERED | | | TBD | | |
| **Objective 2.4.4 - Restore and rehabilitate training lands when feasible** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY 19** | **FY 20** | **FY 21** | **FY 22** |
| 2.4.4-A | Evaluate methods and costs for common restoration efforts. | NR | ONGOING | COVERED | X | X | X | X | X |
| 2.4.4-B | Develop "a toolbox" of restoration practice recommendations for consideration at higher value locations and include climate change considerations as applicable. | NR | ANNUALLY | COVERED | X | X | X | X | |
| **Element 2.5 - Wet Areas Management** | | | | | | | | | |
| **Objective 2.5.1: Manage wet areas to protect their ecosystem functionality.** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY 19** | **FY 20** | **FY 21** | **FY 22** |
| 2.5.1-A | Inventory natural and artificial water sources. | NR | FY 18 | COVERED | X | | | | |
| 2.5.1-B | Assess the condition of abiotic and biotic resources at existing water sources, both natural and man-made (egg. Guzzlers). | NR | EVERY 5 YEARS | COVERED | X | X | | | X |
| 2.5.1-C | Annually monitor the use of natural and artificial water sources. | NR | ANNUALLY | COVERED | X | X | X | X | X |
| **Element 2.6 - Invasive Species Management** | | | | | | | | | |
| **Objective 2.6.1 - Prevent, contain and slow the spread of invasive species aboard the Combat Center to conserve and enhance native species and functionality of natural systems** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY 19** | **FY 20** | **FY 21** | **FY 22** |
| 2.6.1-A | Develop a risk-based list of priority invasive species. | NR | FY 18 | COVERED | X | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.6.2-B | Compile historical occurrence data and perform limited, low-cost field surveys to map the occurrence of priority invasives on the landscape. | NR | FY 19 | NFA | X | X | X | X | X |
| 2.6.2-C | Formulate and cost out control measures. Implement measures. Monitor effectiveness over time. | NR | FY 19-22 | COVERED | X | X | X | X | X |
| **Element 2.7 - Wildfire Management** | | | | | | | | | |
| **Objective 2.7.1 - Revise the Wildfire Management Plan for the Combat Center** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY 19** | **FY 20** | **FY 21** | **FY 22** |
| 2.7.1-A | Incorporate and validate wildfire prevention in range CCO. | MTD | FY 19 | COVERED | | X | | | |
| 2.7.1-B | Maintain a GIS shapefile of burnable acres and if a fire occurs, update the layer to begin tracking locations of burned acres and monitoring of post-fire effects. | NR | ONGOING | COVERED | X | X | X | X | X |
| 2.7.1-C | As a proactive measure, inventory treatment methods for burned areas to reduce soil erosion and invasion by exotic species. | NR | FY 21 | COVERED | | | | X | |
| 2.7.1-D | Ensure the Wildfire Management Plan is revised once every 5 years. | MA | FY 18 | COVERED | X | | | | TBD |
| **Element 2.8 - Mainside Grounds Management Support** | | | | | | | | | |
| **Objective 2.8.1 - Ensure that Mainside landscaping and grounds maintenance are integrated and consistent with natural resources goals and objectives** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY 19** | **FY 20** | **FY 21** | **FY 22** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2.8.1-A | Develop a conservation plan for the Curation Center using the conservation planning process to address resource concerns associated with soil erosion and irrigation inefficiencies, and determine whether an energy audit is needed. Ensure any practice recommendations selected are cost-effective. | NR | FYs 19-20 | COVERED | | X | X | | |
| 2.8.1-B | Ensure that xeriscape principals and native plant emphases are incorporated in landscaping projects through regular revisions of the approved plant list, the Base Exterior Architecture Plan, and regular professional input to projects. | NR | ONGOING | COVERED | X | X | X | X | X |
| 2.8.1-C | Develop/validate the CCO for native landscaping. | NR | FY 20 | COVERED | | | X | | |
| 2.8.1-D | Develop a vegetation trimming SOP | NR | FY 18 | COVERED | X | | | | |
| **GOAL 3: Manage Federally Protected Species** | | | | | | | | | |
| **Element 3.1 - Desert Tortoise Management** | | | | | | | | | |
| **Objective 3.1.1 - Inventory and regularly monitor desert tortoise using standardized protocols to improve the understanding of long-term population trends aboard the Combat Center** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY19** | **FY20** | **FY21** | **FY 22** |
| 3.1.1- A | Update tortoise density information for installation lands. | NR | ANNUALLY | COVERED | X | X | X | X | X |
| 3.1.1- B | Monitor long-term study plots on a 3-year rotation. | NR | ANNUALLY | COVERED | X | X | X | X | X |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3.1.1- C | Monitor desert tortoise habitat condition. | NR | ANNUALLY | COVERED | X | TBD | X | X | X |
| | **Objective 3.1.2 - Inventory and monitor to identify threats to the desert tortoise** | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY19** | **FY20** | **FY21** | **FY 22** |
| 3.1.2- A | Examine disturbance effects on desert tortoise population health. | NR | FYs 18-20 | COVERED | X | X | X | | |
| 3.1.2-B | Support the Spatial Data Support System (SDSS) prioritizing conservation actions. | NR | ONGOING | COVERED | X | X | X | X | X |
| 3.1.2- C | Conduct desert tortoise predator assessments (mostly raven, coyote). | NR | ANNUALLY | COVERED | X | X | X | X | X |
| 3.1.2-D | Investigate effects of contaminants on desert tortoise health. | NR | FYs 18-19 | COVERED | X | X | | | |
| | **Objective 3.1.3 - Perform health assessments to further the Combat Center's knowledge of desert tortoise health aboard the installation** | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY19** | **FY20** | **FY21** | **FY 22** |
| 3.1.3-A | Perform health assessments on established plots, in restricted areas, and elsewhere on base as needed. | NR | ONGOING | COVERED | X | X | X | X | X |
| 3.1.3-B | Perform necropsies on desert tortoises to detect trends for mortality and emergent infectious diseases. | NR | ONGOING | COVERED | X | X | X | X | X |
| 3.1.3-C | Maintain awareness of emergent desert tortoise health issues. | NR | ONGOING | COVERED | X | X | X | X | X |
| | **Objective 3.1.4 - Minimize tortoise injury and mortality aboard the Combat Center** | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY19** | **FY20** | **FY21** | **FY 22** |
| 3.1.4 - A | Develop a Raven Management Plan. | NR | FY 18 | COVERED | X | | | | |
| 3.1.4 - B | Apply for and maintain a MBTA depredation permit for ravens. | NR | ANNUALLY | NFA | X | x | x | x | x |

| | **Objective 3.1.5 - Operate TRACRS to contribute to the recovery and eventual delisting of the desert tortoise** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY19** | **FY20** | **FY21** | **FY 22** |
| 3.1.5- A | Manage the TRACRS facility. | NR | ONGOING | COVERED | X | X | X | X | X |
| 3.1.5- B | Monitor desert tortoise nests for growth. | NR | ONGOING | COVERED | X | X | X | X | X |
| 3.1.5- C | Monitor release of desert tortoises. | NR | ONGOING | COVERED | X | X | X | X | X |
| | **Objective 3.1.6 - Implement the following required provisions from the Biological Opinion for Desert Tortoise: General Conservation Measures, Reasonable and Prudent Measures, Terms and Conditions, Conservation Recommendations; and required provisions from the 2017 SEIS** | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY19** | **FY20** | **FY21** | **FY 22** |
| 3.1.6-A | Conduct line distance sampling to monitor tortoise density and recovery in the Ord/Rodman ACEC. | NR | ANNUALLY | COVERED | X | X | X | X | X |
| 3.1.6-B | Maintain a record of all observations of desert tortoise encountered at the Combat Center. | NR | ONGOING | COVERED | X | X | X | X | X |
| 3.1.6-C | Provide an annual report to the USFWS, due March 31, which summarizes all required reporting information outlined in the B.O. | NR | ANNUALLY | COVERED | X | X | X | X | X |
| 3.1.6-D | Install OHV barriers, rehabilitate unauthorized route, and maintain over time, in the Ord/Rodman ACEC. | NR | ONGOING | COVERED | X | X | X | X | X |
| 3.1.6-E | Perform post-translocation monitoring. | NR | ONGOING | COVERED | X | X | X | X | X |
| 3.1.6-F | Perform post-translocation research. | NR | ONGOING | COVERED | X | X | X | X | X |
| 3.1.6-G | Conduct regular patrols of translocation recipient sites. | CLEO | ONGOING | COVERED | X | X | X | X | X |
| | **Objective 3.1.7 - Improve desert tortoise population numbers aboard the installation and support recovery of the population aboard the installation and in adjacent recovery unit; apply appropriate land-use restrictions to high-density tortoise population areas aboard the installation that balance training and natural and fiscal resource requirements.** | | | | | | | | |

| Task No. | Task Description | Lead Entity | Timeframe | NEPA Status | FY 18 | FY19 | FY20 | FY21 | FY 22 |
|---|---|---|---|---|---|---|---|---|---|
| 3.1.7- A | Develop a population augmentation initiative with USFWS and CDFW. | NR | FY 18 | COVERED | X | X | X | | |
| 3.1.7- B | Use the habitat assessment study to identify habitat quality variables that influence the tortoise and may be positively influenced aboard the installation. | NR | ONGOING | COVERED | X | X | X | X | X |
| **Element 3.2 - Other Sensitive Species** | | | | | | | | | |
| **Objective 3.2.1 - Comply with the Migratory Bird Treaty Act and its implementing regulations while meeting mission requirements** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY19** | **FY20** | **FY21** | **FY 22** |
| 3.2.1- A | Provide an annual report, required by the Special Purpose Permit, to continue authorization to relocate nests and transport sick or injured birds. | NR | ANNUALLY | COVERED | X | X | X | X | X |
| 3.2.1- B | Expand burrowing owl surveys, including the expansion area. | NR | FY 20 | COVERED | | | X | X | |
| 3.2.1-C | Place anti-roosting and anti-nesting devices, as appropriate, on facilities in training areas, and Mainside. | NR | ONGOING | NFA | X | X | X | X | X |
| **Objective 3.2.2 - Comply with the Bald Eagle and Golden Eagle Protection Act and its implementing regulations** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY19** | **FY20** | **FY21** | **FY 22** |
| 3.2.2- A | Conduct regular aerial surveys for eagles within range training areas. | NR | 2 consecutive years, every 5 years | COVERED | | X | X | | |
| 3.2.2- B | Identify and monitor eagle nesting locations. | | | | | | | | |
| **Objective 3.2.3 - Ensure conservation benefits can be provided for candidate species which occur on base and are proposed for federal listing by developing species-specific conservation plans** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY19** | **FY20** | **FY21** | **FY 22** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3.2.3-A | Maintain awareness of emerging candidate species for federal listing. | NR | PRIOR TO LISTING | COVERED | X | X | X | X | X |
| 3.2.3-B | Develop a management plan in coordination with USFWS to address any species approved for listing. | NR | YEAR 1 OF LISTING | COVERED | TBD | TBD | TBD | TBD | TBD |

## GOAL 4: Support Other Uses and Engagement

### Element 4.1 - Outdoor Recreation

**Objective 4.1.1 - Support the access and sustainable use of on-base natural resources by the general public and military interest groups by establishing a hunting program**

| Task No. | Task Description | Lead Entity | Timeframe | NEPA Status | FY 18 | FY19 | FY20 | FY21 | FY 22 |
|---|---|---|---|---|---|---|---|---|---|
| 4.1.1- A | Identify game management priorities for a hunting program. | NR & CLEP | FY 18 | COVERED | X | | | | |
| 4.1.1- B | Provide on-base hunter safety training. | CLEP | ONGOING start FY19 | COVERED | | X | X | X | X |
| 4.1.1- C | Develop a CCO on hunting. | CLEP | FY 19 | NFA | | | X | | |

**Objective 4.1.2 - Support the access and sustainable use of on-base natural resources by the general public and military interest groups by identifying and developing other outdoor recreational opportunities on the Combat Center**

| Task No. | Task Description | Lead Entity | Timeframe | NEPA Status | FY 18 | FY19 | FY20 | FY21 | FY 22 |
|---|---|---|---|---|---|---|---|---|---|
| 4.1.2-A | Develop formal outdoor recreational plan. | NR | | COVERED | | | X | | |
| 4.1.2- B | Develop, as outlined in plan, a multi-use area for outdoor education and recreation activities. | NR | FYs 19-21 | NFA | | X | X | X | |
| 4.1.2- C | Identify other potential recreation opportunities. | NR | ONGOING | COVERED | X | X | X | X | X |

### Element 4.2 - Conservation Law Enforcement

**Objective 4.2.1 - Operate a Conservation Law Enforcement Program to prevent exploitation of the natural resources from occurring on the installation**

| Task No. | Task Description | Lead Entity | Timeframe | NEPA Status | FY 18 | FY19 | FY20 | FY21 | FY 22 |
|---|---|---|---|---|---|---|---|---|---|
| 4.2.1-A | Develop CLEO SOPs. | CLEP | FY 18 | COVERED | X | | | | |
| 4.2.1-B | Annually review CLEO SOPs. | CLEP | ANNUALLY | COVERED | | X | X | X | X |
| 4.2.1-C | Monitor for natural resources degradation and exploitation, and reduce illegal trespass, OHV activity, and lawlessness in range training areas. | CLEP | ONGOING | COVERED | X | X | X | X | X |
| 4.2.1-D | Conduct investigations of violations of Natural Resources law and take appropriate action. | CLEP | ONGOING | COVERED | X | X | X | X | X |
| 4.2.1-E | Ensure all CLEOs are certified in Federal Law Enforcement Training Center's (FLETC) Land Management Police Training (LMPT). | CLEP | ONGOING | COVERED | X | X | X | X | X |
| 4.2.1-F | Send CLEOs to relevant workshops put on by the Desert Tortoise Council. | CLEP | ONGOING | COVERED | X | X | X | X | X |
| 4.2.1-G | Provide all CLEOs with regular training in resources to enhance their skillset. | CLEP | ONGOING | COVERED | X | X | X | X | X |
| 4.2.1-H | Develop and maintain CLEO resources monitoring reference books in electronic and hardcopy formats. | NR | ANNUALLY | COVERED | X | X | X | X | X |
| 4.2.1-I | Develop and implement an agreement with BLM regarding patrol of translocation recipient sites. | NR | FY 18 | COVERED | X | X | X | X | X |
| **Element 4.3 - Environmental Awareness** | | | | | | | | | |
| **Objective 4.3.1: Encourage awareness of natural resources for internal stakeholders** | | | | | | | | | |
| **Task No.** | **Task Description** | **Lead Entity** | **Timeframe** | **NEPA Status** | **FY 18** | **FY19** | **FY20** | **FY21** | **FY 22** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 4.3.1- A | Update/revise the contractor field briefing video. | NR | ANNUALLY | COVERED | X | X | X | X | X |
| 4.3.1-B | Revise range briefings and develop appropriate handouts. | NR | ANNUALLY | COVERED | | X | X | X | X |
| 4.3.1-C | Provide natural resources information at on-base community outreach events. | NR | ONGOING | COVERED | X | X | X | X | X |
| 4.3.1-D | Develop a natural resources education program for the curation center to host for the marine community (backyard birding, earth day, guided hikes, get to know your species, desert ecology lectures, etc.…). | NR | FY 18; then ONGOING | COVERED | X | X | X | X | X |
| 4.3.1-E | Develop a Native American plant use outreach interpretive module. | NR | FY 18 | COVERED | X | | | | |
| 4.3.1-F | Update EA website | NR | ONGOING | COVERED | X | X | X | X | X |
| 4.3.1-G | Assess the condition of interpretive signage on-base; replace and add additional signage as necessary. | NR | ONGOING | NFA | X | X | X | X | X |
| 4.3.1-H | Maintain a volunteer program for community to assist EA with general functions (taxidermy, support with marsh bird monitoring and desert tortoise tracking, seed collection, weed treatments, etc.…) | NR | ONGOING | COVERED | X | X | X | X | X |
| 4.3.1-I | Develop a volunteer management plan identifying tasks, opportunities (internships), etc.… to secure external support for NR initiatives. | NR | FY 18 | COVERED | X | | | | |
| 4.3.1-J | Develop a pollinator initiative aboard the Combat Center. | NR | ONGOING | COVERED | X | X | X | X | X |
| | **Objective 4.3.2 - Encourage awareness of natural resources for external stakeholders** | | | | | | | | |

| Task No. | Task Description | Lead Entity | Timeframe | NEPA Status | FY 18 | FY19 | FY20 | FY21 | FY 22 |
|---|---|---|---|---|---|---|---|---|---|
| 4.3.2- A | Provide natural resources information at external community outreach events. | NR | ONGOING | COVERED | X | X | X | X | X |
| 4.3.2- B | Develop an Educational Outreach Plan working with local leaders, communities and groups to promote awareness of environmental sensitivity and responsible OHV use. | GEA | ONGOING | COVERED | X | X | X | X | X |

## Workplan Key

| | |
|---|---|
| **Task No.** | Coding for the task no. developed using the following approach:<br>Goal #. Element #. Ob. # - Task Letter |
| **Task Description** | This section provides a general discussion of the proposed task. |
| **Lead Entity** | The entities identified in the workplan include:<br>CG - Commanding General<br>CLEP - Conservation Law Enforcement Program<br>EA - Environmental Affairs<br>GEA - Government and External Affairs<br>MA - Mission Assurance<br>MTD - MAGTFTC training directorate<br>NR - Natural Resources<br>PWD - Public Works Department<br>RTAMS - Range Training and Maintenance<br>SELF - Sustained Expeditionary Landing Field |
| **Timeframe** | The different types of project timeframes are described below:<br>ONGOING - happens more than once a year over multiple years<br>ANNUALLY - happens once a year over multiple years<br>EVERY X YEARS - recurs on a regular, multi-year frequency<br>FY(s) - One-time events, identified by the fiscal year(s) in which they are planned. |
| **NEPA Status** | COVERED - task is covered by INRMP analysis (or is already covered by another NEPA analysis; we are considering that all actions identified as "covered" have minimal negative impacts on the environment and therefore can be analyzed here, even if already analyzed under another document).<br>NFA - Needs future (later) analysis |
| **FY 18 - FY 22** | This is the 5 Year Schedule for project implementation. It reflects two things - the years in which funding requests are planned, and the years in which implementation activities may occur. Coding is described below.<br><br>$#, ### - Funding requests currently budgeted in STEP are identified in dollars under the year in which the request is planned<br><br>X - indicates planned implementation activities (without a specific FY fund request)<br><br>TBD - indicates "to be determined," this code indicates a funding request, and/or general implementation activity, may occur at a later time. |

