MARINE CORPS AIR STATION
MIRAMAR, CALIFORNIA

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN 2018

Subject to annual review and revision






Natural Resources Division
Environmental Management Department
Marine Corps Air Station Miramar

Tetra Tech, Inc.
Santa Barbara, CA

Gene Stout and Associates
Loveland, CO

Geomorph Information Systems
San Diego, CA

Prepared for
Commanding Officer
Marine Corps Air Station Miramar

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MCAS MIRAMAR MISSION

To maintain and operate facilities, and provide services and material support to the 3rd Marine Aircraft Wing and other tenant organizations.

Recommended citation: MCAS Miramar 2018. Integrated Natural Resources Management Plan for Marine Corps Air Station Miramar, California.

June 2018

Commanding Officer, MCAS Miramar
Environmental Policy Statement

TEAM MIRAMAR

The mission of MCAS Miramar is simple: Support 3rd MAW and the Operational FMF. What we do each and every day contributes to success in combat. In order to be effective we must take care of our Marines, Sailors and families. By improving the lives of our families we support Marines and increase unit and family readiness. Team Miramar will help Marines be ready to do the Nation's bidding, as Marines have always done, by providing premier MAGTF training facilities, off duty recreation, and vibrant support of the family core. To accomplish this we must also take care of our training and recreational environments.

It is MCAS Miramar's commitment to:

- Comply with applicable environmental law, regulation and policy.
- Employ strict Pollution Prevention (P2) efforts.
- Conserve natural and cultural resources.
- Clean up or control areas of past contamination.
- Minimize any risk to our mission.
- Strive for continual improvement of our environmental performance.

In order to achieve our goals, the following Objectives and Targets have been established:

Objective	Target	Target Implementation Date
Reduce the amount of trash going to the landfill	▪ Increase solid waste diversion rate from 35% to 40% through various means to include but not limited to increased recycling awareness particularly with cardboard recycling and source reduction	▪ Reach 40% diversion annually, starting in 2017
F-35 program support infrastructure environmentally supported	▪ Complete F-35 Supplementary Environmental Assessment ▪ All necessary environmental permits secured ▪ Environmental mitigation completed	▪ Annually, starting in 2017
Reduce risk of environmental regulatory noncompliance	▪ All personnel aboard the installation receive general awareness annual training by Jan 30 ▪ Train Facilities Engineering and Acquisition Division to enforce appropriate government contractor environmental practices by Dec 31 ▪ Environmental Management Department audits every permitted site and source by Dec 31	▪ Annually

Marine Corps Air Station Miramar is committed to continual improvement; recognizing the public as our partner, our continual improvement will be pursued and documented within our Environmental Management System (EMS) at www.MiramarEMS.com. Commander and leaders of all units will promote awareness of this policy and that superior environmental management expands training opportunities, maximizing resources, and supports 3d MAW and the Marine Corps Mission. For more information contact the Environmental Management Department at 858-577-1108.

J. G. WOODWORTH

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

MARINE CORPS AIR STATION MIRAMAR, CALIFORNIA

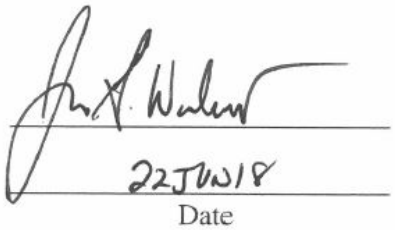
ENDORSEMENT

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

Written letters of concurrence from the Carlsbad Office, U.S. Fish and Wildlife Service Region 8 and the California Department of Fish and Wildlife are in Appendix F of this Integrated Natural Resources Management Plan.

Approving Official:

JASON G. WOODWORTH
Colonel, U.S. Marine Corps
Commanding Officer
Marine Corps Air Station Miramar



Date

Department of Defense
United States Marine Corps

Finding of No Significant Impact for Implementation of the Integrated Natural Resources Management Plan Marine Corps Air Station Miramar San Diego County, California

The United States Marine Corps, following Section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality regulations (40 CFR § 1500-1508) implementing the procedural provisions of NEPA, gives notice that an Environmental Assessment (EA) has been prepared and that an Environmental Impact Statement (EIS) will not be prepared for the implementation of an Integrated Natural Resources Management Plan for Marine Corps Air Station (MCAS) Miramar. Based on the following summary of effects (as discussed in the EA), I have determined that the full implementation alternative will not have a significant effect on the human environment. Therefore, an EIS is not needed.

Proposed Action. The proposed action is the implementation of an Integrated Natural Resources Management Plan (INRMP) for MCAS Miramar. The INRMP is a planning document that facilitates the management and conservation of natural resources on land and waters under the control of the Department of Defense. The INRMP meets statutory requirements of the Sikes Act Improvement Act (SAIA) of 1997, Public Law 105-85, Div. B Title XXIX, Nov. 17, 1997, 111 Stat 2017-2019, 2020-2022. The SAIA requires each installation to prepare an INRMP that provides for the management and use of natural resources on the installation, to the extent that such activities are consistent with the installation's military mission.

The INRMP is designed to balance the management of ecosystem resources unique to the Station and support Station military mission requirements and other land use activities affecting the installation natural resources. The INRMP is a fully integrated plan developed with input from Station planners and trainers, natural resources managers, regulatory agencies, and the public. The INRMP identifies planned natural resource management actions that must be and could be implemented to support stewardship and conservation compliance in support of the military readiness mission of the Station.

Agency Coordination. The SAIA requires that INRMPs be prepared in coordination with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW). Such coordination should reflect the mutual agreement of all parties concerning the conservation, protection, and management of fish and wildlife resources on an installation. Further, the SAIA requires the public be afforded an opportunity to review and comment on the plan during its preparation.

MCAS Miramar provided the USFWS and the CDFW with two opportunities to review and comment on the drafts of the INRMP. Public review and comment occurred from December 16, 2017 to January 22, 2018. Copies of the Draft 2018 INRMP and this Draft EA were placed on the MCAS Miramar Environmental Management System web site http://www.miramar-ems.marines.mil/ .

Alternatives. Three alternatives were evaluated in the EA:

- Alternative 1 – Full Implementation of the MCAS Miramar INRMP (Preferred Alternative)
- Alternative 2 – Partial Implementation of the MCAS Miramar INRMP
- Alternative 3 – No Action Alternative (continue implementing the 2011 INRMP)

The Preferred Alternative (Alternative 1) provides a net benefit to the environment while supporting current levels of military activity. Alternative 2, Partial Implementation of the INRMP, would entail implementation of only Common Output Levels of Service (COS) Level 3 and ongoing actions and projects. This would provide a net benefit to the environment while supporting current levels of military activity, but to a lesser degree than Alternative 1. Alternative 3, the No Action Alternative, would entail continued implementation of objectives and practices under the existing natural resources management program and 2011 INRMP, which would provide a net benefit to the environment while supporting current levels of military activity, but to a lesser degree than either Alternative 1 or Alternative 2.

Environmental Effects. The EA presents a review and analysis of the anticipated environmental impacts associated with the preferred and other alternatives. Resources evaluated include geology, soils, climate, hydrology, watersheds and wetlands, air quality, noise, recreation, public health and safety (hazardous waste/materials, environmental health and safety risks to children), land and air space use, cultural resources, biological resources, environmental justice, and socio-economics. There would be no significant negative impacts, individually or cumulatively, associated with implementing the INRMP. There would not be any disproportionately high and adverse human health or environmental effects from the action on minority and/or low-income populations. Nor would there be any impacts associated with the protection of children from environmental health and safety risks. The preferred alternative will provide a positive effect to natural resources. Since the actions proposed are either environmentally beneficial or neutral, there should be little, if any, environmental controversy surrounding implementation of the INRMP.

Findings. Based on a review of the information contained in the EA, it is concluded that implementation of the 2018 INRMP on MCAS Miramar is not a major federal action that would significantly affect the quality of the environment within the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969, as amended. Accordingly, the preparation of an EIS is not required.

Based on the EA for implementation of the INRMP and this Finding of No Significant Impact, I approve the INRMP and endorse full implementation of the planned natural resource management actions it contains (pending availability of funds).

The EA prepared for the Marine Corps addressing this action is on file and interested parties may obtain a copy from: Commanding Officer, MCAS Miramar; Attn: Environmental Management Department, H & HS; P.O. Box 452013, San Diego, California 92145-2013, telephone (858) 577-1108. A limited number of copies of the EA are available to fill single-copy requests.

Signature: _____ 22 JUN 18

JASON G. WOODWORTH — Date

Colonel, U.S. Marine Corps

Commanding Officer

Marine Corps Air Station Miramar

TABLE OF CONTENTS

Appendices

LIST OF TABLES

LIST OF FIGURES

ACRONYMS

BASH	Bird/Animal Air Strike Hazard
BCC	Bird of Conservation Concern
BGEPA	Protected by Bald and Golden Eagle Protection Act
BMP	Best Management Practice
BRAC	Base Realignment and Closure
CalTrans	California Department of Transportation
CDFW	California Department of Fish and Wildlife
CIM	Climate Informed Monitoring
CFR	Code of Federal Regulations
CNPS	California Native Plant Society
COLS	Common Output Levels of Service
CWA	Clean Water Act
DoD	Department of Defense
EA	Environmental Assessment
EIS	Environmental Impact Statement
EOD	Explosives Ordnance Disposal
ESA	Endangered Species Act
FC	Federal Candidate for Listing
FE	Federal Endangered Species
FGDC	Federal Geographic Data Committee
FT	Federal Threatened Species
GIS	Geospatial Information System
GPS	Global Positioning Systems
HEM	Habitat Evaluation Model
HMMWV	High Mobility Multipurpose Wheeled Vehicle
I	Interstate
INRMP	Integrated Natural Resources Management Plan
kV	kilovolt
LTEM	Long-Term Ecosystem Monitoring
MA	Management Area
MC	Munition Constituent
MCAS	Marine Corps Air Station
MCCS	Marine Corps Community Services
MCIWEST	Marine Corps Installations West
MCO	Marine Corps Order
MEC	Munitions and Explosives of Concern
MHPA	Multi-Habitat Planning Area
MRP	Munitions Response Program

MRS	Munitions Response Site
MSCP	Multiple Species Conservation Program
NAS	Naval Air Station
NCCP	National Community Conservation Planning Program
NEPA	National Environmental Policy Act
NRCS	National Resource Conservation Service
NVC	National Vegetation Classification
OPBUD	Operations Budget
PA	Preliminary Assessment
PE	Federally Proposed Endangered Species
PL	Public Law
PSR	Pre-Activity Survey Report
PT	Federally Proposed Threatened Species
REPI	Readiness and Environmental Protection Integration
RI/FS	Remedial Investigation/Feasibility Study
RNA	Research Natural Area
SANDAG	San Diego Association of Governments
SAR	Species at Risk
SC	State Candidate for Listing [Plant]
SCD	State Candidate for Delisting
SCE	State Candidate for Listing [Animal]
SCT	State Candidate for Listing as Threatened
SDCWA	San Diego County Water Authority
SDG&E	San Diego Gas and Electric
SE	State Listed Endangered
SFP	State Fully Protected Species
SI	Site Inspection
SR	State Listed Rare
SSC	Species of Special Concern (former candidates for Federal listing)
ST	Stated Listed Threatened
T/E	Threatened/Endangered
U.S.	United States
USC	United States Code
USFWS	United States Fish and Wildlife Service
USMC	United States Marine Corps

EXECUTIVE SUMMARY

Purpose

This Integrated Natural Resources Management Plan (INRMP) guides implementation of the natural resources program on Marine Corps Air Station (MCAS) Miramar (Station). The program conserves MCAS Miramar natural resources and helps ensure compliance with environmental laws and regulations. The INRMP actions help maintain quality training lands to accomplish MCAS Miramar's critical military mission on a sustained basis and ensure that natural resources conservation measures and military mission activities are integrated and consistent with federal stewardship requirements.

This INRMP shows interrelationships between individual components of natural resources management (*e.g.*, vegetation, wetlands, fish and wildlife), mission requirements and other land use activities affecting MCAS Miramar natural resources. The INRMP integrates current and future land use activities at MCAS Miramar with natural resources management and conservation.

The INRMP is intended to be a technical document used by persons planning and/or preparing Station approvals, management actions, orders, instructions, guidelines, standard operating procedures, and other plans. The INRMP provides technical guidance for the integration of natural resource issues and concerns into facilities and operational planning, in accordance with the NEPA decision-making processes.

This INRMP is not intended to be used by persons operating in the field, other than staff of the Environmental Management Department. Field personnel are expected to be operating under Station guidelines, plans, orders, or other approvals that have been developed using the INRMP and have already had environmental compliance review and, where applicable, regulatory approvals and/or permitting.

Environmental Compliance

General

Preparation and implementation of this INRMP are required by the Sikes Act (16 USC 670 *et seq.*), Department of Defense (DoD) Instruction 4715.03 (2013), Office of the Secretary of Defense policy memo (*Implementation of Sikes Act Improvement Act: Updated Guidance*, October 10, 2002), and Marine Corps Order (MCO) 5090.2 (*Marine Corps Environmental Compliance Protection Manual*). This INRMP was prepared using the *Handbook for Preparing, Revising and Implementing Integrated Natural Resources Management Plans on Marine Corps Installations* (U.S. Marine Corps [USMC] 2007). This INRMP is a major revision of the 2011-2015 INRMP (MCAS Miramar 2011a).

This INRMP helps MCAS Miramar comply with other federal and applicable state laws, most notably laws associated with environmental documentation, wetlands, endangered species, and wildlife management in general. Compliance requirements at least partially affecting implementation of the INRMP are listed in Appendix A. This INRMP also maintains the natural resource related Defense Base Closure and Realignment Act (BRAC) commitments resulting from the realignment of Naval Air Station (NAS) Miramar to MCAS Miramar.

National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires disclosure of environmental impacts created by proposed major federal actions. The *Handbook for Preparing, Revising and Implementing Integrated Natural Resources Management Plans on Marine Corps Installations* (USMC 2007) and the Council on Environmental Quality (Implementing Guidelines for NEPA, 40 CFR Parts 1500-1508) recommend an Environmental Assessment be completed for natural resources management plans. MCO 5090.2 and

Miramar Station Order 5090.4 outline NEPA compliance requirements of proposed Marine Corps actions. Thus, an accompanying Environmental Assessment was prepared to analyze environmental impacts of implementing this INRMP, as a separate document.

Sikes Act

The Sikes Act[1] states, *The Secretary of Defense shall carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. To facilitate the program, the Secretary of each military department shall prepare and implement an integrated natural resources management plan for each military installation ...*

The Sikes Act (16 USC 670 *et seq*.) requires that, consistent with the use of military installations to ensure the preparedness of the Armed Forces, each INRMP shall, where appropriate and applicable, provide for:

- fish and wildlife management, land management, forest management, and fish and wildlife-oriented recreation;
- fish and wildlife habitat enhancement or modifications;
- wetland protection, enhancement, and restoration where necessary for support of fish or wildlife;
- integration of, and consistency among, the various activities conducted under the INRMP;
- establishment of specific natural resources management objectives and time frames for proposed action;
- sustained use by the public of natural resources to the extent such use is not inconsistent with the needs of fish and wildlife resources management;
- public access to the military installation that is necessary or appropriate for sustained use by the public of natural resources to the extent that the use is not inconsistent with the needs of fish and wildlife resources, subject to requirements necessary to ensure safety and military security;
- enforcement of natural resource laws and regulations;
- no net loss in the capability of military installation lands to support the military mission of the installation; and
- such other activities as the Secretary of the military department considers appropriate.

The Sikes Act also requires or provides for:

- regular review of this INRMP and its effects, not less often than every five years;
- exemption from procurement of services under Office of Management and Budget Circular A-76 and any of its successor circulars; and
- priority for contracts involving implementation of this INRMP to state and federal agencies having responsibility for conservation of fish or wildlife.

Endangered Species Act

This INRMP has the concurrence of the U.S. Fish and Wildlife Service (USFWS). This concurrence includes agreement that the INRMP complies with the Endangered Species Act (ESA). Review of this INRMP was via informal consultation with regard to the ESA. Implementation of this INRMP is not likely to adversely affect any threatened or endangered species.

The USFWS considered but determined not to designate critical habitat aboard the Station for the San Diego fairy shrimp (USFWS 2007b), Riverside fairy shrimp (USFWS 2005, 2012a), coastal California gnatcatcher (USFWS 2007a), spreading navarretia (USFWS 2010), willowy monardella (USFWS 2006,

[1] The Sikes Act referenced in this INRMP is as amended, including Public Law 105-85, the Sikes Act Improvement Act of 1997.

2012b), and the Quino checkerspot butterfly (USFWS 2009). The USFWS made this determination because the Station's INRMP, as implemented, is a legally operative INRMP that "*provides a benefit to the species for which critical habitat [was] proposed for designation*," per section 218 of the 2004 National Defense Authorization Act and ESA Section 4(a)(3)(b)(i). This revised INRMP continues the applicable protections and procedures for these species.

Scope

The INRMP provides the basis and criteria for protecting and managing natural resources using landscape and ecosystem perspectives, consistent with the military mission. The INRMP applies to organizations internal and external to MCAS Miramar that are involved with or interested in the management or use of Station natural resources and lands. This application includes active duty units, reserve components, Station organizations, private groups, and individuals, including tenants, lessees, easements, or others using real property pursuant to a permit, license, right of way, or any other form of permission.

Relationship to the Military Mission

The Marine Corps has a unique defense mission among the nation's armed services of being able to field, on virtually immediate notice, a self-sufficient air and ground combat force trained as an integrated team under a single command. To prepare for this mission, the Marine Corps must maintain the flexibility to train its units so they are prepared for the challenges they may face in combat. MCAS Miramar is an important facility for satisfying these training requirements.

The mission of MCAS Miramar is "*To maintain and operate facilities, and provide services and material support to the 3d Marine Aircraft Wing and other tenant organizations.*" The mission of the Third Marine Aircraft Wing, the Station's primary tenant, is to "*Provide combat-ready, expeditionary aviation forces capable of short-notice, world-wide deployment to Marine Air Ground Task Force, fleet, and unified commanders*."

Marine Corps goals for natural resources management, along with those specifically adopted for MCAS Miramar, provided guidance for the development of the INRMP. A critical goal of the INRMP is to support the Marine Corps military mission by ensuring compliance with applicable environmental laws and regulations. This INRMP supports the military mission by protecting and enhancing training lands upon which the mission is critically dependent. The Station has a long, publicly acknowledged history of outstanding natural resources stewardship that will be continued through the implementation of this INRMP.

The INRMP describes impacts of the military mission upon natural resources and the means to mitigate these impacts. However, this INRMP does not evaluate the MCAS Miramar military mission, nor does it replace any requirement for environmental documentation of the military mission at the Station.

Cooperators

This document was prepared in cooperation with the U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife (CDFW), representing the federal and state Sikes Act cooperating agencies, respectively. Appendix F includes coordination/review/concurrence documents from the USFWS and CDFW. Other federal and state agencies, lease and easement holders, nongovernmental organizations, and the general public were afforded opportunities to review and comment on the INRMP.

MCAS Miramar Natural Resources

MCAS Miramar has 144 native and non-native vegetation types within 44 alliances. Major vegetation types on MCAS Miramar include scrub, chaparral, woodlands, freshwater marsh, and grassland. The entire eastern portion of MCAS Miramar (*i.e.*, east of I-15) functions as an important habitat linkage with adjacent

open spaces. The Station has important wildlife corridors that allow for wildlife movement and dispersal. In October 2003 the Cedar Fire swept through MCAS Miramar and much of the region in general. The fire burned about 17,600 acres on the Station; in general, the vegetation has recovered since 2003.

At a minimum, MCAS Miramar supports 7 species of amphibians, 30 species of reptiles, and 39 species of mammals. Well over 200 species of birds have been observed on the Station. Vernal pools and other seasonally ponded features (147 acres) at MCAS Miramar are the largest and most contiguous in southern California, supporting important and least disturbed examples of endangered and sensitive species dependent on vernal pool habitat in the region (Bauder and Wier 1991).

Federally listed species found on MCAS Miramar include the threatened coastal California gnatcatcher (*Polioptila californica californica*), endangered least Bell's vireo (*Vireo bellii pusillus*), endangered Quino checkerspot butterfly (*Euphydryas editha quino*), federally proposed Hermes copper butterfly (*Hermelycaena* [*Lycaena*] *hermes*), endangered Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*), endangered willowy monardella (*Monardella viminea*, Elvin and Sanders 2003; *Monardella linoides* ssp. viminea, Abrams 1951), and six species associated with vernal pool habitat, such as the San Diego mesa mint (*Pogogyne abramsii*) and San Diego fairy shrimp (*Branchinecta sandiegonensis*). Species of Regional Special Concern (including species at risk of listing) at the Station include former candidates for federal listing as threatened or endangered, species of concern to the State of California, and species that are regionally rare or of limited distribution.

The Station's overall approach to managing natural resources follows the principles of ecosystem management, consistent with Marine Corps policy. The MCAS Miramar strategy for conservation and management is to 1) limit activities, minimize development, and mitigate actions in areas supporting high densities of vernal pool habitat, threatened or endangered species, and other wetlands and 2) manage activities and development in areas of low densities, or no regulated resources, with site-specific measures and programmatic instructions. Management Areas (MAs) were identified primarily to support the conservation and management of Special Status Species, wetlands, and other areas warranting special attention. Level I MAs (2,683 acres) support nearly all vernal pool habitat basins and watersheds and some closely associated coastal California gnatcatcher territories. Conservation needs in Level II MAs (5,898 acres) focus on non-vernal pool, federally listed species. Level III MAs (1,740 acres) support riparian vegetation and habitat linkages not contained within Level I and II MAs. Remaining undeveloped areas not in Levels I, II, or III MAs have been delineated as Level IV MAs (7,859 acres). Level V MAs (4,858 acres) are developed areas that support few unaltered natural landscapes and therefore almost no high value natural resources. Figure 5.1 and Table 5.1 in Chapter 5 illustrate and summarize important resources within these MAs, respectively.

Accomplishments

Chapter 7 discusses specific accomplishments over the past five years with regard to natural resources management on MCAS Miramar. Particularly noteworthy was UFSWS recognition that the INRMP (MCAS Miramar 2006, MCAS Miramar 2011a) was sufficiently beneficial to the coastal California gnatcatcher (USFWS 2007a), San Diego fairy shrimp (USFWS 2007b), Quino checkerspot butterfly (USFWS 2009a), and Riverside fairy shrimp (USFWS 2011a, USFWS 2012a) that designation of critical habitat for these species was precluded aboard MCAS Miramar.

Other notable accomplishments included:

Vernal Pool Habitat – One of the Station's most important sensitive resources
Natural Resources Division

- successes in invasive plant prevention and control;
- increased conservation awareness;
- updated floral monitoring (O'Leary 2009), which demonstrated that virtually no changes were attributable to Marine Corps military activities;
- soil erosion and vegetation damage repair on seven sites;
- a study that concluded that the coastal California gnatcatcher will find and inhabit suitable nesting habitat, in spite of the MCAS aircraft noise environment (Hubbs-Sea World Research Institute 2006);
- federally-listed Special Status species monitoring, including recent observations (April 2017) of the endangered Quino checkerspot butterfly, which, in general, confirmed ongoing habitat recovery from the 2003 Cedar Fire;
- completion of BRAC 1995 vernal pool mitigation commitments;
- managing federally- and state-listed Species of Special Concern;
- updated vegetation mapping for the entire Station (Tetra Tech 2014);
- inventorying, monitoring, and managing vernal pool habitat and its Special Status Species, including identification of areas that appear suitable for re-establishing vernal pools, completed in 2009;
- supporting the Miramar National Cemetery vernal pool restoration project, completed in 2016;
- completion of vernal pool and wetland habitat restoration for MV-22 Basing facilities mitigation (2018);
- delineation of non-vernal pool wetlands and other Waters of the U.S. (Lichvar and Dixon 2008);
- meeting compliance requirements associated with migratory birds;
- first off-installation habitat compensation project in the Department of the Navy (mitigation for Miramar Brig Expansion impacts);
- providing technical support for the development and implementation of the 2008 *Bird/Animal aircraft Strike Hazard (BASH) Plan*;
- supporting natural resources-based outdoor recreation, particularly with regard to permitting and management of the Miramar Fish Pond and the establishment of the Stowe Trail for mountain biking; and
- developing and maintaining Geospatial Information System databases and using them to support Station decision-making.