# APPENDIX B
# Environmental Assessment

**Document to be included during final printing.**

# APPENDIX C

## Plant Species

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| **Pteridaceae** | | | | |
| | *Cheilanthus parryi* | Parry's Lip Fern | | 2 |
| | *Notholaena parryi* | Cloak-fern | | 1 |
| **Ephedraceae** | | | | |
| | *Ephedra aspera* | Boundary Ephedra | | 1, 9 |
| | *Ephedra californica* | California Ephedra | | 1, 9 |
| | *Ephedra funerea* | Death Valley Ephedra | | 1 |
| | *Ephedra nevadensis* | Nevada Ephedra | | 1 |
| | *Ephedra viridis* | Green Ephedra | | 1 |
| **Aizoaceae** | | | | |
| * | *Mesembryanthemum nodiflorum* | Slender-leaved iceplant | | 1 |
| * | *Sesuvium verrucosum* | Western Sea-purslane | | 1 |
| **Amaranthaceae** | | | | |
| * | *Amaranthus albus* | Tumbleweed | | 1 |
| | *Amaranthus blitoides* | Procumbent Amaranth | | 1 |
| | *Amaranthus fimbriatus* | Fringed Amaranth | | 1 |
| | *Tidestromia oblongifolia* | Honeysweet | | 1 |
| **Apiaceae** | | | | |
| | *Cymopterus mulitnervatus* | Purple-nerve Cymopterus | CRPR 2B.2 | 1 |
| | *Cymopterus panamintensis var. acutifolius* | Panamint Springparsley | | 1 |
| | *Lomatium parryi* | Parry's Lomatium | | 1 |
| **Apocynaceae** | | | | |
| | *Amsonia tomentosa* | Woolly Bluestar | | 1 |
| | *Asclepias albicans* | White-stemmed Milkweed | | 1 |
| | *Asclepias erosa* | Desert Milkweed | | 1, 9 |
| | *Asclepias subulata* | Rush Milkweed | | 1 |
| | *Funastrum crispum* | Rigid Climbing Milkweed | | 1 |
| | *Funastrum utahense* | Utah Vine Milkweed | CRPR 4.2 | 1, 2, 5, 8, 9 |
| | *Matelea parvifolia* | Spearleaf | CRPR 2B.3 | 2, 5, 8 |
| **Asteraceae** | | | | |
| | *Acamptopappus sphaerocephalus var. hirtellus* | Hairy Rayless Goldenhead | | 1 |
| | *Adenophyllum cooperis* | Cooper's Dogweed | | 1 |
| | *Adenophyllum porophylloides* | San Felipe Dogweed | | 1 |
| | *Ambrosia acnathicarpa* | Annual Bur-sage | | 1 |

| | Scientific Name | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Ambrosia dumosa* | White Bur-sage | | 1, 8, 9 |
| | *Ambrosia salsola var. salsola* | Cheesebush | | 1, 8, 9 |
| | *Anisocoma acaulis* | Scalebud | | 1 |
| | *Atrichoseris platyphylla* | Parachute Plant | | 1, 9 |
| | *Baccharis brachyphylla* | Shortleaf Baccharis | | 1 |
| | *Bahiopsis parishii* | Parhish's Goldeneye | | 1, 9 |
| | *Baileya multiradiata* | Many Ray Desert Marigold | | 1 |
| | *Baileya pauciradiata* | Short Ray Desert Marigold | | 1, 9 |
| | *Baileya pleniradiata* | Woolly Desert Marigold | | 1 |
| | *Bebbia juncea var. aspera* | Sweetbush | | 1, 8, 9 |
| | *Brickellia atractyloides var. arguta* | Pungent Brickelbush | | 1 |
| | *Brickellia californica* | California Brickelbush | | 1 |
| | *Brickellia desertorum* | Desert Brickelbush | | 1, 9 |
| | *Brickellia incana* | Woolly Brickelbush | | 1 |
| | *Calycoseris parryi* | Yellow Tack-stem | | 1, 9 |
| | *Chaenactis carphoclinia var. carphoclinia* | Pebble Pincushion | | 1 |
| | *Chaenactis fremontii* | Fremont's Pincushioni | | 1, 9 |
| | *Chaenactis stevioides* | Desert Pincushion | | 1, 9 |
| | *Dicoria canescens* | Desert Twinbugs | | 1, 8 |
| * | *Dimorphotheca sinuata* | Namaqualand Cape Marigold | | 1 |
| | *Encelia actoni* | Acton's Encelia | | 1 |
| | *Encelia farinosa* | Brittlebush | | 1, 8, 9 |
| | *Encelia frutescens* | Rayless Encelia | | 1, 8 |
| | *Encelia virginensis* | Virgin River Encelia | | 9 |
| | *Ericameria coooperi var. cooperi* | Cooper's Goldenbush | | 9 |
| | *Ericameria cuneata var. spathulata* | Wide Wedgeleaf Goldenbush | | 1 |
| | *Ericameria paniculata* | Spreading Rabbitbush | | 1 |
| | *Erigeron canadensis* | Horseweed | | 1 |
| | *Erigeron divergens* | Spreading Daisy | | 1 |
| | *Eriophyllum lanosum* | Heavy Woolly Sunflower | | 9 |
| | *Eriophyllum mohavense* | Barstow Woolly Sunflower | CRPR 1B.2 | 5, 8 |
| | *Eriophyllum wallacei* | Wallace's Woolly Sunflower | | 1, 9 |
| | *Geraea canescens* | Desert Sunflower | | 1, 9 |
| | *Glyptopleura marginata* | Carveseed | | 1 |
| | *Gutierrezia microcephala* | Sticky Snakeweed | | 1 |
| | *Gutierrezia sarothrae* | Matchweed | | 1 |
| | *Heterotheca grandiflora* | Telegraph Weed | | 1 |
| | *Isocoma acradenia* | Alkali Goldenbush | | 1 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| * | *Lactuca serriola* | Prickly Lettuce | | 1 |
| | *Laennecia coulteri* | Coulter's Horseweed | | 1 |
| | *Lasthenia glabrata ssp. coulteri* | Coulter's Goldfields | CRPR 1B.1 | 2, 5, 8 |
| | *Layia glandulosa* | White Tidy-tips | | 1, 9 |
| | *Lepidospartum squamatum* | California Broomsage | | 1 |
| | *Leptosyne bigelovii* | Bigelow's Tickseed | | 1, 9 |
| | *Leptosyne californica* | California Tickseed | | 1 |
| | *Logfia arizonica* | Arizona Cottonrose | | 1 |
| | *Logfia depressa* | Dented Cottonrose | | 1 |
| | *Logfia filaginoides* | California Cottonrose | | 1, 9 |
| | *Malacothrix californica* | California Desert Dandelion | | 1 |
| | *Malacothrix coulteri* | Coulter's Desert Dandelion | | 1 |
| | *Malacothrix glabrata* | Smooth Desert Dandelion | | 1, 9 |
| | *Monoptilon bellidiforme* | Daisy Desertstar | | 1 |
| | *Monoptilon bellioides* | Mojave Desertstar | | 1, 9 |
| | *Nicolletia occidentalis* | Hole-in-the-sand Plant | | 1 |
| | *Palafoxia arida var. arida* | Desert Palafox | | 1, 9 |
| | *Pectis papposa var. papposa* | Chich-weed | | 1 |
| | *Perityle emoryi* | Emory's Rock Daisy | | 1, 9 |
| | *Peucephyllum schotti* | Schott's Pygmycedar | | 1 |
| | *Pleurocoronis pluriseta* | Bush Arrowleaf | | 1 |
| | *Pluchea sericea* | Arrow-weed | | 1 |
| | *Porphyllum gracile* | Slender Odora | | 1 |
| | *Prenanthella exigua* | Brightwhite | | 1 |
| | *Psathyrotes ramosissima* | Hairy Turtleback | | 1, 9 |
| * | *Pseudognaphalium luteoalbum* | White Lamb Everlasting | | 1 |
| | *Psilostrophe cooperi* | Whitestem Paperflower | | 9 |
| | *Rafinesquia neomexica* | Desert Chicory | | 1, 9 |
| | *Senecio flaccidus var. monoensis* | Smooth Threadleaf Ragwort | | 1 |
| | *Senecio mohavensis* | Mojave Ragwort | | 1 |
| * | *Sonchus oleraceus* | Common Sow Thistle | | 1 |
| | *Stephanomeria exigua ssp. exigua* | Small Wire-lettuce | | 1 |
| | *Stephanomeria pauciflora* | Few Flower Wire-lettuce | | 1, 9 |
| | *Stylocline micopoides* | Desert Neststraw | | 1 |
| | *Symphyotrichum subulatum* | Annual Saltmarsh Aster | | 1 |
| | *Syntrichopappus fremontii* | Fremont's Syntrichopappus | | 1 |
| | *Taraxacum officinale* | Common Dandelion | | 1 |
| | *Tetradymia spinosa* | Short Spine Horsebrush | | 1 |
| | *Trichoptilium incisum* | Yellowdome | | 1 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Trixis californica var. californica* | California Trixis | | 1 |
| | *Xylorhiza tortifolia var. tortifolia* | Mojave-aster | | 1, 9 |
| **Bignoniaceae** | | | | |
| | *Chilopsis linearis ssp. arcuata* | Desert Willow | T1 | 1, 4, 5, 9 |
| **Boraginaceae** | | | | |
| | *Amsinckia menziesii* | Menzies's Fiddleneck | | 1 |
| | *Amsinckia tessellata* | Bristly Fiddleneck | | 8, 9 |
| | *Amsinckia tessellata var. tessellata* | Bristly Fiddleneck | | 1 |
| | *Cryptantha angustifolia* | Narrow-leaved Cryptantha | | 1 |
| | *Cryptantha barbigera* | Bearded Cryptantha | | 1, 9 |
| | *Cryptantha circumscissa* | Cushion Cryptantha | | 1, 9 |
| | *Cryptantha costata* | Ribbed Cryptantha | CRPR 4.3 | 2, 5, 8 |
| | *Cryptantha decipiens* | Gravel Cryptantha | | 1 |
| | *Cryptantha dumetorum* | Scrambing Cryptantha | | 1, 9 |
| | *Cryptantha holoptera* | Winged Cryptantha | CRPR 4.3 | 1, 2, 5, 8 |
| | *Cryptantha maritima* | Guadalupe Cryptantha | | 1 |
| | *Cryptantha micrantha var. micrantha* | Red-root Cryptantha | | 1, 9 |
| | *Cryptantha nevadensis* | Nevada Cryptantha | | 1, 9 |
| | *Cryptantha pterocarya* | Wingnut Cryptantha | | 1, 9 |
| | *Cryptantha racemosa* | Shrubby Cryptantha | | 1 |
| | *Cryptantha utahensis* | Scented Cryptantha | | 1 |
| | *Emmananthe peduliflora var. penduliflora* | Whispering Bells | | 1, 9 |
| | *Eucrypta chrysanthemifolia var. bepinnatifida* | Spotted Hideseed | | 1 |
| | *Eucrypta micrantha* | Dainty Desert Hideseed | | 1 |
| | *Heliotropium convolvulaceum var. californicum* | Morning-glory Heliotrope | | 1 |
| | *Heliotropium curassavicum var. oculatum* | Alkali Heliotrope | | 1 |
| | *Nama demissum var. demissum* | Coville's Weak Purple Mat | | 1, 9 |
| | *Nama hsipidum var. spathulatum* | Rough Purple Mat | | 1 |
| | *Nama pusillum* | Eggleaf Purple Mat | | 1 |
| | *Pectocarya heterocarpa* | Mixed-nut Pectocarya | | 1 |
| | *Pectocarya platycarpa* | Wide-toothed Pectocarya | | 1, 9 |
| | *Pectocarya recurvata* | Arched-nut Pectocarya | | 1, 9 |
| | *Phacelia calthifolia* | Calthaleaf Phacelia | | 1 |
| | *Phacelia crenulata* | Cleft Leaf Phacelia | | 9 |
| | *Phacelia crenulata var. ambigua* | Hidden Cleft  Leaf Phacelia | | 1 |
| | *Phacelia crenulata var. crenulata* | Cleft Leaf Phacelia | | 1 |
| | *Phacelia crenulata var. minutiflora* | Small Flower Phacelia | | 1 |
| | *Phacelia cryptantha* | Hidden Flower Phacelia | | 1 |

| | Scientific Name | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Phacelia distans* | Wild Heliotrope Phacelia | | 1 |
| | *Phacelia fremontii* | Fremont's Phacelia | | 1 |
| | *Phacelia neglecta* | Alkali Phacelia | | 1 |
| | *Phacelia pachyphylla* | Blacktack Phacelia | | 1 |
| | *Phacelia pedicellata* | Pedicellate Phacelia | | 1 |
| | *Phacelia rotundifolia* | Round Leaf Phacelia | | 1 |
| | *Phacelia tanacetifolia* | Lacy Phacelia | | 9 |
| | *Plagiobothrys arizonicus* | Arizona Popcornflower | | 9 |
| | *Plagiobothrys jonesii* | Mojave Popcornflower | | 1 |
| | *Tiquillia nuttallii* | Annual Crinklemat | | 1 |
| | *Tiquillia plicata* | Fan-leaved Crinklemat | | 1 |
| **Brassicaceae** | | | | |
| | *Boechera inyoensis* | Inyo Rockcress | | 1 |
| * | *Brassica tournefortii* | Sahara Mustard | | 1, 3, 4, 6, 7, 8, 9 |
| * | *Capsella bursa-pastoris* | Shepard's Purse | | 1 |
| | *Caulanthus cooperi* | Cooper's Jewelflower | | 1 |
| | *Caulanthus lasiophyllus* | Woolly Leaf Jewelflower | | 1, 9 |
| | *Descurainia pinnata* | Tansymustard | | 8, 9 |
| | *Descurainia pinnata ssp. glabra* | Hairless Western Tansymustard | | 1 |
| | *Descurainia sophia* | Wise Tansymustard | | 1 |
| | *Dithyrea californica* | California Spectaclepod | | 1 |
| | *Draba cuneifolia* | Wedgeleaf Draba | | 1 |
| * | *Hirschfeldia incana* | Shortpod Mustard | | 1, 8 |
| | *Lepidium flavum* | Yellow Pepper-grass | | 9 |
| | *Lepidium fremontii* | Desert Pepper-grass | | 1, 9 |
| | *Lepidium lasiocarpum ssp. lasiocarpum* | Shaggy Fruit Pepper-grass | | 1 |
| | *Lepidium thurberi* | Thurber's Pepper-grass | | 9 |
| * | *Sisymbrium altissimum* | Tumble Mustard | | 3, 8 |
| * | *Sisymbrium irio* | London Rocket | | 1, 3, 7 |
| * | *Sisymbrium orientale* | Indian Hedgemustard | | 1 |
| | *Stanleya pinnata* | Desert Prince's Plume | | 1, 9 |
| | *Streptanthella longirostris* | Longbeak Streptanthella | | 1 |
| | *Thysanocarpus curvipes* | Curvy Fringepod | | 1 |
| | *Thysanocarpus laciniatus* | Nothc Fringepod | | 1 |
| **Cactaceae** | | | | |
| | *Coryphantha alversonii* | Foxtail Cactus | | 1, 5, 8, 9 |
| | *Cylindropuntia acanthocarpa* | Buckhorn Cholla | | 9 |
| | *Cylindropuntia bigelovii* | Teddy-bear Cholla | | 9 |

| | Scientific Name | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Cylindropuntia echinocarpa* | Silver Cholla | | 1, 9 |
| | *Cylindropuntia ramosissima* | Diamond Cholla | | 1, 9 |
| | *Cylindropuntia wigginsii* | Wiggin's Cholla | CRPR 3.3 | 1 |
| | *Echinocactus polycephalus var. polycephalus* | Cottontop Cactus | | 1, 9 |
| | *Echinocactus engelmannii* | Engelmann's Hedgehog Cactus | | 1, 9 |
| | *Ferocactus cylindraceus* | California Barrel Cactus | | 1, 5, 8 |
| | *Mammillaria dioica* | White Fishhook Cactus | | 9 |
| | *Mammillaria tetrancistra* | Fringe Petal Fishhook Cactus | | 1 |
| | *Opuntia basilaris var. basilaris* | Beavertail Cactus | | 1, 9 |
| | *Sclerocactus polyancistrus* | Mojave Fish-hook Cactus | CRPR 4.2 | 2, 5, 8 |
| **Campanulaceae** | | | | |
| | *Nemacladus glanduliferus* | Glandular Threadplant | | 1, 9 |
| | *Nemacladus rubescens* | Desert Threadplant | | 1 |
| | *Nemacladus sigmoideus* | Sigmoid Threadplant | | 1 |
| **Caryophyllaceae** | | | | |
| | *Achyronychia cooperi* | Onyx Flower | | 1 |
| | *Spergularia marina* | Saltmarsh Sand-spurrey | | 2 |
| **Cleomaceae** | | | | |
| | *Cleomella obtusifolia* | Mojave Stinkweed | | 1 |
| | *Peritoma arborea* | Bladderpod | | 1, 9 |
| | *Wislizenia refracta ssp. refracta* | Jackass-clover | CRPR 2B.2 | 1, 2, 5, 8 |
| **Chenopodiaceae** | | | | |
| | *Allenrolfea occidentalis* | iodinebush | | 1 |
| | *Atriplex canescens var. canescens* | Four-wing Saltbush | | 1, 8, 9 |
| | *Atriplex confertifolia* | Shadscale | | 1, 8 |
| | *Atriplex elegans* | Wheelscale | | 1 |
| | *Atriplex hymenelytra* | Desert-holly | | 1, 8 |
| | *Atriplex lentiformis* | Big Saltbush | | 1, 9 |
| | *Atriplex polycarpa* | Allscale Saltbush | | 1, 8, 9 |
| * | *Atriplex rosea* | Tumbling Saltbush | | 1 |
| * | *Atriplex semibaccata* | Australian Saltbush | | 1 |
| * | *Bassia hyssopifolia* | Fivehorn Smotherweed | | 1, 9 |
| * | *Chenopodium album* | Lamb's Quarters | | 1, 8 |
| * | *Chenopodium murale* | Nettleleaf Goosefoot | | 1 |
| * | *Cycloloma atriplicifolium* | Winged Pigweed | | 1 |
| | *Grayia spinosa* | spiny Hopsage | | 1, 9 |
| | *Krascheninnikovia lanata* | Winter Fat | | 1 |
| | *Monolepis nuttalliana* | Nuttall's Povery Weed | | 1 |
| * | *Salsola paulsenii* | Paulsen's Russian Thistle | | 1, 6 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| * | *Salsola tragus* | Prickly Russian Thistle | | 1, 3, 6, 7, 8 |
| | *Suaeda nigra* | Black Seablite | | 1, 8, 9 |
| **Crassulaceae** | | | | |
| | *Dudleya saxosa ssp. saxosa* | Panamint Dudleya | CRPR 1B.3 | 5, 8 |
| **Crossosomataceae** | | | | |
| | *Crossosoma bigelovii* | Ragged Rockflower | | 1 |
| **Cucurbitaceae** | | | | |
| | *Brandegea bigelovii* | Desert Starvine | | 1 |
| | *Cucurbita palmata* | Coyote Melon | | 1, 9 |
| **Cuscutaceae** | | | | |
| | *Cuscuta denticulata* | Small-toothed Dodder | | 1 |
| **Euphorbiaceae** | | | | |
| | *Croton californicus* | California Croton | | 1, 9 |
| | *Ditaxis neomexicana* | New Mexico Silverbush | | 1, 9 |
| | *Ditaxis serrata* | California Ditaxis | | 1 |
| | *Euphorbia abramsiana* | Abram's Spurge | CRPR 2B.2 | 2 |
| | *Euphorbia albomarginata* | White Margine Spurge | | 1, 9 |
| * | *Euphorbia maculata* | Spotted Spurge | | 1 |
| | *Euphorbia micromera* | Sonoran Spurge | | 1 |
| | *Euphorbia ocellata ssp. arenicola* | Ring Sand Spurge | | 1 |
| | *Euphorbia parryi* | Parry's Spurge | CRPR 2B.3 | 2 |
| | *Euphorbia polycarpa* | Many Seed Spurge | | 1 |
| | *Euphorbia revoluta* | Revolute Spurge | CRPR 4.3 | 2 |
| | *Euporbia setiloba* | Yuma Spurge | | 1 |
| | *Stillingia linearifolia* | Thin Leaf Toothleaf | | 1 |
| | *Stillingia spinulosa* | Annual Toothleaf | | 1 |
| **Fabaceae** | | | | |
| | *Acmispon brachycarpus* | Short Fruit Lotus | | 1 |
| | *Acmispon strigosus* | Strigose Lotus | | 1, 9 |
| | *Astragalus acutirostris* | Sharpkeel Milkvetch | | 1 |
| | *Astragalus didymocarpus var. dispermus* | Two Seeded Milkvetch | | 1 |
| | *Astragalus layneae* | Layne Milkvetch | | 1 |
| | *Astragalus lentiginosis var. fremontii* | Fremont's Freckled Milkvetch | | 1, 9 |
| | *Dalea mollis* | Hairy Prairie Clover | | 1, |
| | *Dalea mollissima* | Soft Prairie Clover | | 1 |
| | *Lupinus arizonicus* | Arizona Lupine | | 1 |
| | *Lupinus bicolor* | Miniature Lupine | | 9 |
| | *Lupinus concinnus* | Bajada Lupine | | 1 |

| | Scientific Name | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Lupinus shockleyi* | Shockley's Lupine | | 1 |
| | *Lupinus sparsiflorus* | Coulter's Lupine | | 9 |
| | *Marina parryi* | Parry's False Prairie-clover | | 1 |
| * | *Medicago lupulina* | Black Burclover | | 1 |
| * | *Melilotus indicus* | Indian Sweetclover | | 1 |
| | *Parkinsonia aculeata* | Mexican Palo Verde | | 1 |
| | *Parkinsonia florida* | Blue Palo Verde | | 1, 4 |
| | *Prosopis glandulosa var. torreyana* | Honey Mesquite | T1 | 1, 8, 9 |
| | *Psorothamnus arborescens var. simplicifolius* | Simple Leaved Mojave Indigo-bush | | 1 |
| | *Psorothamnus emoryi* | Emory's Indigo-bush | | 1, 9 |
| | *Psorothamnus polydenius* | Nevada Indigo-bush | | 1 |
| | *Psorothamnus spinosus* | Smoke Tree | | 1, 8, 9 |
| | *Senegalia greggii* | Catclaw Acacia | | 1, 8, 9 |
| | *Senna armata* | Spiny Senna | | 1, 8, 9 |
| **Geraniaceae** | | | | |
| * | *Erodium cicutarium* | Redstem Filaree | | 1, 3, 7, 8, 9 |
| | *Erodium texanum* | Texas Filaree | | 1, 9 |
| **Krameriaceae** | | | | |
| | *Krameria bicolor* | White Rhatany | | 1, 9 |
| | *Krameria erecta* | Pima Rhatany | | 1 |
| **Lamiaceae** | | | | |
| | *Condea emoryi* | Desert Lavender | | 1, 8, 9 |
| | *Monardella robisonii* | Robison's Monardella | CRPR 1B.3 | 2, 5, 8 |
| | *Salvia columbariae* | Chia | T1 | 1, 9 |
| | *Salvia mohavensis* | Mojave Sage | | 1 |
| | *Scutellaria mexicana* | Mexican Skullcap | | 1, 9 |
| **Lennoaceae** | | | | |
| | *Pholisma arenarium* | Desert Christmas Tree | | 1 |
| **Loasaceae** | | | | |
| | *Mentzelia affinis* | White Blazing Star | | 1, 9 |
| | *Mentzelia albicaulis* | White Stem Blazing Star | | 1 |
| | *Mentzelia involucrata* | White Bract Blazing Star | | 1, 9 |
| | *Mentzelia obscura* | Pacific Blazing Star | | 9 |
| | *Mentzelia oreophila* | Argus Blazing Star | | 1 |
| | *Mentzelia tridentata* | Creamy Blazing Star | | 10 |
| | *Petalonyx thurberi ssp. thurberi* | Thurber's Sandpaper Plant | | 1 |
| **Malvaceae** | | | | |
| | *Eremalche exilis* | White Mallow | | 1 |

| | Scientific Name | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Eremalche rotundifolia* | Desert Fivespot | | 1, 9 |
| * | *Malva neglecta* | Common Mallow | | 9 |
| * | *Malva parviflora* | Cheeseweed | | 1 |
| | *Sidalcea neomexicana* | Salt Spring Checkerbloom | CRPR 2B.2 | 5, 8 |
| | *Sphaeralcea ambigua var. ambigua* | Apricot Mallow | | 1, 9 |
| | *Sphaeralcea angustifolia* | Narrow-leaved Mallow | | 1 |
| | *Sphaeralcea emoryi var. emoryi* | Emory's Globemallow | | 1 |
| **Molluginaceae** | | | | |
| * | *Mollugo cerviana* | Threadstem Carpetweed | | 1 |
| **Montiaceae** | | | | |
| | *Calyptridium monandrum* | Common Pussypaws | | 1 |
| | *Cistanthe ambigua* | Desert Cistanthe | | 1 |
| **Nyctaginaceae** | | | | |
| | *Abronia villosa* | Desert Sand-verbena | | 8, 9 |
| | *Abronia villosa var. villosa* | Desert Sand-verbena | | 1 |
| | *Allionia incarnata* | Trailing Windmills | | 1, 9 |
| | *Boerhavia triquetra var. intermedia* | Fivewing Ringstem | | 1 |
| | *Boerhavia wrightii* | Wright's Ringstem | | 1 |
| | *Mirabilis laevis var. retrorsa* | Desert Wishbone | | 1, 9 |
| | *Mirabilis laevis var. villosa* | Hairy Wishbone | | 1 |
| **Oleaceae** | | | | |
| | *Menodora spinescens* | Spiny Twinberry | | 1 |
| **Onagraceae** | | | | |
| | *Camissonia campestris ssp. campestris* | Mojave Suncup | | 1, 9 |
| | *Camissoniopsis pallida ssp. hallii* | Hall's Suncup | | 1 |
| | *Chylismia brevipes ssp. brevipes* | Golden Suncup | | 1, 9 |
| | *Chylismia cardiophylla ssp. cardiophylla* | Heartleaf Suncup | | 1 |
| | *Chylismia calviformis ssp. aurantiaca* | Orange Cutleaf Suncup | | 1, 9 |
| | *Eremothera boothii ssp. boothii* | Booth's Evening-primrose | CRPR 2B.3 | 2, 5, 8, 9 |
| | *Eremothera boothii ssp. condensata* | Dense Evening-primrose | | 1 |
| | *Eremothera chamaenerioides* | Longcapsule Evening-primrose | | 1 |
| | *Eremothera refracta* | Narrowleaf Evening-primrose | | 1 |
| | *Eulobus californicus* | False-mustard | | 9 |
| * | *Oenothera curtiflora* | Shortened Evening-primrose | | 1 |
| | *Oenothera deltoides ssp. deltoides* | Basket Evening-primrose | | 1, 9 |
| | *Oenothera primiveris ssp. bufonis* | Desert Toad Evening-primrose | | 1 |
| **Orobanchaceae** | | | | |
| | *Orobanche cooperii* | Cooper's Broom-rape | | 1 |
| **Papaveraceae** | | | | |

| | Scientific Name | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Argemone corymbosa* | Mojave Pricklypoppy | | 1, 9 |
| | *Argemone munita* | Chicalote | | 1 |
| | *Eschscholzia glyptosperma* | Desert Poppy | | 1, 9 |
| | *Eschscholzia minutiflora* | Pygmy Poppy | | 1, 9 |
| | *Eschscholzia parishii* | Parish's Poppy | | 1 |
| **Phrymaceae** | | | | |
| | *Mimulus bigelovii* | Bigelow's Monkeyflower | | 1, 9 |
| | *Mimulus pilosus* | Downy Monkeyflower | | 9 |
| **Plantaginaceae** | | | | |
| | *Antirrhinum filipes* | Desert Snapdragon | | 1 |
| | *Mohavea breviflora* | Mojave Ghost Flower | | 1 |
| | *Mohavea confertiflora* | Sonoran Ghost Flower | | 1 |
| | *Penstemon albomarginatus* | White-margined Beardtongue | CRPR 1B.1 | 1, 2, 5, 8 |
| | *Penstemon clevelandii var. mohavensis* | Cleveland's Mojave Beardtongue | | 1 |
| | *Penstemon pseudospectabilis* | Desert Beardtonge | CRPR 2B.2 | 1 |
| | *Penstemon thurberi* | Thurber's Beardtongue | CRPR 4.2 | 2, 5, 8 |
| * | *Plantago lanceolata* | English Plantain | | 3, 8 |
| | *Plantago ovata* | Desert Plantain | | 1, 9 |
| * | *Veronica anagallis-aquatica* | Water Speedwell | | 1 |
| **Polemoniaceae** | | | | |
| | *Aliciella leptomeria* | Sand Aliciella | | 1 |
| | *Aliciella micromeria* | Dainty Aliciella | | 1 |
| | *Eriastrum diffusum* | Miniature Woollystar | | 1, 9 |
| | *Eriastrum eremicum ssp. eremicum* | Desert Woollystar | | 1 |
| | *Eriastrum harwoodii* | Harwood's Eriastrum | CRPR 1B.2 | 8 |
| | *Eriastrum sparsiflorum* | Few-flowered Eriastrum | CRPR 4.3 | 1 |
| | *Eriastrum wilcoxii* | Wilcox's Woollystar | | 1 |
| | *Gilia aliquanta ssp. aliquanta* | Puffcalyx Gilia | | 5 |
| | *Gilia latiflora* | Broad Flowered gilia | | 1 |
| | *Gilia latiflora var. davyi* | Davy's Broad Flowered gilia | | 1 |
| | *Gilia minor* | Little Gilia | | 9 |
| | *Gilia scopulorum* | Rock Gilia | | 1 |
| | *Gilia sinuata* | Rosy Gilia | | 1 |
| | *Gilia stellata* | Star Gilia | | 1, 9 |
| | *Ipomopsis polycladon* | Many Branched Ipomopsis | | 1 |
| | *Langloisia setosissima ssp. punctata* | Lilac Sunbonnet | | 1, 9 |
| | *Leoptosiphon aureus ssp. aureus* | Golden Leptosiphon | | 1 |
| | *Linanthus arenicola* | Sand Linanthus | | 1, 5 |
| | *Linanthus demissus* | Desert Snow | | 1 |

| | Scientific Name | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Linanthus filiformis* | Yellow Linanthus | | 1 |
| | *Linanthus jonesii* | Jone's Linanthus | | 1 |
| | *Loeseliastrum matthewsii* | Desert Calico | | 1, 9 |
| | *Loeseliastrum schottii* | Schott's Calico | | 1 |
| **Polygonaceae** | | | | |
| | *Chorizanthe brevicornu var. brevicornu* | Brittle Spineflower | | 1, 9 |
| | *Chorizanthe corrugata* | Wrinkled Spineflower | | 1 |
| | *Chorizanthe rigida* | Rigid Spineflower | | 1, 9 |
| | *Chorizanthe spinosa* | Mojave Spineflower | CRPR 4.2 | 2, 5, 8 |
| | *Chorizanthe xanti var. leucotheca* | White-bracted Spineflower | CRPR 1B.2 | 5, 8 |
| | *Eriogonum brachyanthum* | Short-flower Buckwheat | | 1 |
| | *Eriogonum brachypodum* | Parry's Buckwheat | | 1 |
| | *Eriogonum deflexum var. deflexum* | Reflexed Buckwheat | | 1, 9 |
| | *Eriogonum fasciculatum* | California Buckwheat | | 8, 9 |
| | *Eriogonum fasciculatum var. poliofolium* | Mojave Desert Buckwheat | | 1 |
| | *Eriogonum inflatum* | Desert Trumpet | | 1, 9 |
| | *Eriogonum maculatum* | Spotted Buckwheat | | 1, 9 |
| | *Eriogonum nidularium* | Birdnest Buckwheat | | 1, 9 |
| | *Eriogonum pusillum* | Yellow Turbans | | 1 |
| | *Eriogonum reniforme* | Kidney-leaf Buckwheat | | 1 |
| | *Eriogonum thomasii* | Thomas' Buckwheat | | 1, 9 |
| | *Eriogonum trichopes* | Little Desert Trumpet | | 1 |
| | *Eriogonum viridescens* | Greenish Buckwheat | | 1 |
| | *Eriognonum wrightii var. nodosum* | Knotstem Wright's Buckwheat | | 1 |
| | *Oxytheca perfoliata* | Round-leaf Puncturebract | | 1 |
| * | *Polygonum argyrocoleon* | Persian Knotweed | | 1 |
| * | *Polygonum aviculare ssp. depressum* | Dented Oval Leaf Knotweed | | 1 |
| | *Rumex hymenosepalus* | Fleshy Dock | | 1 |
| **Portulacaceae** | | | | |
| | *Portulaca halimoides* | Desert Portulaca | CRPR 4.2 | 2, 5, 8 |
| **Ranunculaceae** | | | | |
| | *Delphinium parishii ssp. parishii* | Parish's Larkspur | | 1 |
| **Resedaceae** | | | | |
| | *Oligomeris linifolia* | Lineleaf Whitepuff | | 1 |
| **Rosaceae** | | | | |
| | *Coleogyne ramosissima* | Blackbrush | | 1, 8 |
| | *Prunus fasciculata var. fasciculata* | Desert Almond | | 1 |
| | *Purshia tridentata* | Antelope Bush | | 9 |
| **Rubiaceae** | | | | |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Galium angustifolium ssp. gracillimum* | Slender Bedstraw | CRPR 4.2 | 1, 2, 5, 8, 9 |
| | *Galium stellatum* | Starry Bedstraw | | 1 |
| **Rutaceae** | | | | |
| | *Thamnosma montana* | Turpentine Bush | | 1, 9 |
| **Salicaceae** | | | | |
| | *Populus fremontii ssp. fremontii* | Fremont's Cottonwood | T1 | 1, 4 |
| | *Salix gooddingii* | Goodding's Black Willow | | 1 |
| **Simaroubaceae** | | | | |
| | *Castela emoryi* | Emory's Crucifixion-thorn | CRPR 2B.2 | 1, 2, 8 |
| **Simmondsiaceae** | | | | |
| | *Simmondsia chinensis* | Jojoba | T1 | 1 |
| **Solanaceae** | | | | |
| | *Datura wrightii* | Wright's Jimsonweed | T1 | 1 |
| | *Lycium andersonii* | Anderson's Box-thorn | | 1, 9 |
| | *Lycium cooperii* | Cooper's Box-thorn | | 1 |
| | *Nicotiana obtusifolia* | Desert Tobacco | T1 | 1, 9 |
| | *Physalis crassifolia* | Yellow Nightshade | | 1, 9 |
| | *Physalis lobata* | Lobed Ground-cherry | CRPR 2B.3 | 2, 5, 8 |
| **Tamaricaceae** | | | | |
| * | *Tamarix aphylla* | Athel Tamarix | | 1, 3, 4, 6, 7 |
| * | *Tamarix ramosissima* | Hairy Tamarix | | 1, 3, 4, 6, 7, 8 |
| **Urticaceae** | | | | |
| | *Parietaria hespera var. hespera* | Western Pellitory | | 1 |
| **Verbenaceae** | | | | |
| | *Verbena gooddingii* | Gooding's Vervain | | 1 |
| **Viscaceae** | | | | |
| | *Phorodendron californicum* | Desert Mistletoe | | 1, 9 |
| **Zygophyllaceae** | | | | |
| | *Fagonia laevis* | California Fagonbush | | 1 |
| | *Kallstroemia californica* | California Caltrop | | 1 |
| | *Larrea tridentata* | Creosote Bush | T1 | 1, 8, 9 |
| * | *Tribulus terrestris* | Puncturevine | | 1, 8 |
| **Agavaceae** | | | | |
| | *Hesperocallis undulata* | Desert Lily | | 9 |
| | *Yucca brevifolia* | Joshua Tree | | 1, 8, 9 |
| | *Yucca schidigera* | Mojave yucca | | 1, 8, 9 |
| **Alliaceae** | | | | |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Allium parishii* | Parish's Onion | CRPR 4.3 | 1, 2, 5, 8 |
| **Liliaceae** | | | | |
| | *Calochortus kennedyi var. kennedyi* | Desert Mariposa Lily | | 1 |
| **Cyperaceae** | | | | |
| | *Bolboschoenus robustus* | Seacoast Bulrush | | 1 |
| | *Cyperus esculentus* | Edible Flatsedge | | 1 |
| **Melanthiaceae** | | | | |
| | *Toxicoscordion brevibracteatum* | Desert Death Camas | | 1 |
| **Poaceae** | | | | |
| | *Aristida adscensionis* | Sixweeks Three-awn | | 1 |
| | *Aristida californica* | California Three-awn | | 1 |
| | *Aristida purpurea var. parishii* | Parish three-awn | | 1 |
| | *Aristida purpurea var. purpurea* | Purple Three-awn | | 1 |
| * | *Avena barbata* | Slender wild Oat | | 1 |
| | *Bouteloua aristidoides var. aristidoides* | Needle Grama | | 1 |
| | *Bouteloua barbata var. barbata* | Sixweeks Grama | | 1 |
| | *Bromus arizonicus* | Arizona Brome | | 1 |
| * | *Bromus catharticus* | Rescuegrass | | 1 |
| * | *Bromus madritensis ssp. rubens* | Red Brome | | 1, 3, 7, 8, 9 |
| * | *Bromus tectorum* | Cheat Grass | | 1, 8 |
| * | *Chloris virgata* | Feather Finger Grass | | 1 |
| * | *Cynodon dactylon* | Bermuda Grass | | 1 |
| | *Dasyochloa pulchella* | Low Woollygrass | | 1 |
| * | *Digitaria sp.* | Crabgrass | | 3, 8 |
| * | *Digitaria sanguinalis* | Hairy Cottontop | | 1 |
| | *Distichlis spicata* | Salt Grass | | 1, 9 |
| * | *Echinochloa crus-galli* | Barnyard Cockspurgrass | | 1 |
| * | *Festuca myuros* | Rattail Fescue | | 1 |
| | *Festuca octoflora* | Eight Flowered Fescue | | 1 |
| | *Hilaria rigida* | Big Galleta | | 1, 8 |
| | *Hordeum depressum* | Low Barley | | 9 |
| * | *Hordeum murinum* | Wall Barley | | 1, 3, 7 |
| | *Leptochloa fusca ssp. univervia* | Mexican Sprangletop | | 1 |
| | *Muhlenbergia microsperma* | Littleseed Muhly | | 1 |
| | *Muhlenbergia porteri* | Bush Muhly | | 1 |
| * | *Phalaris aquatica* | Harding Grass | | 1, 3, 7 |
| * | *Poa annua* | Annual Blue Grass | | 1 |
| * | *Polypogon monspeliensis* | Rabbit Foot Beard Grass | | 1 |
| * | *Schismus arabicus* | Arabian Schismus | | 1, 3, 7, 8 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| * | *Schismus barbatus* | Mediterranean Schismus | | 1, 3, 6, 7, 8, 9 |
| | *Sporobolus cryptandrus* | Sand Dropseed | | 1 |
| | *Stipa hymenoides* | Indian Rice Grass | | 1, 8, 9 |
| | *Stipa speciosa* | Desert Needle Grass | | 1, 9 |
| **Themidaceae** | | | | |
| | *Androstephium breviflorum* | Small-flowered Androstephium | CRPR 2B.2 | 2 |
| | *Muilla coronata* | Crowned Muilla | CRPR 4.2 | 1, 2, 5, 8 |
| **Typhaceae** | | | | |
| | *Typha domingensis* | Southern Cattail | | 1 |
| | *Typha latifolia* | Broad-leaved Cattail | | 1 |

***Federal***
R Taxon removed from Candidate status (no present compliance status).
***Tribes***
T1 Species of interest/concern as identified by tribes.
***State***
CR State-listed as Rare.
CC Candidate for State listing.
***California Rare Plant Ranks*** (CRPR)
*Inventory of Rare and Endangered Vascular Plants of California:*
1B Rare or endangered in California and elsewhere.
2 Rare or endangered in California, but more common elsewhere.
3 Need more information (a review list).
4 Plants of limited distribution (watch list).
***CRPR Threat Ranks***
.1 - Seriously endangered in California
.2 – Fairly endangered in California
.3 – Not very endangered in California
Reference:
1 Elvin, Mark A. 2000. Rare Plant Survey and Floristic Inventory. Tierra Data Systems. January 2000.
2 AgriChemical & Supply, Inc. 2006. Sensitive Plant Surveys Final Report. July 2006.
3 AgriChemical & Supply, Inc. 2005. Invasive Non-Native Plant Survey Final Report. August 2005.
4 AgriChemical & Supply, Inc. 2008. Exotic Pest Plant Treatment on Marine Corps Air Ground Combat Center, Twentynine Palms, CA Final Report. February 2008.
5 Marine Air Ground Task Force training Command (MAGTFTC). 2006. Integrated Natural Resources management Plan and Environmental Assessment. Fiscal Years 2002-2006.
6 Marine Air Ground Task Force Training Command. 2008. Invasive Plant Species Management Plan.
7 Tierra Data, Inc. 2009. MCAGCC Twentynine Palms Historic Invasive Species Survey of the Western Training Areas. November 2009.
8 Marine Corps Air Ground Combat Center (MCAGCC). 2012. Final Environmental Impact Statement, Land Acquisition and Airspace Establishment to Support Large-Scale Marine Air Ground Task Force Live Fire and Maneuver Training. July 2012.
9 ICF Jones & Stokes. 2009. Twentynine Palms Proposed Western and Southern, Base Expansion Areas; Rare and Sensitive Plant Surveys Final Report. July 2009.
10 Vegetation Map of Expansion Area; in progress, Vernadero, 2018.