INRMP Implementation Summary

The Station natural resources management goals and specific objectives to attain these goals can be found in Chapter 7 of the INRMP.

This INRMP will be considered to be implemented when MCAS Miramar:

- actively requests, receives, and uses funds for Common Output Levels of Service (COLS) Level 3 (core requirements) Projects and activities;
- ensures that sufficient numbers of professionally trained natural resources management staff are

available to perform the tasks required by the INRMP;
- coordinates annually with the USFWS and the CDFW; and
- documents specific INRMP action accomplishments undertaken each year (USMC 2007).

Formal adoption of an INRMP by the installation commander constitutes a commitment to seek funding and execute, subject to the availability of funding, all COLS Level 3 Projects in accordance with specific timeframes identified in the INRMP. Under the Sikes Act, any natural resources management activity that is specifically addressed in the plan must be implemented (subject to availability of funds). Failure to implement the INRMP is a violation of the Sikes Act and may be a source of litigation (USMC 2007).

This INRMP is designed to provide direct input into the USMC Status Tool for Environmental Programs (STEP) budget system. The INRMP (Chapters 7 and 9 and Appendix E) describes specific projects with justifications, timelines, and budgets. Appendix E addresses funding specific to this INRMP and its projects. The below table summarizes INRMP implementation costs by funding source.

Type Funds Programmed	**FY 18**	**FY 19**	**FY 20**	**FY 21**	**FY 22**	**Totals**
COLS Level 3						
O&M, MC**	**$794**	**$581**	**$741**	**$1,039**	**$792**	**$3,948**
OPBUD**	$794	$581	$741	$1,039	$792	$3,948
CMP	$0	$0	$0	$0	$0	$0
Agricultural Outlease Income	**$54**	**$56**	**$57**	**$81**	**$66**	**$314**
Subtotals (COLS Level 3)	**$848**	**$637**	**$799**	**$1,120**	**$858**	**$4,262**
COLS Level 2						
O&M, MC	**$27**	**$93**	**$28**	**$30**	**$390**	**$567**
OPBUD	$27	$93	$28	$30	$30	$207
CMP	$0	$0	$0	$0	$360	$360
Agricultural Outlease Income	**$0**	**$0**	**$280**	**$0**	**$360**	**$640**
Subtotals (COLS Level 2)	**$27**	**$93**	**$308**	**$30**	**$750**	**$1,207**
COLS Level 1						
O&M, MC	**$60**	**$49**	**$58**	**$67**	**$78**	**$312**
OPBUD	$60	$49	$58	$67	$78	$312
CMP	$0	$0	$0	$0	$0	$0
Agricultural Outlease Income	**$202**	**$250**	**$0**	**$250**	**$0**	**$702**
Subtotals (COLS Level 1)	**$262**	**$299**	**$58**	**$317**	**$78**	**$1,014**
Grand Totals	**$1,137**	**$1,029**	**$1,164**	**$1,467**	**$1,686**	**$6,483**

* Funding in thousands of dollars.

** Project MI3CONNROPB48050007, which provides staffing for the Natural Resources Program, is captured within COLS Level 3, O&M, MC (OPBUD) funding for years 2018-2022 ($370,000-$385,000,

respectively).

Costs and Benefits

- **Costs:** Full implementation of the INRMP will cost approximately $**6,483,000** for FY 2018 - FY 2022. Funding will be from Operations and Maintenance, Marine Corps (including Operations Budget and Centrally Managed Environmental Program funds) and income from the nursery Agricultural Outlease.
- **Military Mission Benefits:** Implementation of this INRMP provides accurate and up-to-date resource information to support planning of military mission requirements. It helps reduce maintenance costs, improve health and safety, and improve the quality of training land and its associated training at MCAS Miramar.
- **Environmental Benefits:** The INRMP provides the basis for the conservation and protection of natural resources. It reduces vegetation loss and soil erosion from military and support activities, reduces the potential for environmental pollution, and promotes biodiversity conservation. Plan implementation increases overall knowledge of the operation of Station ecosystems through surveys and research. INRMP implementation monitors ecosystem/natural resource "health" to decrease long-term environmental costs and reduces personal and installation liabilities from environmental noncompliance, including formal designation of ESA critical habitat.
- **Other Benefits:** Interested agencies, groups, and persons better understand the positive management efforts that are conserving natural resources on MCAS Miramar. Quality of life for the Station community and neighbors is improved.

INRMP Organization

This INRMP is organized as follows.

- Chapter 1, ***Introduction*** describes the purpose of compliance requirements for the INRMP, its relationship with regional conservation planning efforts, and relationships between natural resources management regarding overall MCAS Miramar and 3rd Marine Aircraft Wing missions. It describes the MCAS Miramar overall strategy for conservation and management and lists goals of that management. It also provides general information on the location and environmental setting at MCAS Miramar.
- Chapter 2, ***MCAS Miramar Land Use*** describes the land use history, military operational requirements and military land use, and nonmilitary land use at the Station and on adjacent lands.
- Chapter 3, ***Physical Setting*** describes the climate, geology and soils, hydrology and watersheds, and potentially contaminated sites on the Station.
- Chapter 4, ***Biological Resources*** describes vegetation and landcover types, vernal pool habitat, wildlife and wildlife habitat, habitat linkages and wildlife corridors, Special Status Species, a summary of the 2003 Cedar Fire, and a description of the Habitat Evaluation Model and its use.
- Chapter 5, ***Management Areas and Land Use Compatibility*** describes Level I-V Management Areas, discusses land use compatibility issues, and identifies the Station's conservation contributions to regional conservation programs.
- Chapter 6, ***Project and Mitigation Planning*** identifies environmental compliance requirements associated with Station project planning, including NEPA, ESA, Clean Water Act, and Migratory Bird Treaty Act requirements, and describes project mitigation planning for both temporary and permanent project effects.
- Chapter 7, ***Natural Resources Management Goals and Objectives*** identifies Marine Corps and Station natural resources management goals, specific objectives to attain these goals, and individual natural resources management projects in a standard format with justifications, timelines, and budgets.
- Chapter 8, ***Compliance and Law Enforcement*** describes means to maintain conservation

compliance awareness and environmental compliance and natural resources-related enforcement.

- Chapter 9, ***INRMP Implementation and Evaluation*** identifies Marine Corps and Department of Defense policy regarding implementation of this INRMP and identifies personnel, personnel training, supplies and equipment, project support, funding, and command support needed to implement this INRMP.
- ***Literature Cited*** documents all sources referenced in this INRMP.
- ***Preparers and Agency Reviewers*** identifies individuals, with their qualifications, who prepared this document and Navy/Marine Corps, USFWS, and CDFW personnel who were consulted during preparation of this INRMP.
- ***Appendices*** contain information or data relevant to implementation of the natural resources management on MCAS Miramar.

For those who are primarily interested in natural resources actions and projects planned for 2018-2022, they are identified in Appendix E. Appendix E can provide a basis for evaluating plan implementation.

Summary

The Marine Corps believes that military activities can be compatible with the conservation of sensitive biological resources. MCAS Miramar will continue its well-established program of managing and conserving its natural resources in support of the Station military mission. The DoD, and MCAS Miramar in particular, recognizes that degradation of the land degrades its use for realistic training, and thereby degrades readiness.

The INRMP outlines steps required to meet DoD, U.S. Marine Corps, and MCAS Miramar legal obligations to provide for the stewardship of the natural resources on MCAS Miramar, while supporting the accomplishment of the military mission. The INRMP has been developed through cooperation with appropriate regulatory agencies. As a public document, it will support and perpetuate the military mission while fostering stewardship and goodwill for MCAS Miramar. This INRMP will not resolve all existing and/or future environmental issues. It does, however, provide the guiding strategy, personnel, and means to minimize and work toward resolution of such issues.

1.0 INTRODUCTION

1.1 Purpose of the INRMP

This Integrated Natural Resources Management Plan (INRMP) guides implementation of the natural resources program on Marine Corps Air Station (MCAS) Miramar. It integrates current and future land-use activities at MCAS Miramar with natural resources management and conservation. The natural resources program manages, conserves, and rehabilitates MCAS Miramar land and natural resources and helps ensure compliance with environmental laws and regulations.

The INRMP is intended to be a technical document used by persons planning and/or preparing Station approvals, management actions, orders, instructions, guidelines, standard operating procedures, and other plans. Information from appropriate natural and cultural resource research, agency regulation, regional management plans, as well as older references are incorporated in this INRMP to provide integrated, applicable, efficient, and cost-effective measures for decision guidance. This technical guidance for natural resource issues, operational planning, and facilities (in accordance with the National Environmental Policy Act [NEPA] decision-making processes) allows for the soundest and most beneficial natural resource management.

This INRMP is not intended to be used by persons operating in the field, other than the Natural Resources Division Environmental Management Department. Field personnel are expected to be operating under Station guidelines, plans, orders, or other approvals that have been developed using the INRMP, have had environmental compliance review, and, where applicable, have had regulatory approvals and/or permitting.

1.1.1 Requirement for Preparation of an INRMP

The Sikes Act states, *The Secretary of Defense shall carry out a program to provide for the conservation and rehabilitation of natural resources on military installations. To facilitate the program, the Secretary of each military department shall prepare and implement an integrated natural resources management plan for each military installation...*

The Sikes Act (16 USC 670 *et seq*.) requires that, consistent with the use of military installations to ensure the preparedness of the Armed Forces, each INRMP shall, where appropriate and applicable, provide for:

- fish and wildlife management, land management, forest management, and fish and wildlife-oriented recreation;
- fish and wildlife habitat enhancement or modifications;
- wetland protection, enhancement, and restoration where necessary for support of fish or wildlife;
- integration of, and consistency among, the various activities conducted under the INRMP;
- establishment of specific natural resources management objectives and time frames for proposed action;
- sustained use by the public of natural resources to the extent such use is not inconsistent with the needs of fish and wildlife resources management;
- public access to the military installation that is necessary or appropriate for sustained use by the public of natural resources to the extent that the use is not inconsistent with the needs of fish and wildlife resources, subject to requirements necessary to ensure safety and military security;
- enforcement of natural resource laws and regulations;
- no net loss in the capability of military installation lands to support the military mission of the installation; and
- such other activities as the Secretary of the military department considers appropriate.

The Sikes Act also requires or provides for:

- regular review of this INRMP and its effects, not less often than every five years;
- provisions for spending hunting and fishing permit fees exclusively for the protection, conservation, and management of fish and wildlife, including habitat improvement and related activities in accordance with the INRMP;
- exemption from procurement of services under Office of Management and Budget Circular A-76 and any of its successor circulars; and
- priority for contracts involving implementation of this INRMP to state and federal agencies having responsibility for conservation of fish or wildlife.

An installation must prepare an INRMP when it supports federally listed species and/or designated critical habitat; substantial wetland areas; or large areas (*e.g.*, 50 or more acres) used for military readiness purposes, which require care (*e.g.*, actions to prevent soil erosion) (MCO 5090.2). MCAS Miramar, having met all three requirements, is required to prepare and implement an INRMP.

The 2000-2005 INRMP (MCAS Miramar 2000) implemented requirements of Biological Opinion 1-6-95-F-33 (United States Fish and Wildlife Service [USFWS] 1996a) and Section 404 Permit number 95-20158-ES for the Realignment of Naval Air Station (NAS) Miramar to the MCAS Miramar. This compliance required MCAS Miramar to ... *develop and implement their proposed Multiple Species Habitat Management Plan (MHMP) in a manner that is consistent with the guidelines that have been established for subarea plans for the Multiple Species Conservation Program (MSCP)*. The subarea plans that border MCAS Miramar include the City of San Diego, the County of San Diego, the City of Poway, and the City of Santee. The City of Santee is only at the draft stage in developing their MSCP Subarea Plan.

During the past five years, the natural resources program at MCAS Miramar has significantly improved due to updated and more extensive survey data for Special Status Species, vernal pool habitat, and other resources; improved geospatial data management capabilities; staff development and experience; and lessons learned from projects accomplished or ongoing. This INRMP is a major revision of the 2011-2015 INRMP (MCAS Miramar 2011a). This revision is being accomplished using the Department of Defense (DoD) *Integrated Natural Resources Management Plan (INRMP) Implementation Manual* (DoD Manual 4715.03).

Revision of this INRMP, as required by the Sikes Act, has been accomplished in cooperation with the USFWS and California Department of Fish and Wildlife (CDFW). This cooperation ensured that the INRMP reflected mutual agreement of these parties concerning conservation, protection, and management of fish and wildlife resources on the Station. Appendix F includes review/concurrence documents from the USFWS and CDFW. Also, as required by the Sikes Act, this INRMP reflects comments received by the Station following public review.

In 2013, the DoD, USFWS, and the International Association of Fish and Wildlife Agencies signed a Memorandum of Understanding for a Cooperative Integrated Natural Resource Management Program on Military Installations. The DoD, among other items, agreed to:

- take the lead in the development of policies and guidance related to INRMP development, updates, revisions, and implementation, and to ensure the involvement, as appropriate, in these processes of the USFWS and state fish and wildlife agencies;
- encourage DoD Components to take full advantage of these USFWS and state fish and wildlife agency natural resources expertise through the use of Economy Act transfers and cooperative agreements;

- encourage DoD Components and USFWS to explore the use of the Fish and Wildlife Coordination Act for technical assistance, fish stocking, and other conservation projects. Projects should be given priority that:
    - sustain the military mission;
    - effectively apply ecosystem management principles; and
    - consider the strategic planning priorities of the USFWS and the state fish and wildlife agency.
- encourage DoD Components to give priority to INRMP requirements that: sustain military mission activities while ensuring conservation of natural resources, and provide adequate staffing with the appropriate expertise for updating, revising, and implementing each INRMP within the scope of DoD Component responsibilities, mission, and funding constraints; subject to mission, safety, security, and ecosystem requirements, provide public access to military installations to facilitate the sustainable multipurpose use of its natural resources;
- identify natural resource research needs, and develop research proposals with input from the Parties; and
- identify opportunities with the DoD Components to facilitate cooperative regional and local natural resource conservation partnerships and initiatives with USFWS and state fish and wildlife agency offices.

The MCAS Miramar INRMP was developed and will be implemented in a manner consistent with this Memorandum of Understanding.

Endangered Species Act (ESA) compliance review of the INRMP was via informal consultation as implementation is not likely to adversely affect any listed threatened or endangered species. Any future action warranting formal Section 7 ESA consultation would result in a biological opinion that would complement provisions within this INRMP and would have precedence.

1.1.2 INRMP Tribal Consultation and Public Review

DoD Instruction 4710.02 (*DoD Interactions with Federally-Recognized Tribes*) states that DoD Components shall afford tribes that have a cultural or historical affiliation with lands encompassed by the installation an opportunity to consult on the development of INRMPs where tribal treaty rights or other rights to natural resources potentially may be affected. If such tribes are identified, DoD Components shall incorporate a standard process for consultation in INRMPs whenever issues arise between the tribe and the Component. DoD Components shall involve tribal governments early in the planning process and shall endeavor to complete consultations prior to implementation of the proposed action. Early involvement means that a tribal government is given an opportunity to comment on a proposed action in time for the tribal government to provide meaningful comments that may affect the decision. In 2015 and 2016, the local tribes were notified that MCAS Miramar was going to start updating the INRMP and in 2018 we afforded them an opportunity to review the Draft INRMP/EA (Appendix F).

Implementation of Sikes Act Improvement Amendments: Supplemental Guidance concerning INRMP Reviews (Memorandum, Assistant Deputy Under Secretary of Defense, November 1, 2004) (used in conjunction with Office of the Secretary of Defense policy memo *Implementation of Sikes Act Improvement Act: Updated Guidance,* October 10, 2002) requires that if MCAS Miramar, USFWS, and CDFW determine that revisions to the MCAS Miramar INRMP are necessary, public comment shall be invited in conjunction with any required NEPA analysis. Such NEPA analysis would be required if substantial revisions to the INRMP are thought to be required and these revisions are expected to result in biophysical consequences materially different from those anticipated in the existing INRMP and analyzed in an existing NEPA document. In that case, a new or supplemental NEPA analysis must be prepared and the public provided a

reasonable opportunity to comment on the revised INRMP. Public comment was requested for preparation of this MCAS Miramar Draft INRMP revision (Appendix F).

An environmental assessment (EA) for INRMP implementation was prepared concurrently with revision of the INRMP. This EA process included public comment.

1.1.3 INRMP Implementation

MCAS Miramar's natural resource management program will seek appropriate funding and will set priorities based on funding actually received and annual reviews. Implementation of planned actions is a requirement of the Sikes Act, which directs the development and implementation of INRMPs.

This INRMP will be considered to be implemented when MCAS Miramar (DoD Manual 4715.03, 2013):

- actively requests and uses funds for natural resources management projects, activities and other requirements in support of goals, and objectives identified in this INRMP;
- ensures that sufficient numbers of professionally trained natural resources management staff are available to perform the tasks required by the INRMP;
- invites annual feedback from the appropriate USFWS and State fish and wildlife agency offices on the effectiveness of this INRMP;
- documents specific INRMP action accomplishments undertaken each year; and
- evaluates the effectiveness of past and current management activities and adapts those activities as needed to implement future actions.

The following MCAS personnel are responsible for implementing this INRMP:

- Division Director, Natural Resources Division;
- Wildlife Biologist, Natural Resources Division; and
- Botanist, Natural Resources Division.

The Director of the Natural Resources Division is the Installation Natural Resources Manager.

1.1.4 Reviews, Approvals, and Revisions

Drafts and revisions of this INRMP and the companion EA assessing implementation were reviewed and approved by MCAS Miramar Environmental Impact Review Board.

This INRMP will be reviewed annually with the cooperation of the USFWS and CDFW. The INRMP will be annually reviewed for "operation and effect" and to assess the need for a revision or an update. The purpose of "operation and effect" is to determine whether or not the INRMP meets Sikes Act requirements and is contributing to the conservation and rehabilitation of natural resources on military installations (DoD Manual 4715.03). Web-based United States Marine Corps (USMC) Conservation Metrics Portal (Section 9.1.1, *Implementation Metrics*) will be used to help with evaluations of INRMP implementation. This INRMP will be updated, revised, and/or re-approved at least every five years. The next update or revision is planned to begin in 2021.

1.1.5 Relationship to Regional Conservation Planning Efforts

Previous stewardship by the Department of the Navy resulted in valuable biological resources remaining on MCAS Miramar as the surrounding area developed. Natural resources include important habitats for many rare and sensitive species of plants and wildlife, as well as regional habitat linkages and wildlife corridors. Unfortunately, important biological resources (*e.g.*, vernal pool habitat, coastal California gnatcatcher [*Polioptila californica californica*] habitat, wildlife corridors) have not fared as well on civilian

holdings throughout the Southern California coastal region. Many species and their associated habitats are declining due to continued urban development. Habitats that remain in the region are becoming increasingly fragmented. As a result, the city, county, state, and federal governments, as well as the general public, have given greater attention to protecting biological resources on MCAS Miramar (including protecting habitats on lands adjacent to MCAS Miramar) in the context of regional conservation planning.

San Diego County is a focal point for regional conservation planning efforts to ensure the continued survival of sensitive plant and wildlife species and representations of their associated habitats. These efforts have been facilitated by the Natural Community Conservation Planning Act of 1991 passed by the State of California. The Natural Community Conservation Planning Act process was developed to encourage the conservation of natural communities before species within those communities are threatened with extinction. Natural Community Conservation Planning Program (NCCP), administered by the CDFW, takes a regional, multispecies approach to planning for the protection and perpetuation of biological diversity, while allowing appropriate development and growth. It is designed to be a voluntary, collaborative effort, primarily involving landowners, local government, and state and federal agencies.

Three subregional MSCP plans have been developed in San Diego County under the State of California Natural Community Conservation Planning Act program umbrella. MCAS Miramar, along with several other jurisdictions, is within the MSCP plan for the southwestern portion of the county. The Department of Navy supports the Natural Community Conservation Planning Act program's aims and efforts (Williams 1992). However, the conservation of sensitive biological resources at MCAS Miramar is being planned separately out of concern that the creation of preserves on MCAS Miramar, as part of the MSCP, arbitrarily prohibits military activities.

The Marine Corps believes that military activities generally can be compatible with the conservation of sensitive biological resources[2]. In considering participation in regional ecosystem approaches to resolving land-use conflicts, the Marine Corps considered the following principles:

1. The overriding mission of the DoD is the protection of the national security of the United States, and military activities on departmental lands are vital to fulfillment of that mission.
2. Such agreements, and their projects, will not detract from the DoD national mission, now or in the future.
3. Military lands cannot be used for the mitigation of impacts of non-department actions occurring off the installation that affect the environment.
4. Military lands cannot be set aside as perpetual environmental preserves. While conservation is, and shall be, practiced on Marine Corps installations, the Marine Corps maintains the flexibility to adapt the defense mission to political and technological developments.
5. The DoD's first priority shall be to integrate the management of natural and cultural resources with the military mission within the ecosystem supporting the installation.

California's Wildlife Action Plan, *California Wildlife: Conservation Challenges* (Bunn *et al*. 2007) was published by CDFW to regionally identify species and habitats of greatest conservation need, major stressors affecting native wildlife and habitats, and actions needed to conserve wildlife within these regions. MCAS Miramar is within the South Coast Region, and Action C for that region specifically states, "*Federal, state, local agencies, and private conservancies should safeguard and build upon Camp Pendleton's contribution to the regional network of conservation lands. Similarly, protect habitats on lands adjacent to the Marine Corps Air Station Miramar*."

[2] 22 June 1995. Letter from J.A. Brabham, Lieutenant General, U.S. Marine Corps, Deputy Chief of Staff for Installation and Logistics, to Mr. Gail Kobetich, Field Supervisor, Carlsbad Field Office, U.S. Fish and Wildlife Service.

This Action Plan was revised and the revision was finalized in 2015 (CDFW 2015). MCAS Miramar remains interested in the continued development and implementation of the Action Plan. Some management actions within this INRMP are specifically intended to minimize some stressors identified in the Wildlife Action Plan.

1.2 Military Mission

MCAS Miramar Mission

To maintain and operate facilities, and provide services and material support to the 3rd Marine Aircraft Wing and other tenant organizations.

The Station is managed under the purview of the Commanding Officer, MCAS Miramar. The Third Marine Aircraft Wing is the Station's primary tenant.

Third Marine Aircraft Wing Mission

Provide combat-ready, expeditionary aviation forces capable of short-notice, world-wide deployment to Marine Air Ground Task Force, fleet, and unified commanders.

1.3 Management Approach

Ecosystem management is the basis for the management of natural resources on land under Marine Corps' jurisdiction. An ecosystem can be defined as a dynamic, natural complex of living organisms interacting with each other and with their associated nonliving environment. Ecosystem management has been defined in various ways (*e.g*., Leslie *et al*. 1996); however, all encompass a similar approach to management. As this approach is employed by the Marine Corps, the following definition from Marine Corps Environment Compliance and Protection Manual (MCO 5090.2) is applicable:

> A goal-driven approach to managing natural and cultural resources that supports present and future mission requirements; preserves ecosystem integrity; is at a scale compatible with natural processes; is cognizant of natural processes' time scales; recognizes social and economic viability within functioning ecosystems; is adaptable to complex, changing requirements; and is realized through effective partnerships among private, local, state, tribal, and federal interests. Ecosystem management is a process that considers the environment as a complex system functioning as a whole, not as a collection of parts; and recognizes that people and their social and economic needs are a part of the whole.