# APPENDIX D

## Wildlife Species

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| **Invertebrates** | | | | |
| | *Branchinecta lindahli* | Versatile Fairy Shrimp | | 2 |
| | *Branchia potens* | Solpugid | | 13 |
| | *Eremobates ajoanus* | Solpugid | | 13 |
| | *Eremochelis morrisi* | Solpugid | | 13 |
| | *Eremorhax titania* | Solpugid | | 13 |
| | *Eremocosta titania* | Solpugid | | 13 |
| | *Hermerotrecha branchi* | Solpugid | | 13 |
| | *Order Opiliones* | Daddy Long Legs | | 13 |
| | *Aphonopelma iodius* | Amblypigid | | 13 |
| | *Paruroctonus mesaensis* | Scorpion | | 13 |
| | *Family Araneidae* | Orb Weaver | | 13 |
| | *Gnaphosa sp.* | Stealthy Ground Spider | | 13 |
| | *Family Lycosidae* | Wolf Spider | | 13 |
| | *Syspira tigrina* | Prowling Spider | | 13 |
| | *Peucelia viridans* | Lynx Spider | | 13 |
| | *Philodromus sp.* | Running Crab Spider | | 13 |
| | *Psilochorus sp.* | Cellar Spider | | 13 |
| | *Family Salticidae* | Jumping Spider | | 13 |
| | *Loxosceles deserta* | Violin (Recluse) Spider | | 13 |
| | *Misumenops rothi* | Crab Spider | | 13 |
| | *Order Isopoda* | Desert Pillbug | | 13 |
| | *Family Poduridae* | Springtail | | 13 |
| | *Leucolepisma arenaria* | Silverfish | | 13 |
| | *Machilis sp.* | Jumping Bristletail | | 13 |
| | *Baetidae sp.* | Minnow Mayfly | | 13 |
| | *Pachydiplax longipennis* | Blue Dasher | | 13 |
| | *Erythemis collocata* | Western Pondhawk | | 13 |
| | *Sympetrum corruptum* | Variegated Meadowhawk | | 13 |
| | *Pantala hymenaea* | Spot-winged Glider | | 13 |
| | *Pantala flavescens* | Wandering Glider | | 13 |
| | *Family Libellulidae* | Skimmer | | 13 |
| | *Family Coenagrionidae* | Damselfly | | 13 |
| | *Enallagma civile* | Familiar Bluet | | 13 |
| | *Aeoloplides tenuipennis* | Grasshopper | | 13 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Anconia integra* | Grasshopper | | 13 |
| | *Bootettix argentatus* | Creosote Bush Grasshopper | | 13 |
| | *Cibolacris parviceps* | Grasshopper | | 13 |
| | *Liguroteltix coquilletti* | Grasshopper | | 13 |
| | *Melanoplus yarrowi* | Grasshopper | | 13 |
| | *Parapomala pallida* | Grasshopper | | 13 |
| | *Poecilotettix sanguineus* | Grasshopper | | 13 |
| | *Schistocerca sp.* | Grasshopper | | 13 |
| | *Trimerotropis pallidipennis* | Pallid-winged Grasshopper | | 13 |
| | *Trimerotropis pseudofasciata* | Grasshopper | | 13 |
| | *Trimerotropis rebellis* | Grasshopper | | 13 |
| | *Tytthotyle maculata* | Grasshopper | | 13 |
| | *Acheta assimilis* | Cricket | | 13 |
| | *Acheta domestica* | House Cricket | | 13 |
| | *Anaxipha sp.* | Cricket | | 13 |
| | *Subfamily Nemobiinae* | Cricket | | 13 |
| | *Ceuthophilus sp.* | Camel Cricket | | 13 |
| | *Tanaocerus koebellii* | Grasshopper | | 13 |
| | *Capnobotes fuliginosus* | Sooty-winged Katydid | | 13 |
| | *Eremopedes bilineatus* | Katydid | | 13 |
| | *Insara covilleae* | Katydid | | 13 |
| | *Blatta orientalis* | Oriental Cockroach | | 13 |
| | *Periplaneta sp.* | Cockroach | | 13 |
| | *Arenivaga sp.* | Desert Cockroach | | 13 |
| | *Eremoblatta subdiaphana* | Cockroach | | 13 |
| | *Litaneutra minor* | Minor Ground Mantid | | 13 |
| | *Iris oratoria* | Mediterranean Mantid | | 13 |
| | *Stagmomantis californica* | California Mantid | | 13 |
| | *Order Isoptera* | Termite | | 13 |
| | *Family Phasmatidae* | Walking Stick | | 13 |
| | *Oligotoma nigra* | Black Webspinner | | 13 |
| | *Orius tristicolor* | Minute Pirate Bug | | 13 |
| | *Apiomeris sp.* | Minute Pirate Bug | | 13 |
| | *Family Berytidae* | Stilt Bug | | 13 |
| | *Family Coreidae* | Leaf-footed Bug | | 13 |
| | *Corisella decolor* | Water Boatmen | | 13 |
| | *Pangaeus congruus* | Burrower Bug | | 13 |
| | *Cydnidae sp.* | Burrower Bug | | 13 |
| | *Largus californicus* | California Plant Bug | | 13 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Geocoris pallens* | Seed Bug | | 13 |
| | *Lygaeus kalmii* | Small Milkweed Buc | | 13 |
| | *Neacoryphus lateralis* | Seed Bug | | 13 |
| | *Nysius tenellus* | Seed Bug | | 13 |
| | *Pseudopamera nitidula* | Seed Bug | | 13 |
| | *Chlamyclatus monilipes* | Plant Bug | | 13 |
| | *Hadronema princeps* | Plant Bug | | 13 |
| | *Haplomachides consors* | Plant Bug | | 13 |
| | *Lopidea confraterna* | Plant Bug | | 13 |
| | *Panthenicus picicollis* | Plant Bug | | 13 |
| | *Phytocoris ramosus* | Plant Bug | | 13 |
| | *Phytocoris ingens* | Plant Bug | | 13 |
| | *Taylorilgus pallidulus* | Plant Bug | | 13 |
| | *Tropidosteptes sp.* | Plant Bug | | 13 |
| | *Nabis americoferus* | Damsel Bug | | 13 |
| | *Buenos sp.* | Back Swimmer | | 13 |
| | *Notonecta indica* | Back Swimmer | | 13 |
| | *Chlorochroa sayi* | Say Stink Bug | | 13 |
| | *Dendrocoris contaminatus* | Stink Bug | | 13 |
| | *Tepa brevis* | Stink Bug | | 13 |
| | *Thyanta pallidorvirens* | Stink Bug | | 13 |
| | *Thyanta custator* | Stink Bug | | 13 |
| | *Family Phymatidae* | Ambush Bug | | 13 |
| | *Apiomeris sp.* | Bee Assassin | | 13 |
| | *Paratriatoma hirsuta* | Assassin Bug | | 13 |
| | *Triatoma protracta* | Western Bloodsucking Conenose | | 13 |
| | *Zelus renardii* | Assassin Bug | | 13 |
| | *Arhyssus lateralis* | Scentless Plant Bug | | 13 |
| | *Harmostes reflexus* | Scentless Plant Bug | | 13 |
| | *Liorhyssus hyalinus* | Scentless Plant Bug | | 13 |
| | *Saldula pallipea* | Shore Bug | | 13 |
| | *Family Tingidae* | Lace Bug | | 13 |
| | *Family Aphiidae* | Aphid | | 13 |
| | *Family Cercopidae* | Spittlebug | | 13 |
| | *Norvellina sp.* | Leafhopper | | 13 |
| | *Xerophloea peltata* | Leafhopper | | 13 |
| | *Okanagana vanduzeei* | Cicada | | 13 |
| | *Oecieus decens* | Cixiid Planthopper | | 13 |
| | *Family Delphacidae* | Delphacid Planthopper | | 13 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Family Dictyopharidae* | Dictyopharid Planthopper | | 13 |
| | *Ormenis saucia* | Flatid Planthoppere | | 13 |
| | *Micrutalis sp.* | Treehopper | | 13 |
| | *Multareis cornutus* | Treehopper | | 13 |
| | *Multareoides befurcatus* | Treehopper | | 13 |
| | *Family Psyllidae* | Psyllid (Jumping Plantlice) | | 13 |
| | *Coniopteryx sp.* | Dusty-wing | | 13 |
| | *Neoconis sp.* | Dusty-wing | | 13 |
| | *Chrysopa coloradensis* | Green Lacewing | | 13 |
| | *Chrysoperia comanche* | Green Lacewing | | 13 |
| | *Chrysoperia phlorabunda* | Green Lacewing | | 13 |
| | *Eremochrysa tibialis* | Green Lacewing | | 13 |
| | *Eremochrysa punctinervis* | Green Lacewing | | 13 |
| | *Pimarchrysa albicostales* | Green Lacewing | | 13 |
| | *Micromus variolosus* | Brown Lacewing | | 13 |
| | *Sympherobius killingtoni* | Brown Lacewing | | 13 |
| | *Sympherobius perparvus* | Brown Lacewing | | 13 |
| | *Megalomus moestus* | Brown Lacewing | | 13 |
| | *Plega sp.* | Mantispid | | 13 |
| | *Plega signata* | Mantispid | | 13 |
| | *Brachynemurus pulchellus* | Antlion | | 13 |
| | *Brachynemurus sackeni* | Antlion | | 13 |
| | *Clathroneuria couquilleti* | Antlion | | 13 |
| | *Clathroneuria schwarzi* | Antlion | | 13 |
| | *Eremoleon insipidus* | Antlion | | 13 |
| | *Eremoleon nigribasis* | Antlion | | 13 |
| | *Gnopholeon barberi* | Antlion | | 13 |
| | *Gnopholeon delicatulus* | Antlion | | 13 |
| | *Myrmeleon arizonicus* | Antlion | | 13 |
| | *Myrmeleon californicus* | Antlion | | 13 |
| | *Paranthaclisis congener* | Antlion | | 13 |
| | *Paranthaclisis hageni* | Antlion | | 13 |
| | *Paranthaclisis nevadensis* | Antlion | | 13 |
| | *Scotoleon carrizonus* | Antlion | | 13 |
| | *Scotoleon eiseni* | Antlion | | 13 |
| | *Scotoleon deflexus* | Antlion | | 13 |
| | *Scotoleon expansus* | Antlion | | 13 |
| | *Scotoleon fidelitas* | Antlion | | 13 |
| | *Scotoleon intermedius* | Antlion | | 13 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Scotoleon longipalpus* | Antlion | | 13 |
| | *Scotoleon minusculus* | Antlion | | 13 |
| | *Scotoleon minutus* | Antlion | | 13 |
| | *Scotoleon pallidus* | Antlion | | 13 |
| | *Scotoleon quadripunctatus* | Antlion | | 13 |
| | *Scotoleon singularis* | Antlion | | 13 |
| | *Scotoleon yavapai* | Antlion | | 13 |
| | *Tyttholeon puerilis* | Antlion | | 13 |
| | *Xeranobium sp.* | Anobiid Beetle | | 13 |
| | *Family Anthicidae* | Antlike Flower Beetle | | 13 |
| | *Apatides fortis* | Twi-boring Beetle | | 13 |
| | *Family Bruchidae* | Seed Beetle | | 13 |
| | *Acmaeodera lanata* | Metallic Wood-boring Beetle | | 13 |
| | *Agrilus sp.* | Metallic Wood-boring Beetle | | 13 |
| | *Chrysobothris debilis* | Metallic Wood-boring Beetle | | 13 |
| | *Hippomelas obliterata* | Metallic Wood-boring Beetle | | 13 |
| | *Bembidion sp.* | Ground Beetle | | 13 |
| | *Calosoma peregrinator* | Ground Beetle | | 13 |
| | *Cicindela punctatus* | Tiger Beetle | | 13 |
| | *Aneflomorpha sp.* | Longhorn Beetle | | 13 |
| | *Derobrachus geminatus* | Longhorn Beetle | | 13 |
| | *Plionoma rubens* | Longhorn Beetle | | 13 |
| | *Neochlamisus sp.* | Leaf Beetle | | 13 |
| | *Saxinus saucia* | Red-shouldered Leaf Beetle | | 13 |
| | *Phyllotreta sp.* | Leaf Beetle | | 13 |
| | *Chaetocnema ectypa* | Leaf Beetle | | 13 |
| | *Pachybrachys desertus* | Leaf Beetle | | 13 |
| | *Stenopodius sp.* | Leaf Beetle | | 13 |
| | *Cymatodera punctata* | Cherckered Beetle | | 13 |
| | *Trichodes ornatus* | Cherckered Beetle | | 13 |
| | *Hippodamia convergens* | Convergent Lady Beetle | | 13 |
| | *Olla v-nigrum* | Lady Beetle | | 13 |
| | *Family Cryptophagidae* | Silken Fungus Beetle | | 13 |
| | *Ophryastes argentatus* | Weevil | | 13 |
| | *Apleurus angularis* | Weevil | | 13 |
| | *Family Dascillidae* | Soft-bodied Plant Beetle | | 13 |
| | *Anthrenus sp.* | Carpet Beetle | | 13 |
| | *Dermestes marmoratus* | Common Carrion Dermestid | | 13 |
| | *Trogoderma varlabile* | Skin Beetle | | 13 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Novelsis uteana* | Skin Beetle | | 13 |
| | *Family Dyticidae* | Predaceous Diving beetle | | 13 |
| | *Horistonotus sp.* | Click Beetle | | 13 |
| | *Aphricus sp.* | Click Beetle | | 13 |
| | *Aeolus sp.* | Click Beetle | | 13 |
| | *Heterocerus gnatho* | Variegated Mud-loving Beetle | | 13 |
| | *Saprinus sp.* | Hister Beetle | | 13 |
| | *Xerosaprinus* | Hister Beetle | | 13 |
| | *Troposterus lateralis* | Water Scavenger Beetle | | 13 |
| | *Berosus punctulatus* | Water Scavenger Beetle | | 13 |
| | *Cysteodemus armatus* | Blister Beetle | | 13 |
| | *Eupompha sp.* | Blister Beetle | | 13 |
| | *Lytta auriculata* | Blister Beetle | | 13 |
| | *Lytta magister* | Magisterial Blister Beetle | | 13 |
| | *Nemognatha macswaini* | Blister Beetle | | 13 |
| | *Nemognatha nigripennis* | Blister Beetle | | 13 |
| | *Pleurospasta mirabilis* | Blister Beetle | | 13 |
| | *Zonitis atripennis* | Blister Beetle | | 13 |
| | *Epicauta lauta* | Blister Beetle | | 13 |
| | *Epicauta tenella* | Blister Beetle | | 13 |
| | *Epicauta wheeleri* | Blister Beetle | | 13 |
| | *Meloe strigulosus* | Blister Beetle | | 13 |
| | *Tanaops sp.* | Soft-winged Flower Beetle | | 13 |
| | *Attalus difficilis* | Soft-winged Flower Beetle | | 13 |
| | *Anthobates nubulis* | Tumbling Flower Beetle | | 13 |
| | *Mordella albosutura* | Tumbling Flower Beetle | | 13 |
| | *Mordellistena sp.* | Tumbling Flower Beetle | | 13 |
| | *Family Nitidulidae* | Sap Beetle | | 13 |
| | *Family Oedemeridae* | False Blister Beetle | | 13 |
| | *Family Phengodidae* | Water-penny Beetle | | 13 |
| | *Subfamily Pedilinae* | Fire-colored Beetle | | 13 |
| | *Family Ripiphoridae* | Ripiphorid Beetle | | 13 |
| | *Aphodius lividus* | Scarab Beetle | | 13 |
| | *Cyclocephala longula* | Scarab Beetle | | 13 |
| | *Diplotaxis subangulata* | Scarab Beetle | | 13 |
| | *Diplotaxis moerens* | Scarab Beetle | | 13 |
| | *Ligyrus gibbosus* | Scarab Beetle | | 13 |
| | *Phobetus mojavus* | Scarab Beetle | | 13 |
| | *Belonuchus sp.* | Rove Beetle | | 13 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Cryptoglossa verrucosus* | Darkling Beetle | | 13 |
| | *Alleculina sp.* | Darkling Beetle | | 13 |
| | *Auchmobius picipes* | Darkling Beetle | | 13 |
| | *Centrioptera muricata* | Darkling Beetle | | 13 |
| | *Centrioptera laevis* | Darkling Beetle | | 13 |
| | *Chilometopon sp.* | Darkling Beetle | | 13 |
| | *Cnemodinus sp.* | Darkling Beetle | | 13 |
| | *Coniontis parviceps* | Darkling Beetle | | 13 |
| | *Edrotes ventricosus* | Darkling Beetle | | 13 |
| | *Eleodes armata* | Darkling Beetle | | 13 |
| | *Eupsophulus castaneus* | Darkling Beetle | | 13 |
| | *Eurymetopon sp.* | Darkling Beetle | | 13 |
| | *Hymenorus montivagus* | Darkling Beetle | | 13 |
| | *Melanastus sp.* | Darkling Beetle | | 13 |
| | *Metoponium sp.* | Darkling Beetle | | 13 |
| | *Philolithus actuosus* | Darkling Beetle | | 13 |
| | *Euchaetias zella* | Tiger Moth | | 13 |
| | *Givera mucida* | Goat Moth (Carpenterworm) | | 13 |
| | *Aroga paulalla* | Gelechiid Moth | | 13 |
| | *Arotrura sp.* | Gelechiid Moth | | 13 |
| | *Lita sp.* | Gelechiid Moth | | 13 |
| | *Animomyia smitha* | Measuringworm Moth | | 13 |
| | *Archirhoe neomexicana* | Measuringworm Moth | | 13 |
| | *Chesiadodes coniferaria* | Measuringworm Moth | | 13 |
| | *Chlorochlames appellaria* | Measuringworm Moth | | 13 |
| | *Dichorda rectaria* | Measuringworm Moth | | 13 |
| | *Eupithiecia deserticola* | Measuringworm Moth | | 13 |
| | *Glaucina erroraria* | Measuringworm Moth | | 13 |
| | *Lobocleta lanceolata* | Measuringworm Moth | | 13 |
| | *Lobocleta ossularia* | Measuringworm Moth | | 13 |
| | *Marmopteryx tessellata* | Measuringworm Moth | | 13 |
| | *Narraga timetaria* | Measuringworm Moth | | 13 |
| | *Nasusina minuta* | Measuringworm Moth | | 13 |
| | *Nemoria intensaria* | Emerald | | 13 |
| | *Platea diva* | Measuringworm Moth | | 13 |
| | *Semiothisa colorata* | Measuringworm Moth | | 13 |
| | *Semiothisa cyda* | Measuringworm Moth | | 13 |
| | *Yermola perplexata* | Measuringworm Moth | | 13 |
| | *Erynnis funeralis* | Funereal Duskywing | | 13 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Helioptes ericetorum* | Northern White-skipper | | 13 |
| | *Hylephila phyleus* | Fiery Skipper | | 13 |
| | *Lerodea eufala* | Eufala Skipper | | 13 |
| | *Pyrgus albescens* | Checkered-skipper | | 13 |
| | *Pyrgus scriptura* | Small Checkered-skipper | | 13 |
| | *Pholisora libya* | Sootywing | | 13 |
| | *Tegeticula yuccasella* | Yucca Moth | | 13 |
| | *Atlides halesus* | Great Purple Hairstreak | | 13 |
| | *Brephidium exilis* | Pygmy Blue | | 13 |
| | *Euphilotes enoptes* | Dotted Blue | | 13 |
| | *Euphilotes mojave* | Dotted Blue | | 13 |
| | *Euphilotes bernardino* | Dotted Blue | | 13 |
| | *Hemiargus ceraunus* | Ceraunus (Edward's) Blue | | 13 |
| | *Hemiargus isola* | Reakirt's Blue | | 13 |
| | *Icaricia (Plebejus) acmon* | Acmon Blue | | 13 |
| | *Leptotes marinus* | Marine Blue | | 13 |
| | *Strymon melinus* | Gray Hairstreak | | 13 |
| | *Abagrotis discoidalis* | Owlet Moth | | 13 |
| | *Abagrotis forbesi* | Owlet Moth | | 13 |
| | *Abagrotis nefascia* | Owlet Moth | | 13 |
| | *Abagrotis reedi* | Owlet Moth | | 13 |
| | *Acontia arida* | Owlet Moth | | 13 |
| | *Acontia disconecta* | Owlet Moth | | 13 |
| | *Acontia tetragonia* | Owlet Moth | | 13 |
| | *Allerastria albiciliata* | Owlet Moth | | 13 |
| | *Agrotis ipsilon* | Black Cutworm Moth | | 13 |
| | *Agrotis subterranea* | Owlet Moth | | 13 |
| | *Aseptis serrula* | Owlet Moth | | 13 |
| | *Autographa californica* | Owlet Moth | | 13 |
| | *Bulia deducta* | Owlet Moth | | 13 |
| | *Chalcopasta koebelei* | Owlet Moth | | 13 |
| | *Conochares acutus* | Owlet Moth | | 13 |
| | *Conochares arizonae* | Owlet Moth | | 13 |
| | *Copablepharon album* | Owlet Moth | | 13 |
| | *Cucullia cucullioides* | Owlet Moth | | 13 |
| | *Copicucullia antipoda* | Owlet Moth | | 13 |
| | *Copicucullia heinrichi* | Owlet Moth | | 13 |
| | *Dargida procincta* | Owlet Moth | | 13 |
| | *Discestra fulgora* | Owlet Moth | | 13 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Euanotia clarki* | Owlet Moth | | 13 |
| | *Euxoa auxiliaris* | Owlet Moth | | 13 |
| | *Euxoa oncocnemoides* | Owlet Moth | | 13 |
| | *Euxoa ovilalis* | Owlet Moth | | 13 |
| | *Euxoa recula* | Owlet Moth | | 13 |
| | *Euxoa silens* | Owlet Moth | | 13 |
| | *Grotella stretchi* | Owlet Moth | | 13 |
| | *Grotellaforma lactea* | Owlet Moth | | 13 |
| | *Hadenella pergentilis* | Owlet Moth | | 13 |
| | *Helionche pictipennis* | Owlet Moth | | 13 |
| | *Heliothis phloxiphagus* | Owlet Moth | | 13 |
| | *Heliothis zea* | Owlet Moth | | 13 |
| | *Heteranasia sp.* | Owlet Moth | | 13 |
| | *Hypopta palmata* | Owlet Moth | | 13 |
| | *Lacinipolia illaudabilis* | Owlet Moth | | 13 |
| | *Leucocnemis variabilis* | Owlet Moth | | 13 |
| | *Melipotis indamita* | Owlet Moth | | 13 |
| | *Melipotis jucunda* | Owlet Moth | | 13 |
| | *Mimoschinia rufofascialis* | Owlet Moth | | 13 |
| | *Neotarache deserticola* | Owlet Moth | | 13 |
| | *Nocloa pallens* | Owlet Moth | | 13 |
| | *Oligia marina* | Owlet Moth | | 13 |
| | *Oncocnemis primula* | Owlet Moth | | 13 |
| | *Oxycnemis fusimacula* | Owlet Moth | | 13 |
| | *Peridroma saucia* | Owlet Moth | | 13 |
| | *Ponometia macdunnoghi* | Owlet Moth | | 13 |
| | *Ponometia megocula* | Owlet Moth | | 13 |
| | *Protogygia biclavis* | Owlet Moth | | 13 |
| | *Provla argentata* | Owlet Moth | | 13 |
| | *Pseudanarta crocea* | Owlet Moth | | 13 |
| | *Rhynchagrotis formalis* | Owlet Moth | | 13 |
| | *Rhizagrotis cloanthoides* | Owlet Moth | | 13 |
| | *Schinia dobla* | Owlet Moth | | 13 |
| | *Schinia ligea* | Owlet Moth | | 13 |
| | *Spaelotis havilae* | Owlet Moth | | 13 |
| | *Spodoptera exigua* | Owlet Moth | | 13 |
| | *Spodoptera frugiperda* | Fall Armyworm Moth | | 13 |
| | *Synedoida fumosa* | Owlet Moth | | 13 |
| | *Synedoida tegonica* | Owlet Moth | | 13 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Toxonprucha volucris* | Owlet Moth | | 13 |
| | *Trichoplusia ni* | Cabbage Looper Moth | | 13 |
| | *Tridepia nova* | Owlet Moth | | 13 |
| | *Triocnemis saporis* | Owlet Moth | | 13 |
| | *Zale insuda* | Owlet Moth | | 13 |
| | *Furcula nivea* | Prominent Moth | | 13 |
| | *Charidryas neumogeni* | Brush-footed Butterfly | | 13 |
| | *Chlosyne californica* | California Patch | | 13 |
| | *Danaus gillippus* | Queen | | 13 |
| | *Danaus plexippus* | Monarch | | 13 |
| | *Euptoieta claudia* | Brush-footed Butterfly | | 13 |
| | *Lybithea bachmanii* | Snout Butterfly | | 13 |
| | *Precis coenia* | Common Buckeye | | 13 |
| | *Vanessa cardui* | Painted Lady | | 13 |
| | *Vanessa annabella* | West Coast Lady | | 13 |
| | *Papilio indra* | Indra Swallowtail | | 13 |
| | *Papilio polyxenes* | Black Swallowtail | | 13 |
| | *Anthocharis cethura* | Desert Orangetip | | 13 |
| | *Anthocharis sara* | Sara's Orangetip | | 13 |
| | *Colias eurytheme* | Alfalfa (Orange) Sulphur | | 13 |
| | *Euchloe hyantis* | Pearly Marble | | 13 |
| | *Euchloe niccippe* | Marble | | 13 |
| | *Nathalis iole* | Dainty Sulphur | | 13 |
| | *Pieris rapae* | Cabbage White | | 13 |
| | *Pontia protodice* | Common (Checkered) White | | 13 |
| | *Pontia beckeri* | Becker's White | | 13 |
| | *Phoebis sennae* | Senna (Cloudless) Sulphur | | 13 |
| | *Family Pterophoridae* | Pterophorid Moth | | 13 |
| | *Ypsolopha delicatella* | Diamondback Moth | | 13 |
| | *Oiketicus sp.* | Bagworm Moth | | 13 |
| | *Achyra occidentalis* | Pyralid Moth | | 13 |
| | *Achyra rantalis* | Pyralid Moth | | 13 |
| | *Arenochra flavalis* | Pyralid Moth | | 13 |
| | *Cahela ponderosella* | Pyralid Moth | | 13 |
| | *Euchromius ocelleus* | Pyralid Moth | | 13 |
| | *Evercestis comstocki* | Pyralid Moth | | 13 |
| | *Helvibotys pseudohelvialis* | Pyralid Moth | | 13 |
| | *Jocara trabalis* | Pyralid Moth | | 13 |
| | *Loxostege albiceralis* | Pyralid Moth | | 13 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Loxostege oberthuralis* | Pyralid Moth | | 13 |
| | *Loxostege sticticalis* | Pyralid Moth | | 13 |
| | *Nomophila nearctica* | Pyralid Moth | | 13 |
| | *Prorasea sideralis* | Pyralid Moth | | 13 |
| | *Pyrausta pseudonythesalis* | Pyralid Moth | | 13 |
| | *Ragonotia dotalis* | Pyralid Moth | | 13 |
| | *Spoladea recurvalis* | Pyralid Moth | | 13 |
| | *Apodemia mormo* | Mormon Metalmark | | 13 |
| | *Hemileuca burnsi* | Giant Silk Moth | | 13 |
| | *Erinnyis ello* | Hawk Moth | | 13 |
| | *Erinnyis obscura* | Hawk Moth | | 13 |
| | *Hyles lineata* | White-lined Sphinx | | 13 |
| | *Manduca quinquemaculata* | Tomato Hornworm Moth | | 13 |
| | *Acrolophus variabilis* | Tineid Moth | | 13 |
| | *Cydia latiferreans* | Tortricid Moth | | 13 |
| | *Eucosma sp.* | Tortricid Moth | | 13 |
| | *Family Agromyzidae* | Leafminer Fly | | 13 |
| | *Pegomya duplicata* | Anthomyiid Fly | | 13 |
| | *Apiocera pierci* | Flower-loving Fly | | 13 |
| | *Ablautus sp.* | Robber Fly | | 13 |
| | *Cerotainiops sp.* | Robber Fly | | 13 |
| | *Efferia sp.* | Robber Fly | | 13 |
| | *Protocanthella sp.* | Robber Fly | | 13 |
| | *Megaphorus frustrata* | Robber Fly | | 13 |
| | *Proctacanthus sp.* | Robber Fly | | 13 |
| | *Stichopogon sp.* | Robber Fly | | 13 |
| | *Backomyia sp.* | Robber Fly | | 13 |
| | *Itolia timberlakei* | Robber Fly | | 13 |
| | *Saropogon sp.* | Robber Fly | | 13 |
| | *Promachus sp.* | Robber Fly | | 13 |
| | *Haplopogon sp.* | Robber Fly | | 13 |
| | *Anthrax sp.* | Bee Fly | | 13 |
| | *Apoloysis sp.* | Bee Fly | | 13 |
| | *Aphoebantus sp.* | Bee Fly | | 13 |
| | *Bombylius sp.* | Bee Fly | | 13 |
| | *Chrysanthrax pertusus* | Bee Fly | | 13 |
| | *Eucessia sp.* | Bee Fly | | 13 |
| | *Exoprosopa sp.* | Bee Fly | | 13 |
| | *Geminaria sp.* | Bee Fly | | 13 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Geron sp.* | Bee Fly | | 13 |
| | *Lepidanthrax sp.* | Bee Fly | | 13 |
| | *Lordotus sp.* | Bee Fly | | 13 |
| | *Neodipiocampta sp.* | Bee Fly | | 13 |
| | *Ogcodocera sp.* | Bee Fly | | 13 |
| | *Oligodranes sp.* | Bee Fly | | 13 |
| | *Pantarbes sp.* | Bee Fly | | 13 |
| | *Phthiria sp.* | Bee Fly | | 13 |
| | *Poecilanthrax sp.* | Bee Fly | | 13 |
| | *Parabombylius sp.* | Bee Fly | | 13 |
| | *Thevenemyia sp.* | Bee Fly | | 13 |
| | *Thyridanthrax sp.* | Bee Fly | | 13 |
| | *Toxophora virgata* | Bee Fly | | 13 |
| | *Triploechus sp.* | Bee Fly | | 13 |
| | *Villa sp.* | Bee Fly | | 13 |
| | *Family Calliphoridae* | Blow Fly | | 13 |
| | *Asphondylia sp.* | Gall Midge | | 13 |
| | *Family Ceratopogonidae* | Biting Midge | | 13 |
| | *Family Chamaemyiidae* | Aphid Fly | | 13 |
| | *Family Chironomidae* | Midge | | 13 |
| | *Siphonella sp.* | Chloropid Fly | | 13 |
| | *Thaumatomyia rubida* | Chloropid Fly | | 13 |
| | *Family Culicidae* | Mosquito | | 13 |
| | *Family Cuterebridae* | Robust Bot Fly | | 13 |
| | *Hydrophorus sp.* | Long-legged Fly | | 13 |
| | *Drapetis sp.* | Dance Fly | | 13 |
| | *Ephydra sp.* | Brine Fly | | 13 |
| | *Mosillus tibialis* | Shore Fly | | 13 |
| | *Scatella paludum* | Shore Fly | | 13 |
| | *Family Heleomyzidae* | Heleomyzid Fly | | 13 |
| | *Family Lauxaniidae* | Lauxaniid Fly | | 13 |
| | *Family Lonchaeidae* | Spear-winged Fly | | 13 |
| | *Family Milichiidae* | Milichiid Fly | | 13 |
| | *Family Muscidae* | House Fly | | 13 |
| | *Family Mycetophilidae* | Fungus Gnat | | 13 |
| | *Opomydas sp.* | Mydas Fly | | 13 |
| | *Rhaphiomidas acton* | Flower-loving Fly | | 13 |
| | *Euxesta sp.* | Picture-winged Fly | | 13 |
| | *Family Pipunculidae* | Big-headed Fly | | 13 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Blaesoxipha plinthopyga* | Flesh Fly | | 13 |
| | *Metrichia bulbosa* | Window Fly | | 13 |
| | *Pherbella vitalis* | Marsh Fly | | 13 |
| | *Sepsis sp.* | Black Scavenger Fly | | 13 |
| | *Family Simuliidae* | Black Fly | | 13 |
| | *Family Sphaeroceridae* | Small Dung Fly | | 13 |
| | *Nemotelus arator* | Soldier Fly | | 13 |
| | *Dieuryneura stigma* | Soldier Fly | | 13 |
| | *Eristalis latifrons* | Flower Fly | | 13 |
| | *Syritta pipiens* | Flower Fly | | 13 |
| | *Eupeodes volucris* | Flower Fly | | 13 |
| | *Mallota sp.* | Flower Fly | | 13 |
| | *Meliscaeva sp.* | Flower Fly | | 13 |
| | *Chrysotoxum sp.* | Flower Fly | | 13 |
| | *Platycheirus stegnus* | Flower Fly | | 13 |
| | *Epistrophe sp.* | Flower Fly | | 13 |
| | *Tabanus punctifer* | Tachinid Fly | | 13 |
| | *Gymnosoma fuliginosum* | Tachinid Fly | | 13 |
| | *Microchaetina sp.* | Tachinid Fly | | 13 |
| | *Paradidyma sp.* | Tachinid Fly | | 13 |
| | *Phasia aldrichii* | Tachinid Fly | | 13 |
| | *Peleteria malleola* | Tachinid Fly | | 13 |
| | *Exorista sp.* | Tachinid Fly | | 13 |
| | *Chetogena sp.* | Tachinid Fly | | 13 |
| | *Trupanea jonesi* | Fruit Fly | | 13 |
| | *Euarestoides acutangulus* | Fruit Fly | | 13 |
| | *Thereva sp.* | Stiletto Fly | | 13 |
| | *Family Threophoridae* | Threophorid Fly | | 13 |
| | *Family Tipulidae* | Crane Fly | | 13 |
| | *Family Trixoscelididae* | Trixoscelidid Fly | | 13 |
| | *Ancylandrena sp.* | Andrenid Bee | | 13 |
| | *Andrena sp.* | Burrowing Bee | | 13 |
| | *Perdita sp.* | Andrenid Bee | | 13 |
| | *Megandrena enceliae* | Andrenid Bee | | 13 |
| | *Nomada sp.* | Cuckoo Bee | | 13 |
| | *Melissodes sp.* | Cuckoo Bee | | 13 |
| | *Diadasia sp.* | Cuckoo Bee | | 13 |
| | *Svastra sp.* | Cuckoo Bee | | 13 |
| | *Tetraloniella sp.* | Cuckoo Bee | | 13 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Xeromelecta californica* | Cuckoo Bee | | 13 |
| | *Xeromelecta larreae* | Cuckoo Bee | | 13 |
| | *Xylocopa sp.* | Cuckoo Bee | | 13 |
| | *Anthophora sp.* | Cuckoo Bee | | 13 |
| | *Centris sp.* | Cuckoo Bee | | 13 |
| | *Melecta sp.* | Cuckoo Bee | | 13 |
| | *Apis mellifera* | Honey Bee | | 13 |
| | *Anthophorula sp.* | Bee | | 13 |
| | *Idiomelissodes duplocincta* | Bee | | 13 |
| | *Family Argidae* | Argid Sawfly | | 13 |
| | *Family Bethylidae* | Bethylid Wasp | | 13 |
| | *Chelonus sp.* | Braconid Wasp | | 13 |
| | *Family Chrysididae* | Cuckoo Wasp | | 13 |
| | *Colletes sp.* | Yellow-faced (Plasterer) Bee | | 13 |
| | *Family Chalcididae* | Chalcid Wasp | | 13 |
| | *Family Cynipidae* | Gall Wasp | | 13 |
| | *Family Encyrtidae* | Encrytid Wasp | | 13 |
| | *Family Eulophidae* | Eulophid Wasp | | 13 |
| | *Family Eupelmidae* | Eupelmid Wasp | | 13 |
| | *Family Eurytomidae* | Seed Chalcid | | 13 |
| | *Crematogaster sp.* | Ant | | 13 |
| | *Leptothorax rugatulus* | Honey Ant | | 13 |
| | *Myrmecocystus kennedyi* | Honey Ant | | 13 |
| | *Myrmecocystus creightoni* | Honey Ant | | 13 |
| | *Monomorium minimum* | Ant | | 13 |
| | *Camponotus sp.* | Carpenter Ant | | 13 |
| | *Pogonomyrmex rugosus* | Harvester Ant | | 13 |
| | *Pogonomyrmex californicus* | California Harvester Ant | | 13 |
| | *Pogonomyrmex magnacanthus* | Harvester Ant | | 13 |
| | *Pseudomyrmex pallidus* | Ant | | 13 |
| | *Messor pergandei* | Black Harvester Ant | | 13 |
| | *Pheidole sp.* | Ant | | 13 |
| | *Iridomyrmex humulis* | Argentine Ant | | 13 |
| | *Dorymyrmex pyramicus* | Ant | | 13 |
| | *Dorymyrmex bicolor* | Ant | | 13 |
| | *Solenopsis xyloni* | Ant | | 13 |
| | *Family Ichneumonidae* | Ichneumonid Wasp | | 13 |
| | *Family Halictidae* | Halictid bee | | 13 |
| | *Ashmeadiella bigeloviae* | Leafcutting Bee | | 13 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Coeloxys sp.* | Leafcutting Bee | | 13 |
| | *Dianthidium sp.* | Leafcutting Bee | | 13 |
| | *Hoplitis sp.* | Leafcutting Bee | | 13 |
| | *Epeolus sp.* | Leafcutting Bee | | 13 |
| | *Neolarra sp.* | Leafcutting Bee | | 13 |
| | *Trachusa bequaerti* | Leafcutting Bee | | 13 |
| | *Trachusa larreae* | Leafcutting Bee | | 13 |
| | *Megachile sp.* | Leafcutting Bee | | 13 |
| | *Hesperapis sp.* | Melittid Bee | | 13 |
| | *Dasymutilla satanas* | Melittid Bee | | 13 |
| | *Family Mutillidae* | Velvet Ant | | 13 |
| | *Spharopthalma sp.* | Velvet Ant | | 13 |
| | *Family Perilampidae* | Perilampid Wasp | | 13 |
| | *Family Platygasteridae* | Platygasterid Wasp | | 13 |
| | *Family Pteromalidae* | Pteromalid Wasp | | 13 |
| | *Pepsis sp.* | Tarantula Hawk | | 13 |
| | *Anoplius cieora* | Blue-black Spider Wasp | | 13 |
| | *Family Scelionidae* | Scelionid Wasp | | 13 |
| | *Campsomeris sp.* | Scoliid Wasp | | 13 |
| | *Ammophila wrightii* | Sphecid Wasp | | 13 |
| | *Aphilanthops hispidus* | Sphecid Wasp | | 13 |
| | *Astata sp.* | Sphecid Wasp | | 13 |
| | *Bembecinus sp.* | Sphecid Wasp | | 13 |
| | *Bembix rugosa* | Sphecid Wasp | | 13 |
| | *Cerceris acanthophila* | Sphecid Wasp | | 13 |
| | *Cerceris sextoides* | Sphecid Wasp | | 13 |
| | *Clypeadon evansi* | Sphecid Wasp | | 13 |
| | *Diploplectron sp.* | Sphecid Wasp | | 13 |
| | *Dryudella sp.* | Sphecid Wasp | | 13 |
| | *Eucerceris canaliculata* | Sphecid Wasp | | 13 |
| | *Eucerceris arenaria* | Sphecid Wasp | | 13 |
| | *Hoplisoides spilopterus* | Sphecid Wasp | | 13 |
| | *Glenostictia sp.* | Sphecid Wasp | | 13 |
| | *Microbembix argyropleura* | Sphecid Wasp | | 13 |
| | *Microstictia ap.* | Sphecid Wasp | | 13 |
| | *Philanthus sp.* | Sphecid Wasp | | 13 |
| | *Podalonia deserticola* | Sphecid Wasp | | 13 |
| | *Podalonia proticola* | Sphecid Wasp | | 13 |
| | *Prionyx foxi* | Sphecid Wasp | | 13 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Prionyx parkeri* | Sphecid Wasp | | 13 |
| | *Steniola duplicata* | Sphecid Wasp | | 13 |
| | *Stictiella sp.* | Sphecid Wasp | | 13 |
| | *Sphecius convallis* | Sphecid Wasp | | 13 |
| | *Sphex ashmeadii* | Sphecid Wasp | | 13 |
| | *Tachytes erimineus* | Sphecid Wasp | | 13 |
| | *Family Tiphiidae* | Tiphiid Wasp | | 13 |
| | *Family Torymidae* | Torymid Wasp | | 13 |
| | *Trichogramma pratti* | Trichogrammatid Wasp | | 13 |
| | *Trichogramma kaykai* | Trichogrammatid Wasp | | 13 |
| | *Subfamily Eumeninae* | Vespid Wasp | | 13 |
| | *Euodynerus annulatus* | Vespid Wasp | | 13 |
| | *Pseudomasaris edwardsii* | Vespid Wasp | | 13 |
| | *Pseudomasaris maculifrons* | Vespid Wasp | | 13 |
| | *Pseudomasaris wheeleri* | Vespid Wasp | | 13 |
| | *Pterocheilus mirandus* | Vespid Wasp | | 13 |
| | *Pterocheilus hirsutipennis* | Vespid Wasp | | 13 |
| | *Pterocheilus laticeps* | Vespid Wasp | | 13 |
| | *Pterocheilus pimorum* | Vespid Wasp | | 13 |
| | *Polistes fuscatus* | Paper Wasp | | 13 |
| **Fish** | | | | |
| * | *Gambusia affinis* | Western Mosquitofish | | 1, 2, 14, 16 |
| **Amphibians** | | | | |
| | *Anaxyrus boreas* | Western Toad | | 2, 14 |
| | *Anaxyrus punctatus* | Red-spotted Toad | | 2, 14 |
| **Reptiles** | | | | |
| | *Aspidoscelis tigris* | Western Whiptail | | 2, 3, 9, 10, 14 |
| | *Callisaurus draconoides* | Zebra-tailed Lizard | | 2, 3, 9, 10, 11, 14 |
| | *Coleonyx variegatus* | Banded Gecko | | 2, 3, 9, 10, 11, 14 |
| | *Crotaphytus bicinctores* | Great Basin Collared Lizard | | 2, 3, 11 |
| | *Crotaphytus insularis* | Desert Collared Lizard | | 14 |
| | *Dipsosaurus dorsalis* | Desert Iguana | | 2, 3, 9, 10, 11, 14 |
| | *Sauromalus ater* | Chuckwalla | | 2, 3, 4, 11, 14 |
| | *Gambelia wislizenii* | Long-nosed Leopard Lizard | | 2, 3, 9, 10, 11, 14 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Phrynosoma platyrhinos* | Desert Horned Lizard | | 2, 3, 9, 10, 11, 14 |
| | *Sceloporus magister* | Desert Spiny Lizard | | 2, 3, 10, 11, 14 |
| | *Uma scoparia* | Mojave Fringe-toed Lizard | CSC | 1, 2, 9, 11, 14 |
| | *Urosaurus graciosus* | Western Long-tailed Brush Lizard | | 2, 3, 9, 11, 14 |
| | *Uta stansburiana* | Side-blotched Lizard | | 2, 3, 9, 10, 11, 14 |
| | *Plestiodon gilberti* | Gilbert Skink | | Hypothetical |
| | *Xantusia vigilis* | Desert Night Lizard | | 2, 11, 14 |
| | *Arizona elegans* | Glossy Snake | | 2, 10, 11, 14 |
| | *Chionactis occipitalis* | Shovel-nosed Snake | | 3, 10, 11, 14 |
| | *Coluber flagellum* | Red Racer (Coachwhip) | | 2, 3, 10, 11, 14 |
| | *Crotalus atrox* | Western Diamondback | | Hypothetical |
| | *Crotalus cerastes* | Sidewinder | | 3, 10, 11, 14 |
| | *Crotalus mitchelli* | Speckled Rattlesnake | | 3, 11, 14 |
| | *Crotalus oreganos (viridis)* | Western Rattlesnake | | Hypothetical |
| | *Crotalus scutulatus* | Mohave Rattlesnake | | 3, 10, 11, 14 |
| | *Leptotyphlops humilis* | Western Blind Snake | | Hypothetical |
| | *Diadophis punctatus* | Ring-necked Snake | | Hypothetical |
| | *Hypsiglena torquata* | Night Snake | | Hypothetical |
| | *Lampropeltis californiae* | California Kingsnake | | 11, 14 |
| | *Lampropeltis getulus* | Desert Kingsnake | | 10 |
| | *Lichanura trivirgata* | Rosy Boa | | 2, 14 |
| | *Phyllorhynchus decurtatus* | Spotted Leaf-nosed Snake | | 2, 10, 11, 14 |
| | *Pituophis melanoleucus* | Ground Snake | | 2, 10, 14 |
| | *Pituophis catenifer* | Gopher Snake | | 3, 10, 11, 14 |
| | *Rhinocheilus lecontei lecontei* | Long-nosed Snake | | 2, 14 |
| | *Salvadora hexalepis* | Western Patch-nosed Snake | | 3, 11, 14 |
| | *Tantilla hobartsmithi* | Southwestern Black-headed Snake | | Hypothetical |
| | *Sonora semiannulata* | Western Groundsnake | | 3, 11 |
| | *Trimorphodon bisculatus* | Lyre Snake | | Hypothetical |
| | *Gopherus agassizii* | Desert Tortoise | FT, ST, T1 | 1, 2, 9, 11, 14 |
| **Birds** | | | | |
| | *Anser albifrons* | Greater White-fronted Goose | MBTA | 2, 14 |
| | *Chen caerulescens* | Snow Goose | MBTA | 2, 14 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Chen rossii* | Ross' Goose | MBTA | 2, 14 |
| | *Branta canadensis* | Canada Goose | MBTA | 2, 14 |
| | *Cygnus columbianus* | Tundra Swan | MBTA | 14 |
| | *Anas strepera* | Gadwall | MBTA | 5, 14 |
| | *Anas americana* | American Wigeon | MBTA | 2, 14 |
| | *Anas platyrhynchos* | Mallard | MBTA | 2, 5, 14 |
| | *Anas discors* | Blue-winged Teal | MBTA | 5, 14 |
| | *Anas cyanoptera* | Cinnamon Teal | MBTA | 5, 14 |
| | *Anas clypeata* | Northern Shoveler | MBTA | 2, 5, 14 |
| | *Anas acuta* | Northern Pintail | MBTA | 5, 14 |
| | *Anas crecca* | Green-winged Teal | MBTA | 5, 14 |
| | *Aythya valisineria* | Canvasback | MBTA | 14 |
| | *Aythya americana* | Redhead | CSC, MBTA | 2, 5, 14 |
| | *Aythya collaris* | Ring-necked Duck | MBTA | 5, 14 |
| | *Aythya marila* | Greater Scaup | MBTA | 14 |
| | *Aythya affinis* | Lesser Scaup | MBTA | 5, 14 |
| | *Clangula hyemalis* | Oldsquaw (Long-tailed Duck) | MBTA | 14 |
| | *Bucephala albeola* | Bufflehead | MBTA | 5, 14 |
| | *Mergus merganser* | Common Merganser | MBTA | 14 |
| | *Oxyura jamaicensis* | Ruddy Duck | MBTA | 2, 5, 14 |
| | *Callipepla gambellii* | Gambel's Quail | | 2, 3, 14 |
| | *Alectoris chukar* | Chukar | | 3 |
| | *Podilymbus podiceps* | Pied-billed Grebe | MBTA | 14 |
| | *Podiceps grisegena* | Red-necked Grebe | MBTA | 14 |
| | *Podiceps nigricollis* | Eared Grebe | MBTA | 2, 5, 14 |
| | *Aechmophorus occidentalis* | Western Grebe | MBTA | 14 |
| | *Phalacrocorax auritus* | Double-crested Cormorant | MBTA | 2, 14 |
| | *Pelecanus erythrorhynchos* | American White Pelican | CSC, MBTA | 14 |
| | *Pelecanus occidentalis* | Brown Pelican | MBTA | 1 |
| | *Ardea herodias* | Great Blue Heron | MBTA | 14 |
| | *Ardea alba* | Great Egret | MBTA | 14 |
| | *Egretta thula* | Snowy Egret | MBTA | 14 |
| | *Bubulcus ibis* | Cattle Egret | MBTA | 14 |
| | *Butorides virescens* | Green Heron | MBTA | 14 |
| | *Plegadis chihi* | White-faced Ibis | MBTA | 2, 14 |
| | *Cathartes aura* | Turkey Vulture | MBTA | 3, 14 |
| | *Pandion haliaetus* | Osprey | MBTA | 2, 14 |
| | *Haliaeetus leucocephalus* | Bald Eagle | BEPA, SE, MBTA | 2 |
| | *Circus cyaneus* | Northern Harrier | CSC, MBTA | 1, 2, 14, 15 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Accipiter striatus* | Sharp-shinned Hawk | MBTA | 1, 2, 14 ,15 |
| | *Accipiter cooperii* | Cooper's Hawk | MBTA | 1, 2, 14, 15 |
| | *Buteo lineatus* | Red-shouldered Hawk | MBTA | 14 |
| | *Buteo jamaicensis* | Red-tailed Hawk | MBTA | 2, 3, 14 |
| | *Buteo regalis* | Ferruginous Hawk | MBTA | 2, 14, 15 |
| | *Aquila chrysaetos* | Golden Eagle | BEPA, CFP, MBTA | 1, 2, 14,15 |
| | *Porzana carolina* | Sora | MBTA | 2, 14 |
| | *Fulica americana* | American Coot | MBTA | 2, 5, 14 |
| | *Himantopus mexicanus* | Black-necked Stilt | MBTA | 2, 5, 14 |
| | *Recurvirostra americana* | American Avocet | MBTA | 2, 5, 14 |
| | *Pluvialis squatarola* | Black-bellied Plover | MBTA | 14 |
| | *Charadrius nivosus* | Snowy Plover | MBTA | 14 |
| | *Charadrius semipalmatus* | Semipalmated Plover | MBTA | 14 |
| | *Charadrius vociferus* | Killdeer | MBTA | 2, 5, 14 |
| | *Actitis macularius* | Spotted Sandpiper | MBTA | 14 |
| | *Tringa solitaria* | Solitary Sandpiper | MBTA | 2, 14 |
| | *Tringa melanoleuca* | Greater Yellowlegs | MBTA | 5, 14 |
| | *Tringa semipalmata* | Willet | MBTA | 14 |
| | *Tringa flavipes* | Lesser Yellowlegs | MBTA | 5, 14 |
| | *Numenius americanus* | Long-billed Curlew | MBTA | 14 |
| | *Limosa fedoa* | Marbled Godwit | MBTA | 14 |
| | *Calidris alpina* | Dunlin | MBTA | 14 |
| | *Calidris minutilla* | Least Sandpiper | MBTA | 2, 5, 14 |
| | *Calidris melanotos* | Pectoral Sandpiper | MBTA | 14 |
| | *Calidris pusilla* | Semipalmated Sandpiper | MBTA | 14 |
| | *Calidris mauri* | Western Sandpiper | MBTA | 5, 14 |
| | *Limnodromus sp.* | Dowitcher | MBTA | 5 |
| | *Limnodromus griseus* | Short-billed Dowitcher | MBTA | 14 |
| | *Limnodromus scolopaceus* | Long-billed Dowitcher | MBTA | 14 |
| | *Gallinago gallinago* | Common Snipe | MBTA | 14 |
| | *Phalaropus tricolor* | Wilson's Phalarope | MBTA | 14 |
| | *Phalaropus lobatus* | Red-necked Phalarope | MBTA | 14 |
| | *Phalaropus fulicarius* | Red Phalarope | MBTA | 14 |
| | *Larus pipixcan* | Franklin's Gull | MBTA | 14 |
| | *Larus philadelphia* | Bonaparte's Gull | MBTA | 14 |
| | *Larus canus* | Mew Gull | MBTA | 14 |
| | *Larus delawarensis* | Ring-billed Gull | MBTA | 5, 14 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Larus occidentalis* | Western Gull | MBTA | 14 |
| | *Larus californicus* | California Gull | MBTA | 5, 14 |
| | *Larus argentatus* | Herring Gull | MBTA | 14 |
| | *Hydroprogne caspia* | Caspian Tern | MBTA | 14 |
| | *Chlidonias niger* | Black Tern | CSC, MBTA | 2, 14, 15 |
| | *Sterna forsteri* | Forster's Tern | MBTA | 14 |
| * | *Columba livia* | Rock Pigeon | | 2, 14 |
| * | *Streptopelia decaocto* | Eurasian Collared-Dove | | Hypothetical |
| | *Zenaida asiatica* | White-winged Dove | MBTA | 2, 3, 14 |
| | *Zenaida macroura* | Mourning Dove | MBTA | 2, 3, 14 |
| | *Columbina inca* | Inca Dove | MBTA | 14 |
| | *Columbina passerina* | Common Ground-Dove | MBTA | 2 |
| | *Geococcyx californianus* | Greater Roadrunner | MBTA, T1 | 2, 3, 14 |
| | *Tyto alba* | Barn Owl | MBTA | 2, 3, 14 |
| | *Bubo virginianus* | Great Horned Owl | MBTA | 2, 3, 12, 14 |
| | *Athene cunicularia* | Burrowing Owl | CSC, MBTA | 1, 2, 6, 14, 15 |
| | *Asio otus* | Long-eared Owl | CSC, MBTA | 1, 2, 14, 15 |
| | *Asio flammeus* | Short-eared Owl | CSC, MBTA | 2, 14 |
| | *Chordeiles acutipennis* | Lesser Nighthawk | MBTA | 2, 3, 14 |
| | *Phalaenoptilus nuttallii* | Common Poorwill | MBTA | 2, 3, 14 |
| | *Chaetura vauxi* | Vaux's Swift | CSC, MBTA | 2, 14, 15 |
| | *Aeronautes saxatalis* | White-throated Swift | MBTA | 2, 3, 14 |
| | *Archilochus alexandri* | Black-chinned Hummingbird | MBTA | 3, 14 |
| | *Calypte anna* | Anna's Hummingbird | MBTA | 2, 3, 14 |
| | *Calypte costae* | Costa's Hummingbird | MBTA | 2, 3, 14 |
| | *Selasphorus rufus* | Rufous Hummingbird | MBTA | 14 |
| | *Selasphorus sasin* | Allen's Hummingbird | MBTA | 14 |
| | *Ceryle alcyon* | Belted Kingfisher | MBTA | 14 |
| | *Melanerpes lewis* | Lewis' Woodpecker | MBTA | 14 |
| | *Sphyrapicus varius* | Yellow-bellied Sapsucker | MBTA | 14 |
| | *Sphyrapicus nuchalis* | Red-naped Sapsucker | MBTA | 14 |
| | *Picoides scalaris* | Ladder-backed Woodpecker | MBTA | 2, 3, 14 |
| | *Colaptes auratus* | Northern Flicker | MBTA | 2, 14 |
| | *Colaptes chrysoides* | Gilded Flicker | SE, MBTA | 2, 14, 15 |
| | *Falco sparverius* | American Kestrel | MBTA | 2, 3, 14 |
| | *Falco columbarius* | Merlin | MBTA | 2, 14, 15 |
| | *Falco peregrinus anatum* | American Peregrine Falcon | CFP, MBTA | 2, 15 |
| | *Falco mexicanus* | Prairie Falcon | MBTA | 1, 2, 14, |