The MCAS Miramar overall strategy for conservation and management is to 1) limit activities, minimize development, and perform mitigation actions in areas supporting high densities of vernal pool habitat, threatened or endangered species, and other wetlands; and 2) manage activities and development in areas of low densities, or no regulated resources, with site-specific measures and programmatic instructions (Chapter 5).

This strategy enables MCAS Miramar to meet its goals and objectives relative to natural resources management and conservation, both locally on the Station and within the region. A Habitat Evaluation Model (HEM) was developed to identify ecologically important areas on the Station, which were, in turn, considered when delineating Management Areas on MCAS Miramar (Chapter 5).

Success of this INRMP will be measured by the implementation of Common Output Levels of Service (COLS) Level 3 (core requirements) projects, which, in turn, implement INRMP goals and objectives (Chapters 7 and 9). This will help ensure that the Station meets requirements of the Sikes Act. Those implementing this INRMP also need to ensure that there is no net loss in the capability of MCAS Miramar lands to fulfill the military operational requirements, as also required by the Sikes Act. The DoD and MCAS Miramar, in particular, recognize that degradation of the land degrades its use for realistic training, thereby degrading readiness.

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2.0 MCAS MIRAMAR LAND-USE

2.1 Location and Environmental Setting

MCAS Miramar is located approximately 13 miles north of downtown San Diego and 4 miles east of the Pacific Ocean (Figure 2.1a). The MCAS Miramar property is about 12 miles long from east to west and about 4 miles from north to south encompassing 23,065 acres[3]. State Route 52 and Interstate 805 (I-805) form the approximate southern and western borders of the installation, respectively, although the Station continues south of State Route 52. I-15, State Route 163, and Kearny Villa Road bisect the Station into east and west. I-15 and Miramar Road are the main access roads to the Station. Several nearby communities continue to grow in the vicinity of MCAS Miramar including the City of Poway, City of Santee, Mira Mesa, Scripps Ranch, Clairemont, Kearny Mesa, and others (Figure 2.1b).

The western portion of MCAS Miramar is located on a marine terrace, or mesa, on the coastal plain that rises gradually from the Pacific Ocean. Western Miramar is relatively flat with deeply incised canyons. East Miramar is made up of coastal foothills and canyons with moderate to steep slopes. Elevations range from 240 feet in the west to 1,178 feet in eastern areas of the Station. Major vegetation types on MCAS Miramar include chaparral (including ceanothus chaparral, chamise chaparral, scrub oak chaparral, and other chaparral), scrub (including buckwheat scrub, riparian scrub, and other upland scrub), grassland, and riparian vegetation (including riparian woodland).

2.2 Overview

The Marine Corps is assigned the unique defense mission among the nation's armed services of being able to field, on virtually immediate notice, a self-sufficient air and ground combat force trained to fight as an integrated team under a single command. To prepare for this mission, the Marine Corps must maintain training facilities that offer diversity and flexibility to train its units, so they are prepared for the challenges they may face in combat. MCAS Miramar is an important facility for satisfying these training, deployment, and personnel support requirements.

MCAS Miramar is generally bisected by Kearny Villa Road. The area west of Kearny Villa Road (the Main Station and South/West Miramar) supports the military need for commercial, administrative, flight operations, and residential facilities. The area east of Kearny Villa Road (East Miramar) is primarily undeveloped, is used for military training and operational exercises and warehousing, and supports the military need for encroachment and access control. Land-use controls for lands underlying flight paths prevent certain types of land-uses that would be incompatible because of noise levels and safety considerations associated with aircraft operations. In addition, undeveloped lands of East Miramar are used for land navigation training, troop maneuvers, bivouacking/over-night camping, aircraft/communication/personnel support exercises, tactical vehicle driver training, and weapons instruction training.

Military land-uses at MCAS Miramar include operational (*e.g.*, aircraft operations) and non-operational (*e.g.*, community support) uses and functions. Land-uses not directly related to or supportive of the military mission also take place within MCAS Miramar. These non-military uses primarily include outleases and easements for public highways, roadways, utilities, and landfills, encompassing about 2,900 acres.

[3]Acreages within this INRMP may not be completely consistent with each other, primarily due to land transfers, different geospatial data system (GIS) software, or time of data collection. This total acreage for MCAS Miramar is considered official (MI.MI>dod_rpi_site_area).

Figure 2.1a. Regional Location of MCAS Miramar

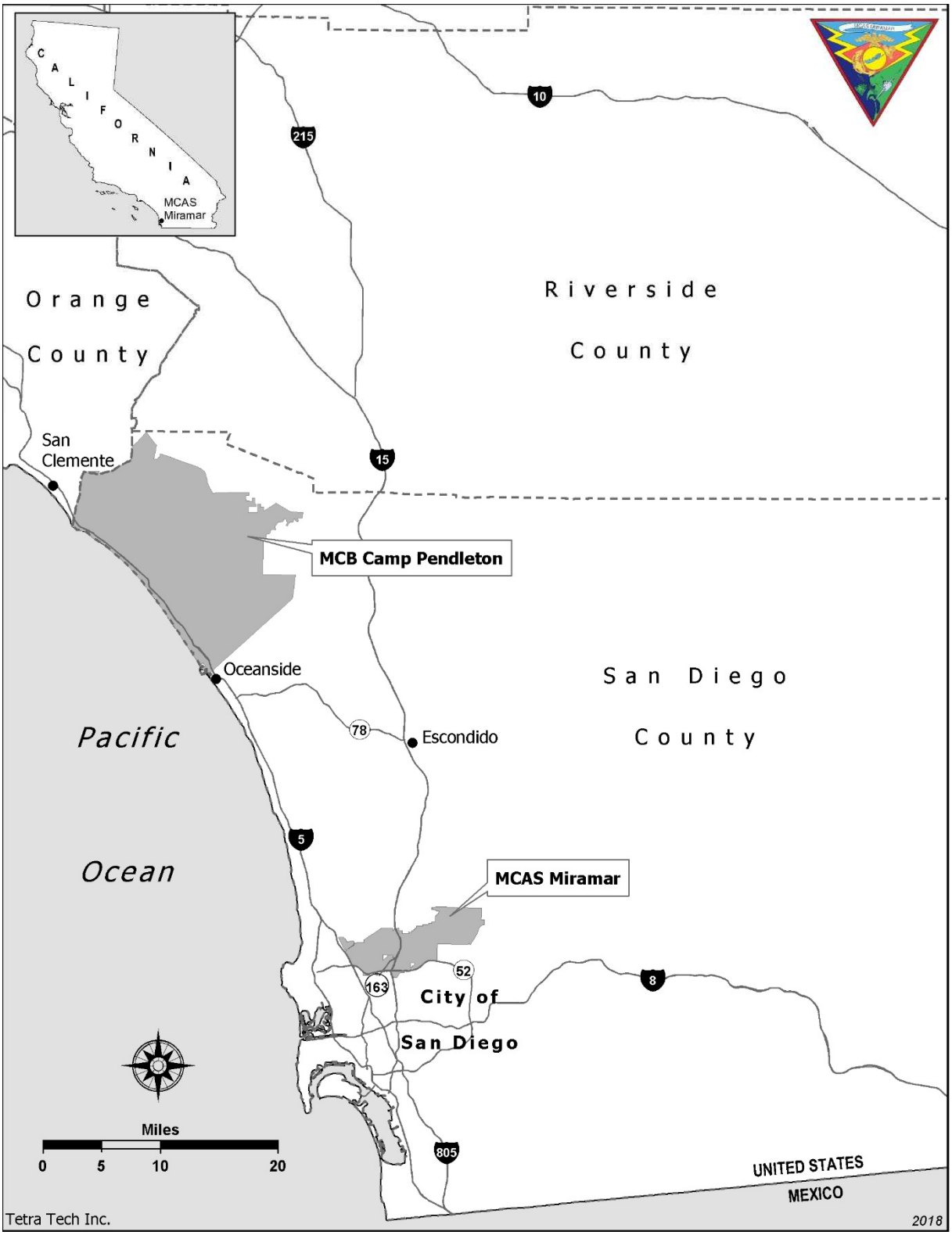
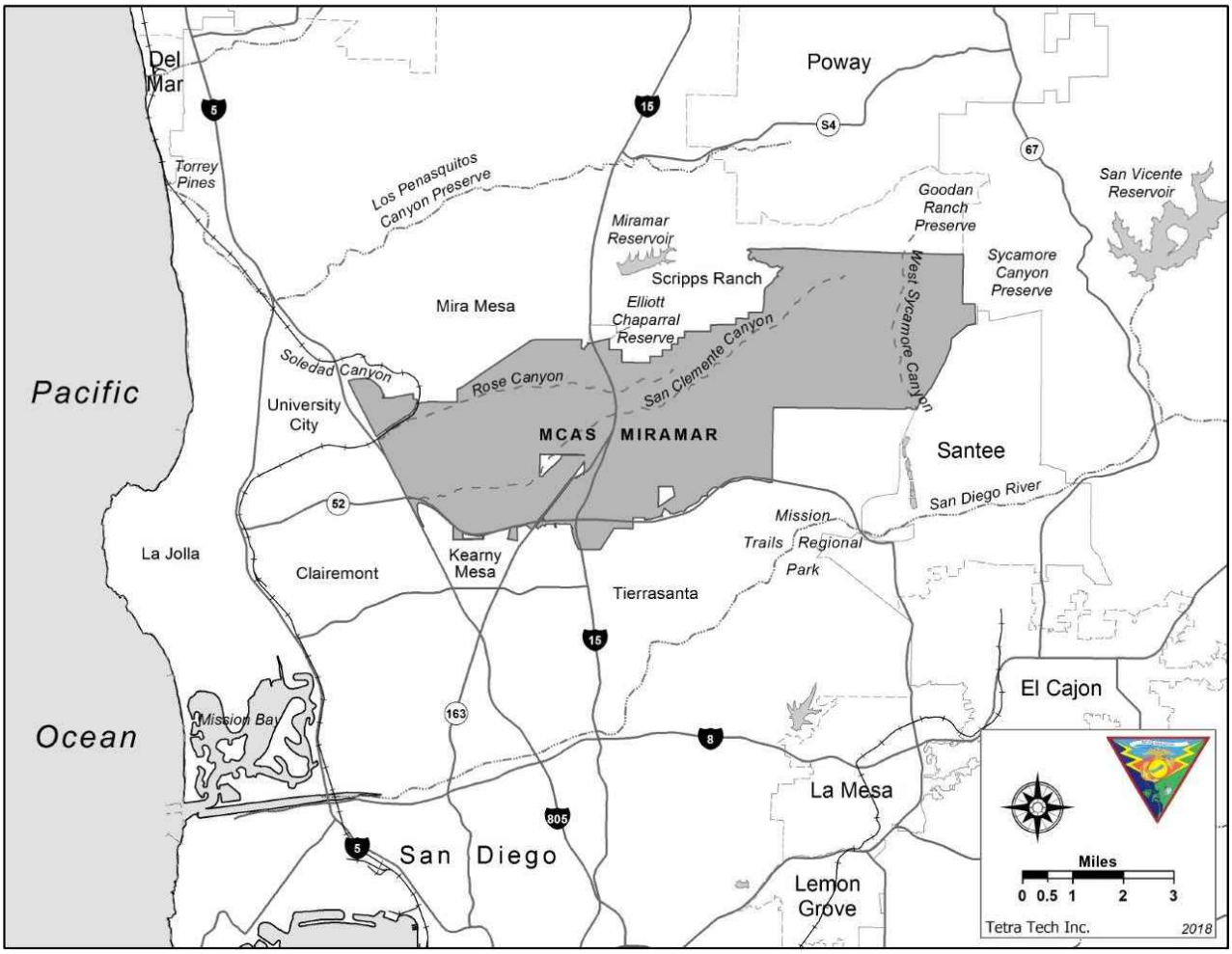


Figure 2.1b. MCAS Miramar and Surrounding Areas



The 2013 Department of Defense Manual for INRMP Implementation, Enclosure 2, requires that the MCAS Miramar INRMP address resource management on "*lands occupied by tenants or lessees or being used by others pursuant to a permit, license, right of way, or any other form of permission*."