| Scientific Name | Common Name | Special Status | Reference |
|---|---|---|---|
| *Contopus cooperi* | Olive-sided Flycatcher | CSC, MBTA | 14 |
| *Contopus sordidulus* | Western Wood-pewee | MBTA | 14 |
| *Empidonax traillii* | Willow Flycatcher | SE, MBTA | 1, 14 |
| *Empidonax traillii extimus* | Southwestern Willow Flycatcher | FE, SE, MBTA | 2 |
| *Empidonax hammondii* | Hammond's Flycatcher | MBTA | 3, 14 |
| *Empidonax wrightii* | Gray Flycatcher | MBTA | 14 |
| *Empidonax oberholseri* | Dusky Flycatcher | MBTA | 14 |
| *Empidonax difficilis* | Pacific-slope Flycatcher | MBTA | 3, 14 |
| *Sayornis nigricans* | Black Phoebe | MBTA | 2, 5, 14 |
| *Sayornis saya* | Say's Phoebe | MBTA | 2, 3, 5, 14 |
| *Myiarchus cinerascens* | Ash-throated Flycatcher | MBTA | 2, 3, 14 |
| *Myiarchus tyrannulus* | Brown-crested Flycatcher | MBTA | 2, 14, 15 |
| *Tyrannus vociferans* | Cassin's Kingbird | MBTA | 14 |
| *Tyrannus verticalis* | Western Kingbird | MBTA | 2, 3, 14 |
| *Tyrannus forficatus* | Scissor-tailed Flycatcher | MBTA | 14 |
| *Lanius ludovicianus* | Loggerhead Shrike | CSC, MBTA | 1, 2, 5, 14, 15 |
| *Vireo bellii* | Bell's Vireo | MBTA | 14 |
| *Vireo bellii pusillus* | Least Bell's Vireo | FE, SE, MBTA | 2 |
| *Vireo solitarius* | Solitary Vireo | MBTA | 14 |
| *Vireo flavifrons* | Yellow-throated Vireo | MBTA | 14 |
| *Vireo gilvus* | Warbling Vireo | MBTA | 14 |
| *Aphelocoma californica* | Western Scrub-jay | MBTA | 14 |
| *Corvus brachyrhynchos* | American Crow | MBTA | 14 |
| *Corvus corax* | Common Raven | MBTA | 1, 2, 3, 5, 14 |
| *Eremophila alpestris* | Horned Lark | MBTA | 2, 3, 5, 14 |
| *Tachycineta bicolor* | Tree Swallow | MBTA | 5, 14 |
| *Tachycineta thalassina* | Violet-green Swallow | MBTA | 3, 14 |
| *Stelgidopteryx serripennis* | Northern Rough-winged Swallow | MBTA | 3, 5, 14 |
| *Riparia riparia* | Bank Swallow | ST, MBTA | 2, 14, 15 |
| *Petrochelidon pyrrhonota* | Cliff Swallow | MBTA | 2, 3, 5, 14 |
| *Hirundo rustica* | Barn Swallow | MBTA | 3, 5, 14 |
| *Auriparus flaviceps* | Verdin | MBTA | 2, 3, 14 |
| *Sitta canadensis* | Red-breasted Nuthatch | MBTA | 14 |
| *Sitta carolinensis* | White-breasted Nuthatch | MBTA | 14 |
| *Salpinctes obsoletus* | Rock Wren | MBTA | 2, 3, 14 |
| *Catherpes mexicanus* | Canyon Wren | MBTA | 2, 14 |
| *Troglodytes aedon* | House Wren | MBTA | 14 |