Developed areas within MCAS Miramar, defined as areas under active management for mission/administrative use, cover about 4,894 acres and include aircraft operation and maintenance facilities, administrative and residential buildings, storage and supply facilities, recreation areas, and civilian outleases. Facilities at MCAS Miramar include 450 buildings with more than 6,559,543 square feet (151 acres) of building area and other structures and facilities, such as runways, utilities, roadways, and fuel storage. The Station Master Plan (Southwest Division, Naval Facilities Engineering Command, in preparation) defines land-use strategies for MCAS Miramar (*e.g.*, development areas, training areas).

Five military training areas have been designated for field training within the boundaries of the Station (Figure 2.2). In addition, many other facilities provide important military readiness training. During the Base Realignment and Closure (BRAC) process, the Marine Corps indicated that it intended to use training areas consistent with guidelines and procedures established by NAS Miramar (NAS Miramar Instruction 7050.2D). The Marine Corps developed MCAS Miramar Station Order P3500.2, which includes specific instructions for use of these training areas. However, as new mission requirements are identified, ground training areas may be modified.

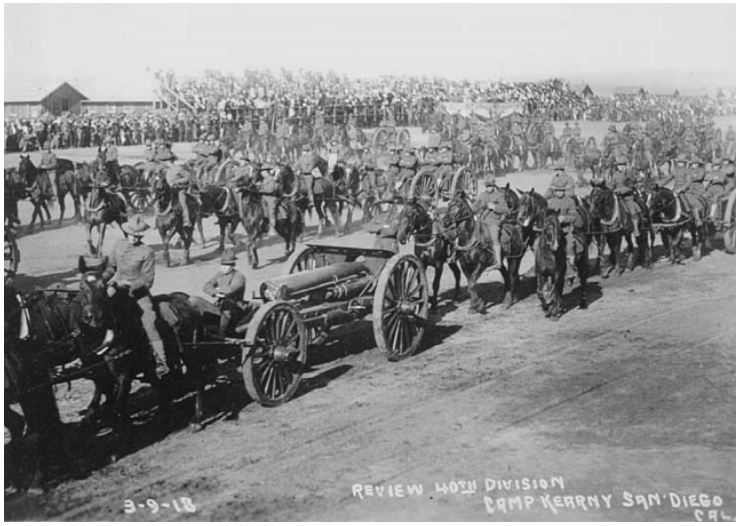
Undeveloped land makes up the remainder of the area within MCAS Miramar. Most of these lands remain undeveloped to support the military need for encroachment and access control by segregating land-uses that may be incompatible because of noise levels and safety considerations associated with military activities. Undeveloped lands within MCAS Miramar form one of the largest parcels of contiguous natural area in the rapidly developing San Diego area.

2.3 Land-use History

An appendix of the MCAS Miramar Integrated Cultural Resources Management Plan (MCAS Miramar Integrated Cultural Resources Management Plan 2011) has a detailed description of the history of the land comprising MCAS Miramar. A detailed history can also be found on MCAS Miramar's cultural resources web page. Native Americans were the first recorded users of the area in the vicinity of MCAS Miramar. The area was likely used as an inland hunting and collecting area for coastal tidepool gatherers.

The area then became part of a Spanish land grant owned by Don Santiago Arguello and was grazed. He divided and sold portions of the land grant after the Civil War. During the mid- to late-1800s, the land was grazed and used for non-irrigated agriculture. In the late 1800s and early 1900s, the farming community of Linda Vista was situated in an area east of what is now I-15 and another community, Miramar, was in the vicinity of I-15 at Miramar Road.

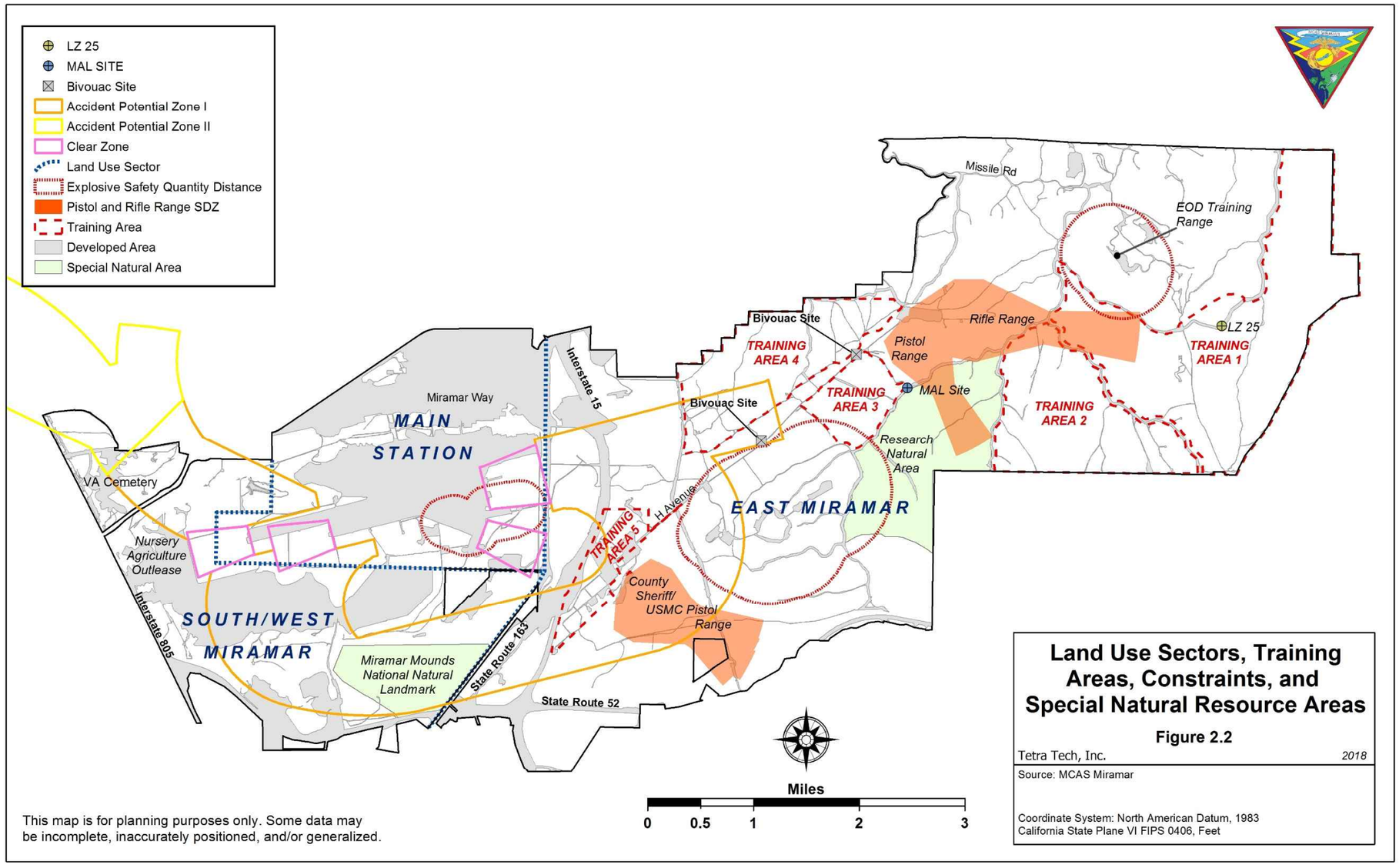
During World War I, an Army infantry training center called Camp Kearny was established on the location of present day MCAS Miramar. In 1917 the Army leased about 8,000 acres for Camp Kearny and soon added an adjacent 5,000 acres for training and maneuvering activities. Approximately 30,000 men and 10,000 horses and mules were housed at Camp Kearny by mid-November 1917. An estimated 1,162 buildings were constructed over a five-year period, most of which were demolished when Camp Kearny was closed in 1922. By the time the war ended, the strategic importance of aviation for the military and the Miramar area as an aircraft launching site was secured. Between the two World Wars, the property was operated briefly as a dirigible base and was known as Army Infantry Training Center Camp Kearny.



Camp Kearny *San Diego Historical Society*

At the start of World War II, the Station was expanded and reorganized into two activities. The southern half became an auxiliary field for NAS North Island, and the northern portion became Marine Corps Air Depot. In 1941, the U.S. Government completed acquisition of nearly 32,000 acres of land east of the Air Depot for a Fleet Marine Force facility, designated Camp Elliott. The Camp was located east of I-15 and included all of present-day East Miramar.

Figure 2.2. Land-use Sectors, Training Areas, Constraints, and Special Natural Resource Areas



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In 1946, the Station was designated MCAS Miramar, until the Marine air units were moved to El Toro in 1947. The Station was re-designated NAS Miramar on 1 April 1952, when it became the Master Jet Station for the Pacific Fleet.

The easternmost portion of present-day MCAS Miramar, referred to in the past as the Sycamore Canyon Annex, was transferred to the U.S. Air Force in 1960 and later to the National Aeronautics and Space Administration for missile testing. In 1977, much of Camp Elliott and the National Aeronautics and Space Administration testing site were transferred back to NAS Miramar.

NAS Miramar remained relatively unchanged until 1993, when MCAS El Toro and MCAS Tustin were selected for closure as a result of the Defense Base Closure and Realignment Act of 1990 (Public Law 101-510) that was accepted by Congress in September 1993 and September 1995. As a result of this selection, Marine Corps units were realigned to NAS Miramar; NAS Miramar officially became MCAS Miramar on 1 October 1997.

2.4 Military Operational Requirements

MV-22, Osprey *MCAS Miramar Combat Camera Division*

All Marines must annually satisfy mandatory training requirements designed to ensure that all personnel are prepared for immediate deployment and combat operations. These training operations can be classified as Marine Corps Common Combat Skills Training, vehicle operations, Marine Wing Service Support, and Air Operations Training. This training consists of open area classes, fieldwork (including land navigation and equipment set up), weapons qualifications, and overnight bivouac activities. Of the approximately 23,065 acres that comprise MCAS Miramar, approximately 4,698 acres in five specified training areas, have been designated specifically for ground training operations. Training in East Miramar is performed in compliance with the Range and Training Area Regulations (Station Order 3500.2A). These training areas are utilized for field training operations by ground and aviation units of the Marine Corps, other active duty and reserve components of the DoD, and nonmilitary federal, state, and local law enforcement agencies. There are also two designated bivouac sites, an Explosive Ordnance Disposal (EOD) training range, and two small arms range complexes adjacent to, but outside of, the training areas. Although other undeveloped areas within East Miramar are not presently identified for current ground training, they serve as part of the Marine Corps inventory for potential future use as training area. Additionally, other developed sites on the Station may also be used to support operational training requirements. Impacts associated with training activities may result from foot traffic, tracked and wheeled motor vehicle operations, combat engineering support operations, temporary encampments, and fixed and rotary wing aviation operations that are conducted during day and night.

Types, frequency, intensity, and duration of training activities vary by location and training requirements. Each of the five dedicated training areas experiences a level of activity and frequency of use that is based on specific training requirements that may require unique physical attributes and/or Station assets in that

area. This results in some areas of the Station experiencing most, if not all of the various activities listed above, while others may experience little or no activity. All Station training activities affect natural resources to some degree, but in many cases, these effects are temporary, of a short duration, and have a low to minimal impact.