| | Scientific Name | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Cistothorus palustris* | Marsh Wren | MBTA | 2, 14 |
| | *Thryomanes bewickii* | Bewick's Wren | MBTA | 14 |
| | *Campylorhynchus brunneicapillus* | Cactus Wren | MBTA | 2, 3, 14 |
| | *Polioptila caerulea* | Blue-gray Gnatcatcher | MBTA | 3, 14 |
| | *Polioptila melanura* | Black-tailed Gnatcatcher | MBTA | 2, 3, 14 |
| | *Regulus calendula* | Ruby-crowned Kinglet | MBTA | 2, 3, 14 |
| | *Sialia currucoides* | Mountain Bluebird | MBTA | 2, 14 |
| | *Catharus ustulatus* | Swainson's Thrush | MBTA | 14 |
| | *Catharus guttatus* | Hermit Thrush | MBTA | 14 |
| | *Turdus migratorius* | American Robin | MBTA | 2, 14 |
| | *Toxostoma redivivum* | California Thrasher | MBTA | 2, 14 |
| | *Toxostoma lecontei* | Le Conte's Thrasher | CSC, MBTA | 1, 2, 14, 15 |
| | *Oreoscoptes montanus* | Sage Thrasher | MBTA | 3, 14 |
| | *Mimus polyglottos* | Northern Mockingbird | MBTA | 2, 3, 14 |
| * | *Sturnus vulgaris* | European Starling | MBTA | 2, 3, 5, 14 |
| | *Anthus rufescens* | American Pipit | MBTA | 2, 5, 14 |
| | *Anthus spragueii* | Sprague's Pipit | MBTA | 14 |
| | *Bombycilla cedrorum* | Cedary Waxwing | MBTA | 14 |
| | *Phainopepla nitens* | Phainopepla | MBTA | 2, 3, 14 |
| | *Parkesia noveboracensis* | Northern Waterthrush | MBTA | 14 |
| | *Oreothypis luciae* | Lucy's Warbler | CSC, MBTA | 3 |
| | *Oreothypis celata* | Orange-crowned Warbler | MBTA | 3, 14 |
| | *Oreothypis ruficapilla* | Nashville Warbler | MBTA | 14 |
| | *Geothlypis tolmiei* | MacGillivray's Warbler | MBTA | 14 |
| | *Geothlypis trichas* | Common Yellowthroat | MBTA | 2, 5, 14 |
| | *Setophaga ruticilla* | American Redstart | MBTA | 14 |
| | *Setophaga petechia* | Yellow Warbler | CSC, MBTA | 2, 14, |
| | *Setophaga pensylvanica* | Chestnut-sided Warbler | MBTA | 14 |
| | *Setophaga coronata* | Yellow-rumped Warbler | MBTA | 2, 3, 5, 14 |
| | *Setophaga nigrescens* | Black-throated Gray Warbler | MBTA | 14 |
| | *Setophaga townsendi* | Townsend's Warbler | MBTA | 3, 14 |
| | *Setophaga occidentalis* | Hermit Warbler | MBTA | 14 |
| | *Cardellina pusilla* | Wilson's Warbler | MBTA | 3, 14 |
| | *Pipilo chlorurus* | Green-tailed Towhee | MBTA | 14 |
| | *Pipilo maculatus* | Spotted Towhee | MBTA | 2, 14 |
| | *Spizella passerina* | Chipping Sparrow | MBTA | 3, 14 |
| | *Spizella breweri* | Brewer's Sparrow | MBTA | 2, 3, 14 |
| | *Pooecetes gramineus* | Vesper Sparrow | MBTA | 14 |
| | *Chondestes grammacus* | Lark Sparrow | MBTA | 14 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Amphispiza bilineata* | Black-throated Sparrow | MBTA | 2, 3, 14 |
| | *Artemisiospiza belli* | Sage Sparrow | MBTA | 2, 3, 14 |
| | *Passerculus sandwichensis* | Savannah Sparrow | MBTA | 2, 3, 5, 14 |
| | *Passerella iliaca* | Fox Sparrow | MBTA | 2 |
| | *Melospiza melodia* | Song Sparrow | MBTA | 14 |
| | *Melospiza lincolnii* | Lincoln's Sparrow | MBTA | 2, 3, 14 |
| | *Zonotrichia leucophrys* | White-crowned Sparrow | MBTA | 2, 3, 5, 14 |
| | *Junco hyemalis* | Dark-eyed Junco | MBTA | 2, 14 |
| | *Piranga ludoviciana* | Western Tanager | MBTA | 3, 14 |
| | *Pheucticus ludovicianus* | Rose-breasted Grosbeak | MBTA | 14 |
| | *Pheucticus melanocephalus* | Black-headed Grosbeak | MBTA | 3, 14 |
| | *Passerina amoena* | Lazuli Bunting | MBTA | 14 |
| | *Agelaius phoeniceus* | Red-winged Blackbird | MBTA | 2, 14 |
| | *Sturnella neglecta* | Western Meadowlark | MBTA | 2, 3, 14 |
| | *Xanthocephalus xanthocephalus* | Yellow-headed Blackbird | CSC, MBTA | 2, 14 |
| | *Euphagus cyanocephalus* | Brewer's Blackbird | MBTA | 2, 5, 14 |
| | *Quiscalus mexicanus* | Great-tailed Grackle | MBTA | 2, 5, 14 |
| * | *Molothrus ater* | Brown-headed Cowbird | MBTA | 14 |
| | *Icterus cucullatus* | Hooded Oriole | MBTA | 2, 14 |
| | *Icterus bullockii* | Bullock’s Oriole | MBTA | 2, 14 |
| | *Icterus parisorum* | Scott’s Oriole | MBTA | 2, 3, 14 |
| | *Haemorhous mexicanus* | House Finch | MBTA | 2, 3, 5, 14 |
| | *Loxia curvirostra* | Red Crossbill | MBTA | 2, 14 |
| | *Carduelis psaltria* | Lesser Goldfinch | MBTA | 2, 3, 14 |
| | *Carduelis lawrencei* | Lawrence's Goldfinch | MBTA | 14 |
| * | *Passer domesticus* | House Sparrow | | 2, 3, 14 |
| **Mammals** | | | | |
| | *Notiosorex crafordi* | Desert Shrew | | Hypothetical |
| | *Macrotus californicus* | California Leaf-nosed Bat | CSC | 1, 2, 14 |
| | *Myotis californicus* | California Myotis | | 2, 7, 11, 12, 14 |
| | *Myotis ciliolabrum* | Small-footed Myotis | CSC | Hypothetical |
| | *Myotis thysanodes* | Fringed Myotis | CSC | Hypothetical |
| | *Myotis volans* | Long-legged Myotis | CSC | Hypothetical |
| | *Myotis yumanensis* | Yuma Myotis | | Hypothetical |
| | *Lasiurus blossevillii* | Western Red Bat | CSC | Hypothetical |
| | *Lasiurus cinereus* | Hoary Bat | | 2, 11, 14 |
| | *Lasiurus xanthinus* | Western Yellow Bat | CSC | 12, 14 |
| | *Parastrellus hesperus* | Canyon Bat | | 11, 12 |

| Scientific Name | | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Eptesicus fuscus* | Big Brown Bat | | 2, 14 |
| | *Euderma maculatum* | Spotted Bat | CSC | Hypothetical |
| | *Pipistrellus hesperus* | Western Pipistrelle | | 2, 7, 14 |
| | *Corynorhinus townsendii* | Townsend's Big-eared Bat | ST | 1, 2, 7, 12, 14 |
| | *Idionycteris phyllotis* | Allen's Big-eared Bat | | Hypothetical |
| | *Antrozous pallidus* | Pallid Bat | CSC | 1, 2, 7, 11, 12, 14 |
| | *Tadarida brasiliensis* | Mexican (Brazilian) Free-tailed Bat | | 2, 7, 11, 12, 14 |
| | *Nyctinomops femorosaccus* | Pocketed Free-tailed Bat | CSC | 11, 14 |
| | *Nyctinomops macrotis* | Big Free-tailed Bat | CSC | 14 |
| | *Eumops perotis californicus* | Western Mastiff Bat | CSC | 1, 2, 14 |
| | *Sylvilagus audubonii* | Desert Cottontail | | 2, 11, 14 |
| | *Lepus californicus* | Black-tailed Jackrabbit | | 2, 11, 14 |
| | *Spermophilus beecheyi* | California Ground Squirrel | | 2, 14 |
| | *Spermophilus tereticaudus* | Round-tailed Ground Squirrel | | 2, 8, 11, 14 |
| | *Ammospermophilus leucurus* | White-tailed Antelope Squirrel | | 2, 8, 10, 11 |
| | *Thomomys bottae* | Botta's Pocket Gopher | | 2, 10, 11, 14 |
| | *Perognathus longimembris* | Little Pocket Mouse | | 2, 10, 11, 14 |
| | *Chaetodipus formosus* | Long-tailed Pocket Mouse | | 2, 11, 14 |
| | *Chaetodipus fallax pallidus* | Pallid San Diego Pocket Mouse | CSC | 1, 2, 14 |
| | *Chaetodipus penicillatus* | Desert Pocket Mouse | | 2, 11, 14 |
| | *Chaetodipus rudinoris* | Baja California Pocket Mouse | | 11 |
| | *Chaetodipus spinatus* | Spiny Pocket Mouse | | 11 |
| | *Dipodomys merriami* | Merriam's Kangaroo Rat | | 2, 10, 11 |
| | *Dipodomys deserti* | Desert Kangaroo Rat | | 2, 11, 14 |
| | *Dipodomys panamintinus* | Panamint Kangaroo Rat | | 2 |
| | *Peromyscus eremicus* | Cactus Mouse | | 2, 14 |
| | *Peromyscus crinitus* | Canyon Deer Mouse | | 2, 11, 14 |
| | *Peromyscus fraterculus* | Northern Baja Deer Mouse | | 11 |
| | *Peromyscus maniculatus* | North American Deer Mouse | | 2, 11 |
| | *Peromyscus truei* | Pinyon Deer Mouse | | 11 |
| | *Onychomys torridus* | Southern Grasshopper Mouse | | 2, 10, 11, 14 |
| | *Neotoma albigula* | White-throated Woodrat | | 11 |
| | *Neotoma lepida* | Desert Woodrat | | 2, 11, 14 |
| | *Rattus rattus* | Black (Roof) Rat | | 11 |
| * | *Mus musculus* | House Mouse | | Hypothetical |
| * | *Canis familiaris* | Domestic Dog | | 2, 14 |

| | Scientific Name | Common Name | Special Status | Reference |
|---|---|---|---|---|
| | *Canis latrans* | Coyote | T1 | 2, 11, 14 |
| | *Vulpes macrotis arsipus* | Desert Kit Fox | CFP | 2, 11, 14 |
| | *Urocyon cinereoargenteus* | Common Gray Fox | | 2, 11, 14 |
| | *Bassariscus astutus* | Ringed-tailed Cat | CFP | Hypothetical |
| | *Procyon lotor* | Northern Raccoon | | 2, 14 |
| | *Taxidea taxus* | American Badger | CSC | 2, 11, 14 |
| | *Mephitis mephitis* | Striped Skunk | | 2, 14 |
| * | *Felis catus* | Domestic Cat | | 2, 14 |
| | *Puma concolor* | Mountain Lion | | 2, 14 |
| | *Lynx rufus* | Bobcat | | 2, 11, 14 |
| | *Ovis canadensis nelsoni* | Desert Bighorn Sheep | CFP | 1, 2, 11, 14 |

****** ***Non-native species***

***Federal*** Federal categories per the Endangered Species Act, administrated by the USFWS.

FE Endangered - any species officially listed by the USFWS that is in danger of extinction throughout all or a significant portion of its range.

FT Threatened - any species officially listed by the USFWS that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

BGEPA Bald and Golden Eagle Protection Act of 1940.

MBTA Migratory Bird Treaty Act of 1918

***Tribes***

T1 Species of interest/concern as identified by tribes..

***State*** State categories per the 1984 California Endangered Species Act

SE Endangered - any species officially listed by the California Fish and Game Commission that is in danger of extinction throughout all or a significant portion of its range.

ST Threatened - any species officially listed by the California Fish and Game Commission that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

CSC California Species of Special Concern.

CFP Fully Protected by the California Department of Fish and Wildlife

References:


1 Marine Air Ground Task Force training Command (MAGTFTC). 2012. Integrated Natural Resources management Plan and Environmental Assessment. Fiscal Years 2012-2016.

2 Marine Corps Air Ground Combat Center (MCAGCC). 2012. Final Environmental Impact Statement, Land Acquisition and Airspace Establishment to Support Large-Scale Marine Air Ground Task Force Live Fire and Maneuver Training. July 2012.

3 Circle Mountian Biologicial Consultants, Inc. 2013. Final Report: Vertebrate Inventory, Human Impacts Analysis, and Management Recommendation For the Marine Corps Air Ground Combat Center, Twentynine Palms, San Bernardino County, California. Prepared for Marine Corps Air Ground Task Force Training Command and Naval Facilitites Engineering Command.

4 ICF International. 2010. Chuckwalla Presence/Absence Surveys in Lavic Lake, Lead Mountain, and Lava Training Areas, Marine Corps Air Ground Combat Center Twentynine Palms, California. Draft. July. Prepared for: Marine Air Ground Task Force Training Command and Naval Facilities Engineering Command Southwest.

| Scientific Name | Common Name | Special Status | Reference |
|---|---|---|---|


5 Marine Corps Air Ground Combat Center (MCAGCC). 2004. Bird/Wildlife Aircraft Strike Hazard (BASH) Plan, Expenditionary Airfield.

6 U.S. Geological Survey (USGS). 2007. Burrowing Owl Surveys and Management Recommendations, Marine Corps Air Ground Task Force Training Command, Twentynine Palms, California. Report prepared by D. Crowe and K. Longshore for Marine Air Ground Task Force Training Command.

7 U.S. Geological Survey (USGS). 2006. Monitoring Bat Roosts in Mines at Marine Corps Air Ground Combat Center, Twentynine Palms, San Bernardino, California, 2005. Report prepared by D. Stokes and R.N. Fisher for Marine Air Ground Task Force Training Command.

8 ICF Jones & Stokes. 2008. Final Report: Mohave Ground Squirrel Presence/Absence Surveys in San Hill, Acorn, Emerson Lake, and Maumee Mine Training Areas, Marine Corps Air Ground Comabt Center, Twentynine Palms, California. Report prepared for Marine Air Ground Task Force Training Command and Naval Facilities Engineering Command Southwest.

9 Cablk, M.E. and 1.S. Heaton. 2002 Nov. Mojave Fringe-Toed Lizard surveys at the Marine Corps Air Ground Combat Center at Twentynine Palms, California and nearby lands Administered by the Bureau ofLand Management. California: Marine Corps Air Ground Combat Center. Report M67399-00-C-0005. 115 p.

10 U.S. Geological Survey (USGS). 2002. Herpetofauna and Small Mammals Surveys on the Marine Corps Air Ground Combat Center, Twentynine Palms, California, March 1999-October 2001. Report prepared by R. Hirsch, S. Hathaway, and R.N. Fisher for Marine Air Ground Task Force Training Command.

11 San Diego Natural History Museum (SDNHM). 2013. Vertebrate Invetory of the Marine Corps Air Ground Combat Center, Twentynine Palms, California. Report prepared by M.A. Stepek, S.B. Tremor, L. Hargrove, D.C Stokes, and B.D. Hollongsworth for Marine Air Ground Task Force Training Command and Naval Facilities Engineering Command Southwest.

12 San Diego Natural History Museum (SDNHM), CGS Incorporated and Vernadero Group. 2014. Bat Surveys in Sunshine Peak Training Area at Marine Corps Air Ground Combat Center, Twentynine Palms, California. Report prepared for Marine Air Ground Task Force Training Command and Naval Facilities Engineering Command Southwest.

13 Pratt, G.F. 2005. Terrestrial Arthropods of the Marine Corps Air Ground Combat Center, Twentynine Palms, California, 2001-2005.

14 Marine Air Ground Task Force training Command (MAGTFTC). 2006. Integrated Natural Resources management Plan and Environmental Assessment. Fiscal Years 2002-2006.

15 Cutler, T.L., D.J. Griffin, and P.R. Krausman. 1999. A Wildlife Inventory and Management Recommendations for the Marine Corps Air Ground Combat Center, Twentynine Palms, California. Prepared for MCAGCC and Southwest Division, Naval Facilities Engineering Command, San Diego, CA under Contract N68711-96-LT-60025. University of Arizona, Tucson, AZ. 142 pp.

16 University of California, Riverside. 1993. Marine Corps Air Ground Combat Center Natural Resources Management Plan, 1992. Departments of Earth Science and Botany and Plant Sciences, Riverside, CA. Prepared for MCAGCC, Twentynine Palms, CA. through Naval Facilities Engineering Command, Southwestern Division, San Diego, CA. 16 pp + app.

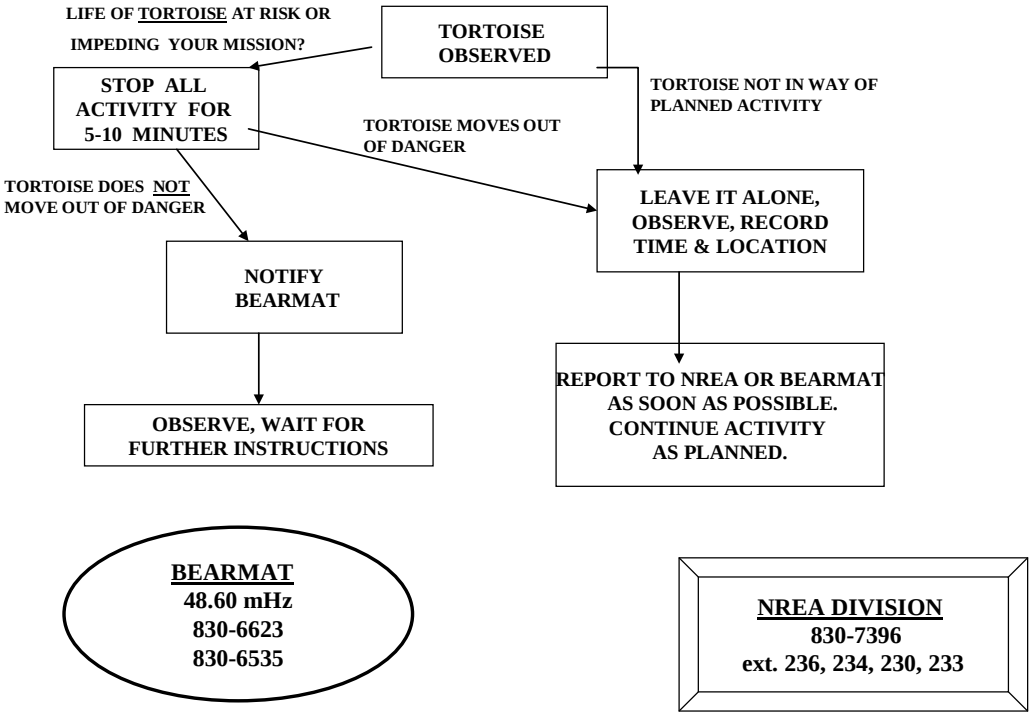
17 Hirsch, R., S. Hathaway, and R. Fisher. 2002. Herpetofauna and Small Mammal Surveys on the Marine Corps Air Ground Combat Center, Twentynine Palms, CA March 1999-Ocober 2001. U.S. Geological Survey, Western Ecological Research Center. Sacramento, California.

# APPENDIX E

# Desert Tortoise Contact Flowcharts

## DESERT TORTOISE CONTACT FLOWCHART

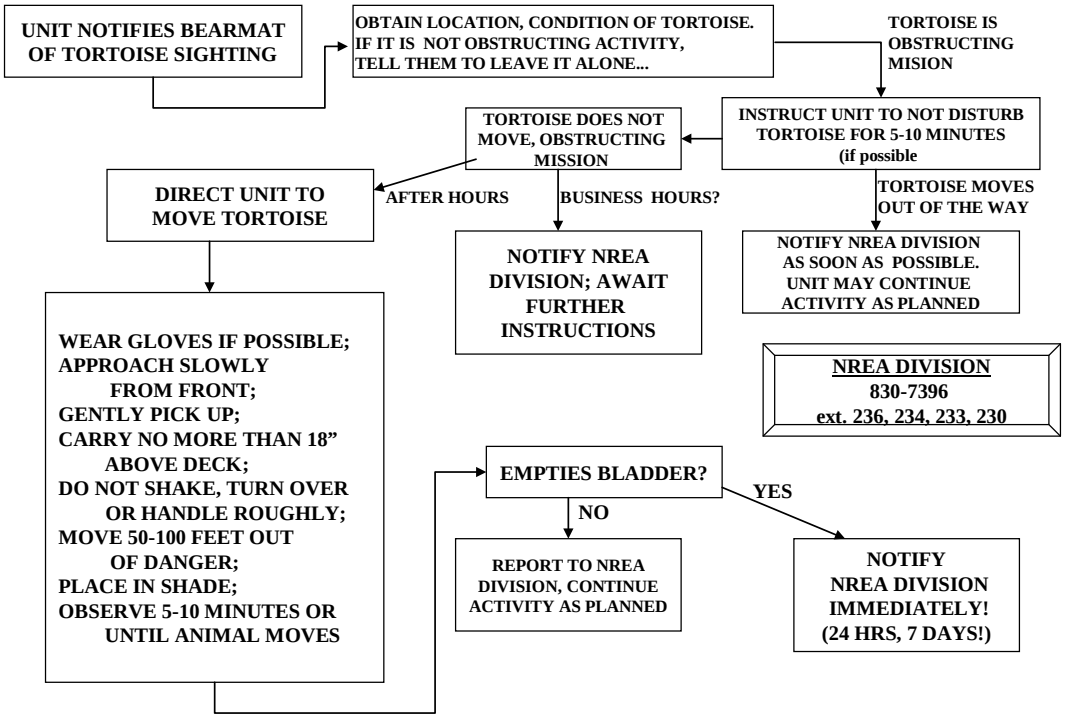
**(UNITS IN FIELD)**



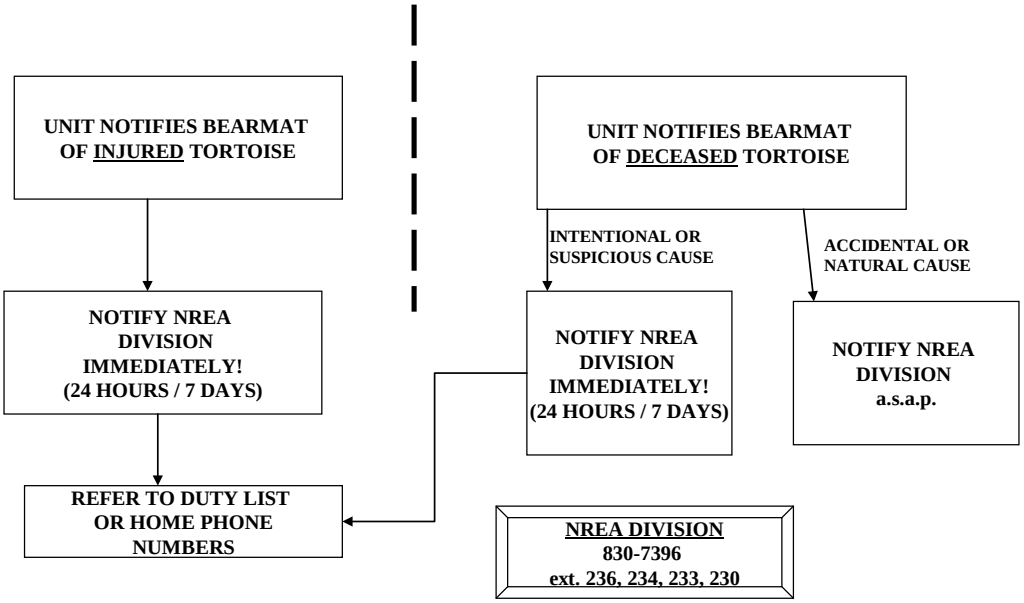

**BEARMAT**
**48.60 mHz**
**830-6623**
**830-6535**

**NREA DIVISION**
**830-7396**
**ext. 236, 234, 230, 233**

# BEARMAT -- DESERT TORTOISE CONTACT FLOWCHART (see next slide if injured or dead)



# BEARMAT -- DESERT TORTOISE CONTACT FLOWCHART (INJURED OR DEAD)

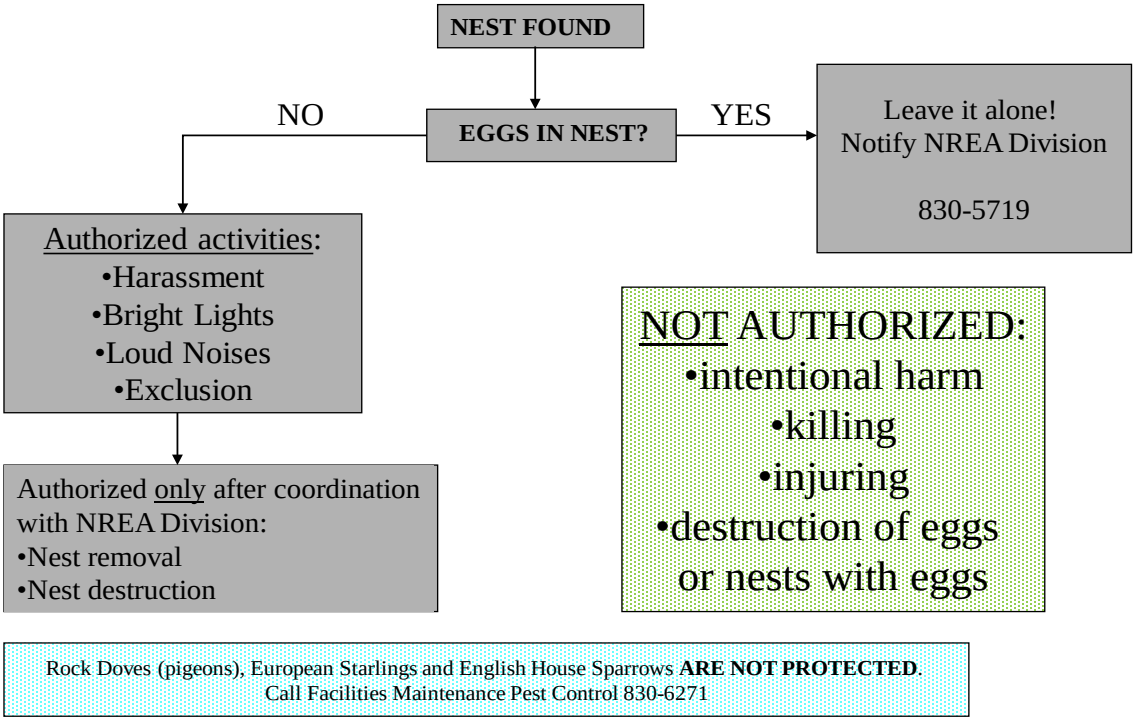


**This Page Intentionally Left Blank**

# APPENDIX F

# Bird Nest Response Matrix

## Response Matrix for
## Bird Nests in Vehicles and Buildings




Rock Doves (pigeons), European Starlings and English House Sparrows **ARE NOT PROTECTED**.
Call Facilities Maintenance Pest Control 830-6271

***This page is left intentionally blank.***

# APPENDIX G

# Letter of Instruction on Depredation

**UNITED STATES MARINE CORPS**
MARINE AIR GROUND TASK FORCE TRAINING COMMAND
MARINE CORPS AIR GROUND COMBAT CENTER
BOX 788100
TWENTYNINE PALMS, CALIFORNIA 92278-8100

5090
4E
OCT 11 2017

LETTER OF INSTRUCTION 49-17

From: Commanding General
To: Distribution List

Subj: PREDATORY ANIMAL MANAGEMENT ACTION

Ref: (a) NAVMC 5090.4A
(b) CCO 3500.4K
(c) NREA Interim General Hunting Rules
(d) CCO 1630.6C
(e) Bureau of Land Management - California Hunting & Shooting Handout
(f) California Fish and Wildlife Hunting Regulations
https://www.wildlife.ca.gov/regulations

Encl: (1) Operational Risk Management Matrix
(2) NREA Interim General Hunting Rules
(3) Hold Harmless Agreement

1. Situation. Increased population of coyotes in the designated Range Training Areas (RTA) has culminated in desensitized or aggressive coyote behavior, endangering Marines, their families, domestic animals, and protected wildlife.

2. Mission. In accordance with the references and in order to control coyote population in designated RTAs aboard the Combat Center, abatement of coyotes is authorized on 14 and 15 October 2017, per reference (c).

3. Execution

a. Commander's Intent and Concept of Operations

(1) Commander's Intent. The intent of this plan is to reduce the number of coyotes in designated RTAs through the use of limited and regulated depredation actions.

(2) Concept of Operations. The Natural Resources and Environmental Affairs (NREA) Division will oversee and staff the event per reference (b). Volunteers will be required to undergo range safety training prior to commencement of event. Volunteers will be paired into two-man teams and depart to designated areas. Teams will return at the conclusion of each day. There will not be an overnight portion for this event.

b. Subordinate Element Missions

(1) Marine Air Ground Task Force (MAGTF) Training Directorate

(a) Provide, de-conflict, and approve the use of the following RTAs: East, Sand Hill, and Acorn.

DISTRIBUTION STATEMENT B: Distribution authorized for MAGTFTC, MCAGCC directorates, special staff sections, and operational forces.

(b) Approve and provide vehicle and range deviations as needed.

(c) Provide radio communications with NREA during the event and if needed, dispatch assets for emergency situations in the RTAs.

(2) Installation Support Directorate, NREA

(a) Serve as lead agency.

(b) Request the use of the following RTAs through Range Facility Management Support System: East, Sand Hill, and Acorn.

(c) Submit vehicle deviations to the MAGTF Training Directorate. Include RTA assignments and call signs on the deviation request.

(d) Provide volunteers with information detailing restrictions or hunting limits within individual RTAs per reference (c).

(e) Conduct a check-in brief on 13 October 2017, check for valid California Hunting license, 4x4 vehicles, and firearms. Provide volunteers with required briefings, event information, and radio with extra battery, maps, enclosure (1), and assignment to their designated hunting areas.

(f) Assign two volunteers to each RTA. Assign each volunteer a call sign based on the RTA, which they are assigned to.

(g) Conduct check-in and checkout of volunteers at Building 2096.

(h) Provide BEARMAT with radio communications and updates throughout the conduct of this event.

(i) Provide all volunteers with a copy of enclosure (2).

c. Coordinating Instructions. The point of contact for this Letter of Instruction (LOI) is Chief Conservation Law Enforcement Officer (CLEO) Russell Elswick at (760) 830-3042 or russell.elswick@usmc.mil.

(1) NREA will choose six volunteers to depredate coyotes in the designated RTAs during established hunting times.

(2) Volunteers will be invited by NREA to participate in the event by name and will provide and utilize licenses, weapons, and vehicles that have received prior approval from NREA and MAGTF Training Directorate. Weapons caliber will be limited to .300 WinMag and lower.

(3) NREA will conduct a mandatory Unexploded Ordnance, Desert Survival, and Natural/Cultural Brief at 1700 on 13 October 2017, in Building 2096. CLEOs will check weapons, license, vehicles, and equipment. Volunteers will be provided enclosure (3) for review and signature. Two volunteers will be assigned to hunt in each designated RTA and provide the volunteers with maps and radios.

(4) On 14 and 15 October 2017, volunteers will check-in at Building 2096 between 0400 and 0700. CLEOs will check volunteer vehicles and provide the volunteers with radios, frequency, and call signs.

(5) After verifying volunteers provided their information, NREA will dispatch volunteers to their assigned RTA and depredation will commence.

(6) Volunteers will notify BEARMAT when departing and returning to Mainside and upon arrival and departure of assigned RTA with call sign, via radio.

(7) NREA will conclude the day by checking out volunteers at Building 2096 between 1800 and 2000 on 14 October 2017, and between 1600 and 2000 on 15 October 2017.

(8) NREA will advise BEARMAT when all RTAs have been cleared at the end of the day.

(9) Volunteers will present their collective take of coyote(s) to NREA at checkout. Do not leave the carcass in the field.

(10) Times:

1. 13 Oct 17/1700-2030: Briefs, license, gear, weapons, and vehicle check.

2. 14 Oct 17/0400-0700: Check-In, 1800-2000: Checkout.

3. 15 Oct 17/0400-0700: Check-In, 1600-2000: Checkout.

(11) If injured, volunteers will attempt to utilize self or buddy assist aid and recovery. If unable to clear the RTA due to the severity or nature of an injury, volunteers will contact BEARMAT for Medevac via primary or secondary communications.

(12) Volunteers must be active duty, retired, military family members, or civilians employed aboard the Combat Center. Volunteers will submit the make, model, caliber, and serial number of the firearm(s) used for the hunt. Volunteers will read and obey all rules and guidelines found in enclosure (2). Volunteers will store and transport weapons in accordance with reference (d).

(13) Volunteers will provide their vehicle information to NREA no later than 29 September 2017. NREA will obtain a deviation letter from MAGTF Training Directorate for volunteers' privately owned vehicles. Vehicles used by volunteers will be equipped with four-wheel drive and carry a minimum of five gallons of water per vehicle.

(14) Volunteers will check in at 1700 at Building 2096 on 13 October 2017, and provide proof of a valid California Hunting License, receive mandatory briefs, and bring weapon and vehicle for inspection.

(15) Participation is at the volunteer's own risk. Should a volunteer injure themselves and require more than buddy or self-aid, they will request assistance through BEARMAT. The volunteer will state name, location, and request for assistance.

(16) Volunteers will abide by all California Hunter Safety Rules and Practices and shall follow all applicable rules and regulations per references (e) and (f). Before they discharge their firearm at a confirmed coyote within their designated RTA, the shooter will ensure he or she is no closer than 150 yards of an occupied structure, will clear the target area,

will not shoot over any road, and will set up the shot so the target has a suitable back stop. A suitable backstop provides enough soil to absorb any errant rounds, and will not contain ricochet hazards like large rocks or boulders. Shooters will always comply with the four Firearms Safety Rules.

(17) Present coyote carcass upon completion of hunt. Report the following: location (RTA), expenditure of ammunition, time, date, and number of shots fired.

4. Administration and Logistics. Directives issued by this Headquarters are published and distributed electronically. Electronic versions of Combat Center LOIs can be found at http://www.29palms.marines.mil/Staff/G1-Manpower/Adjutant-Office/Letters-of-Instruction/.

5. Command and Signal

a. Command. This LOI is applicable to active duty, civilian, and contractor personnel participating in or supporting this event.

b. Signal. This LOI is effective the date signed.

R. MARTINEZ
Chief of Staff

Distribution: B