2.4.1 Marine Corps Common Combat Skills Training

Basic Marine Corps Common Combat Skills Training is required of every Marine, regardless of his/her military occupational specialty. Battle skills training primarily consists of ground combat training conducted to teach or refresh field skills that include infantry; small arms weapons qualifications; Chemical, Biological, Radiological and Nuclear Defense training; and individual and unit training operations. These activities may vary from small groups (2 -13 Marines) to several hundred Marines participating in patrol and land navigation exercises or in organized marches on established roads. Training may occur within any one or a combination of training areas across the Station. Field training also includes training in offensive and defensive maneuvers, patrolling, land navigation, communications, and other associated field activities for engineering support operations. Most training operations last from several hours up to a full day or more, with some activities being scheduled for up to several weeks with bivouacking/overnight camping. Most activities are conducted either on foot or by vehicle, being limited by established range scheduling, training scenario, scheme of exercise maneuver, slope of terrain, and vegetative cover. The following activities are representative of the scope of ongoing Marine Corps Common Combat Skills Training at MCAS Miramar:

- Chemical, Biological, Radiological and Nuclear Defense training in the practical application of decontamination and/or neutralizing agents on personnel, unit field equipment, the use of the M-40 gas mask with exposure to a CS (tear gas) in a confined gas chamber training facility, protective suits to protect individuals from biological or chemical agents, and first aid measures for individuals exposed to such agents. This training also addresses first aid treatments in a field environment and field sanitation for eating utensils, individual water purification, personnel hygiene, and human waste removal/disposal.
- Land navigation training instruction in the use of standard issue 1:25,000 maps and compass and plotting and practical application in the movement from location to location utilizing maps, compass, and terrain association.
- Instruction in the setup and use of mobile field communications equipment that include radios, telecommunications satellite up and down links, computer equipment, and power generation equipment in a field environment.
- Individual training consisting of instruction and testing of individual personnel in basic conditioning and survival skills, which includes physical fitness, swim qualification, and motor vehicle drivers improvement.

2.4.2 Firing Ranges

All Marines require marksmanship training on established ranges for the firing and handling of the M16A2/A4 or M4 service rifle on a known distance course of fire 25, 200, 300, and 500 yards. Many Marines require training for firing and handling the M9 service pistol on a known distance course of fire 7, 15, and 25 yards. The Navy had established a marksmanship range on the former Camp Elliott. This range did not have a long enough surface danger zone to accommodate the M16A2 rifle.

A state-of-the-art, electronically scored rifle range with 40 firing points was constructed in the north-central portion of East Miramar on the site of the former Green Farms Electric Gun Research and Development Facility. This range uses a Location of Miss and Hit system for scoring. A 25-firing point, pistol range has been added to this complex to replace a pistol range at the former Camp Elliott.

Small Arms Training

An EOD range is located in the east-central portion of East Miramar. This range was constructed on a portion of the former Sycamore Canyon Atlas Missile Facility. This demolition range is used to train EOD personnel and is also used for emergency destruction of hazardous explosive items, including items found on the Station and in the local community.

The San Diego County Sheriff's Department small arms range is also used by the Provost Marshal's Office military police, local law enforcement agencies, and Special Operations personnel.

2.4.3 Vehicle Operations

Typically, selected Marines are trained in the operation of numerous types of vehicles that can include High Mobility Multipurpose Wheeled Vehicles (HMMWVs), 7-ton six-wheel drive trucks, Light Armored Vehicles, and commercial all-terrain vehicles. Vehicle operations include the movement on primary and secondary roads by both individual and convoys of vehicles within designated training areas, as well as on established roadways. Typically, motor vehicle training operations consist of vehicle handling, patrolling, screening maneuvers, counter-mechanized ambush, offensive and defensive combat maneuvers, land navigation, and transport of personnel and equipment to and from training areas.

Primary vehicle training operations are conducted on established roads and jeep trails in designated operations areas during day or night hours and occur as the training scenario dictates. In accordance with Station Range and Training regulations, wheeled vehicle traffic is permitted within all training areas and access roads based on vehicle capabilities and the slope of the terrain in the training area[4]. Station regulations require that all personnel use secondary roads within the training areas to the maximum extent practicable and limit vehicle speed to a maximum of 35 miles per hour on improved roads and 15 miles per hour on unimproved roads and jeep trails.

2.4.4 Marine Wing Support Squadron Operations

Marine Wing Support Squadron training operations are developed and conducted to provide training support for medical services, messing, laundry, command posts, supply, transportation, communications, forward air traffic control, and forward air defense systems. These operations also include engineering support for heavy equipment operations, waste water disposal, bivouac sites, field showers, simulated decontamination operations and potable water production, and battle skills training. Marine Wing Support Squadron units provide transport support for material, units, material-handling equipment, and personnel with wheeled transport vehicles. They also facilitate receipt, storage, and further shipment of material and personnel. Engineering support includes reconnaissance, construction of temporary camps, forward field bases to refuel and rearm vehicles and aircraft (including laying down temporary matting, connecting fuel bladders, and utilizing power generation equipment), and removal of landing obstacles.

[4]Training activities in areas occupied by sensitive plant or animal species are coordinated to provide required protection for these species, as detailed in chapters 5 and 6.

Typically, combat engineers employ bulldozers, graders, backhoes, 5-ton six wheel drive trucks, HMMWVs, bulk refueling equipment, reverse osmosis water purification units, and all-terrain forklifts of varying tonnage to move supplies and equipment within training areas. This equipment can also include road graders, forklifts, loaders, bulldozers, small cranes, and light and heavy trucks. Typically, engineering operations involves training 12-20 Marines in the use of a variety of heavy equipment used for earth moving and logistics operations. Engineering training operations are also conducted station-wide in support of road and drainage system maintenance, minor projects (*e.g.*, Fish Pond restoration), and range grading and maintenance operations.

Marine Wing Support Squadron training is usually restricted to relatively flat areas lacking significant vegetation. Most, if not all of these training sites have been highly disturbed during previous training operations or also serve as fuelbreaks, and no new sites are created due to a lack of time, equipment, and financial resources. There is a need for a dedicated engineer training site that could be heavily disturbed. One site used for some training is behind the former Camp Elliott known-distance rifle range.

2.4.5 Aviation Operations

Aviation operations, fixed and rotary wing, occur year-round and consist of training exercises involving landings, takeoff, field carrier landing practice, ordnance loading/unloading, and the transport of personnel or material. This training is either flight operations of fixed-wing or rotary-wing aircraft or aircraft rescue/fire fighting training operations.

CH 53 lifting HMMWV

All fixed-wing aircraft confine take off and landing operations to runways at the Station. Rotary-wing flight operations are conducted over all training areas of Miramar. Takeoffs and landings are conducted from established landing zones, confined area landing sites, and any other location not specifically prohibited to aircraft. Local rotary wing flight operations are typically conducted 100 to 200 feet above ground level, depending on the training scenario and the numbers of aircraft. Training in rotary-wing aircraft also includes the following:

- external load practice, which is the application of lifting, by a helicopter, a load of materials or equipment slung under a helicopter. This also includes slinging a water bucket unit utilized for fire fighting.
- mountainous and/or confined area landings, which includes instruction and training in use of a helicopter landing zone in a mountainous area or one with limited clearance obstacles in close proximity to the landing zone.
- shipboard landing practice on a simulated landing helicopter dock ship deck next to the heavy lift pad located just south of Runway 6R/24L.
- flight operations using light intensifying equipment (night vision) while flying a helicopter in night or low-light situations.

Typically aircraft rescue/firefighting training operations include:

- removing aircrew members from a downed or crashed aircraft,
- extinguishing fires associated with aircraft at an airfield or in remote locations,

- the use of rescue equipment,
- use and operation of firefighting and rescue vehicles, and
- emergency first aid for injured aircrew members.

These training operations are generally conducted in close proximity to the existing runways. Aircraft rescue/fire fighting training uses a burn pit located south of the runways to simulate burning aircraft and/or fuel.

Eight squadrons of the MV-22 Osprey replaced CH-46 helicopter squadrons at MCAS Miramar. This action required the construction of an in-line fueling facility for helicopters and Ospreys at MCAS Miramar, which added developed land.

MCAS Miramar has been made a site for stationing the Joint Strike Fighter F-35 aircraft. This action will replace F/A-18A/C/D Hornets at MCAS Miramar over the next decade with the first F-35 aircraft scheduled to arrive in January 2020.

2.5 MCAS Miramar Military Land-use

2.5.1 Operational Military Uses of MCAS Miramar

MCAS Miramar can be divided into three general geographic and functional sectors: 1) Main Station, 2) South/West Miramar, and 3) East Miramar (Figure 2.2). Marine Corps land-use needs and requirements within each of these areas are described in this section.

Main Station
The Main Station is largely developed and contains facilities that support primary military functions of MCAS Miramar. Military land-uses include the airfield and aircraft operation areas and maintenance, supply, community support, recreation, and residential facilities.

South/West Miramar
South/West Miramar includes the area west of Kearny Villa Road and south and west of the Main Station. There are several non-military and non-operational developments in the area, but currently there are few operational uses. Constraints to land-use in this area include the airfield clear zone, accident potential zones, noise zones, horizontal planes and transitional surfaces, areas of electromagnetic interference, and large concentrations of vernal pool habitat.

East Miramar
East Miramar is located east of Kearny Villa Road (Figure 2.2). Primary military land-uses in this area include field training, ordnance storage and assembly, small arms ranges, and warehousing. Land-use constraints in this area include accident potential zones, noise zones, small arms and EOD range surface danger zones, areas of electromagnetic interference, and Explosive Safety Quantity Distance arcs that surround ordnance magazines.

Five training areas in East Miramar total about 5,000 acres: Training Area 1 (2,132 acres), Training Area 2 (1,021 acres), Training Area 3 (304 acres), Training Area 4 (928 acres), and Training Area 5 (298 acres). Two bivouac sites are outside of, but adjacent to, Training Areas 3 and 4. Encompassed within or adjacent to Training Area 5 is an inactive rifle range. Adjacent to Training Area 5 are the San Diego County Sheriff's

Department small arms range and range operation center, and three military small arms ranges.

Other facilities include firing ranges and explosive ordnance training facilities, Mountainous Area Landing sites (Training Areas 1 and 3); a Confined Area Landing/External Load site (Training Area 1); and a Chemical, Biological, Radiological and Nuclear Defense training site (Training Area 5).

2.5.2 Non-operational Military Uses of MCAS Miramar

Non-operational military uses are land-uses that indirectly support primary military functions of MCAS Miramar. Non-operational uses include housing, community support, and recreation. Most are within the Main Station, although some non-operational uses occur or are proposed in more remote locations of the Station. Non-operational military land-uses associated with the Marine Corps Community Service (MCCS) Department facilities include a recreational vehicle storage lot, a recreational fishing pond, and a golf course. An outdoor adventure park is being considered by MCCS for an area previously occupied by the horse stables between I-15 and Kearny Villa Road at Miramar Way.

The Department of the Navy planned to develop military family housing in an area of south-central East Miramar north of State Route 52. The availability of affordable housing to military personnel and their families in proximity to San Diego area military installations is important to quality of life and retention of personnel. Environmental planning was completed in December 2008. However, more recent changes in force structure and the local housing market have reduced the need for additional military housing, and for now, this large housing project is not needed. It is possible that areas of MCAS Miramar may once again be considered for military housing in the future.

The nursery agriculture outlease is located on the western edge of MCAS Miramar at the Governor Drive off-ramp to I-805. Due to the unique nature of agricultural outleases, they are considered in this document as non-operational military land-uses because receipts from lease payments provide significant funding that supports implementation of this INRMP. Outlease contracts may not exceed 10 years, and all proceeds beyond lease management costs may only be expended for natural resource management, including implementation of planned actions in this INRMP. The nursery agriculture outlease was executed in 2012 and will remain in effect until July 2022.

2.6 MCAS Miramar Non-military Land-use

This section describes existing, planned or proposed civilian or other agency land-use developments that have been identified within or immediately adjacent to MCAS Miramar (Figure 2.6).

Non-military land-use of MCAS Miramar occurs primarily as a result of private inholdings, lease and land-use agreements, and easements, as shown in Figure 2.6. Non-military use of the Station is subject to constraints of military activities supporting the overriding military mission and environmental considerations. Primary constraints include areas managed for resource conservation and areas affected by accident potential zones, areas of high noise exposure levels, surface danger zones, and Explosive Safety Quantity Distance arcs. Due to the relatively small or linear nature of leases and easements on MCAS Miramar, natural resource management is executed on all Station property based on the resources present with minimal, or no, modification due to associated boundaries. Station personnel work in coordination with applicable tenants, as necessary, to assure natural resource management access and encourage their efforts toward furthering the goals of this plan.

As surrounding areas have become more urbanized, there has been increasing demand from the public to access MCAS Miramar for recreational purposes. Select locations of the Station are accessible to the public; however, military constraints limit the amount of land available for recreation. Public access for recreation also must be limited due to 1) military operational and security needs; 2) safety hazards such as explosive

safety distances, firing range surface danger zones, and aircraft operation compatible use/clear zones; 3) staffing limitations; and 4) resources conservation needs. Recreational access to undeveloped areas is extremely limited to a few activities individually approved by the Commanding Officer and managed by Marine Corps Community Services (*e.g.*, Miramar Fish Pond). Occasional natural resource-related field tours are also conducted on MCAS Miramar. Non-military land-uses not related to recreation or natural resources are described below.

San Diego Gas & Electric (SDG&E) Facilities and Maintenance Activities
Numerous SDG&E facilities are located on MCAS Miramar (Figure 2.6). These include:

- a substation in the northern portion of East Miramar;
- 14 electricity transmission lines, 4 gas transmission lines, and a communications line; and
- multiple overhead 12 kV electric distribution lines, located primarily west of I-15.

Additionally, on November 24, 2015, SDG&E submitted a Tier 1 Application for installation of a 36-inch natural gas pipeline that would tie into an existing 20-inch natural gas pipeline that crosses East Miramar. The application is pending and project planning and development is ongoing.

Construction activities associated with SDG&E facilities may include new overhead electric transmission, distribution, and communications lines within existing easements and/or licenses, natural gas transmission, natural gas distribution, and/or communications line in existing easements and/or licenses (access provided by existing roads).

Regular access, reconstruction, repair, replacement, maintenance, and emergency maintenance activities associated with SDG&E facilities include maintenance of electric distribution, electric transmission, and gas transmission corridors. These facilities consist of power and other poles and/or above-ground facilities associated with underground pipelines located in the easement and/or license. These facilities and access routes must be regularly cleaned and maintained and in emergencies repaired. This may require some brush clearing and grading. SDG&E biologists regularly coordinate maintenance and repair projects with the Miramar Natural Resources Division using a Pre-Activity Survey Report (PSR) developed for resource agency coordination. The PSRs are shared via e-mail or ftp site uploads, and Miramar staff reviews them providing resource information and comments on conservation.

There are instances when SDG&E may perform activities requiring excavation that could affect sensitive habitat. SDG&E performs these activities in conformance with guidelines and procedures of the company's Habitat Conservation Plan and Subregional Natural Community Conservation Plan. When permanent or temporary loss of habitat occurs, these impacted areas are re-vegetated or mitigated off-Station, in accordance with these plans and coordination with the Station and, as applicable, the CDFW and USFWS.

South/West Miramar
The area south of Main Station and west of I-15 receives most of the non-military use on MCAS Miramar.

City Landfills
The City of San Diego has been operating sanitary landfills on MCAS Miramar property since 1952. These non-hazardous, Title 14 landfills were developed in four phases. South Landfill was started in 1952 and completed in 1979. North Landfill was started under separate permit in 1979 and completed in 1985. North Landfill is now being managed and monitored as an inactive landfill. West Landfill began under an extension of the state permit for the North Miramar Landfill and is broken into Phase I and Phase II. These active landfill areas are expected to provide capacity through the year 2022. Although the inactive landfill surfaces may provide some wildlife habitat value, they are considered developed facilities as long as

monitoring and maintenance requirements remain in effect. Monitoring is required by state law for a minimum of 30 years after closure.

The Miramar Landfill General Development Plan calls for incorporation of several landfill-related projects into the existing landfill area. Phase II of this plan was a programmatic environmental impact statement completed in 1996. The principal project is the Northern Sludge Processing Facility and associated pipeline, which processes sludge from the North City Water Reclamation Project and Point Loma Sewage Treatment Facility. Other operations related to the existing landfill include a 1) cogeneration facility, which generates heat and electricity from sewer gas and landfill gas; 2) household hazardous waste recycling facility; 3) greens recycling facility, which generates mulch; 4) materials recycling facility, which will handle those parts of the waste stream that are recyclable; and 5) a revegetation nursery.

Santa Fe Pacific Pipeline Bulk Fuel Storage Tank Facility

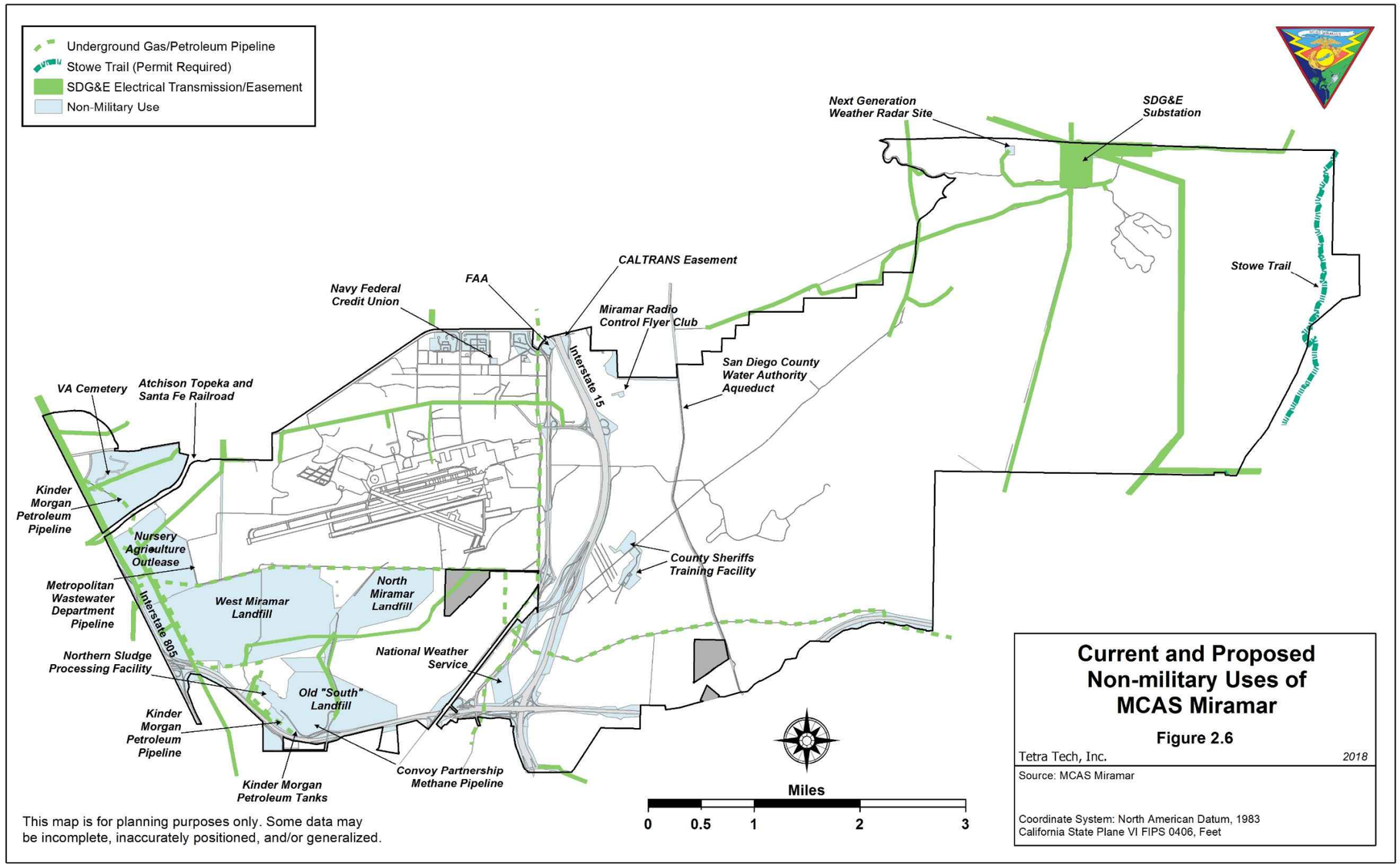
Santa Fe Pacific Pipeline Partners, L.P., an operating company of Kinder Morgan Energy Partners, L.P. operates a bulk fuel storage facility on about six acres of MCAS Miramar along their pipeline and immediately north of State Route (SR) 52 in South Miramar. This facility provides an important fuel transfer capability between the Santa Fe Pacific Pipeline and Navy fuel transport pipelines that flow to Naval Base Point Loma and MCAS Miramar.

Kinder Morgan also maintains two pipelines passing north-south along the west side of MCAS Miramar, an active 16-inch diameter refined petroleum pipeline and an inactive 10-inch pipeline. In accordance with federal regulations, Kinder Morgan performs routine monitoring and maintenance of these pipelines, including visual inspections, periodic internal inspections, and potential anomaly digs and/or repair work as needed.

Hanson Aggregates, Harris Plant

A 76-acre private inholding, located south of the Main Station, is within the boundaries of MCAS Miramar. Extraction activities at the site have ceased, and the company now imports aggregate for the production of asphalt and concrete products.

Figure 2.6. Current and Proposed Non-military Uses of MCAS Miramar



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Reclaimed Water Program Facilities and Pipeline
The City of San Diego operates a sewage treatment program and is recycling water in a secondary treatment system as part of the reclaimed water program. The North City Water Reclamation Facility, adjacent to the northwestern border of MCAS Miramar which, in conjunction with the Northern Sludge Processing Facility, is generating usable (not potable) water from sewage. The Northern Sludge Processing Facility is in the southwest portion of MCAS Miramar. Pipelines run north-south between these facilities through West Miramar. One main distribution line runs east along Miramar Road, past the golf course and housing, and then north along Black Mountain Road. The Public Utilities Department is distributing the reclaimed water, some of which is being used on MCAS Miramar for the golf course and landscaping on Main Station. Pending permitting, a Wet Weather In-Stream Discharge capability has been proposed which would release treated water into the San Clemente Canyon watershed during the wet season when reclaimed water from the recycling plant is not needed for irrigation. Coordination with state and federal wildlife agencies has been completed and MCAS Miramar will work with the City to implement the measures that resulted from the coordination. The City has proposed to monitor the willowy monardella populations in addition to the surveys being done by MCAS Miramar.

Veterans Administration Cemetery
About 214 acres of a 323-acre parcel in the northwestern portion of West Miramar is being developed into a Veterans Administration Cemetery under a land-use agreement (N6247308RP00049) between the Department of the Navy and the Department of Veteran Affairs (VA). The VA is responsible for operation and phased construction of the cemetery consistent with the Environmental Impact Statement (EIS). A ground-breaking ceremony was held on January 30, 2010.

The cemetery will be managed to conserve adjacent natural resources to the greatest extent possible. A Natural Resources Management Plan was prepared for management of this property, consistent with and under the overall guidance provided by this INRMP. About 109 acres of the parcel occupied by the cemetery will remain undeveloped, including areas with most of the vernal pools.

East Miramar
Located within East Miramar are the San Diego County Sheriff's Department working dog training area and small arms range, National Weather Service facilities, SDG&E substation and transmission lines, and three San Diego County Water Authority aqueducts.

San Diego County Sheriff's Department Small Arms Range
The San Diego County Sheriff's Department small arms range is a 92-acre facility within Training Area 5 in old Camp Elliott. County, state, federal, and local law enforcement agencies and military personnel use this site to conduct role-play scenarios and live-fire training exercises, as well as practice rescue training techniques. Associated with the facility is a dog-training facility, an urban disaster training facility, an obstacle course, firearms ranges, a mock town (known as Duffy's Town), and administrative buildings. The tactical training site known as Duffy's Town provides a location for realistic training scenarios, including routine patrol procedures, tactical entry into buildings, and live-fire exercises.

National Weather Service Station
The National Weather Service has a weather station in the northern portion of East Miramar. The site includes facilities that support the Next Generation Weather Radar, which analyzes storm clouds and assists in predicting tornadoes and violent thunderstorms.

San Diego County Water Authority Aqueduct
The San Diego County Water Authority (SDCWA) possesses a 78-acre easement that is about 130 feet wide running north and south through East Miramar. This easement contains one 97-inch, one 84-inch, and

one 69-inch diameter water transmission pipelines and associated surface structures (air vents at high points and blow-offs at low points) along the pipeline that require frequent inspection and periodic maintenance. Most of the easement is overlain by Aqueduct Road, which serves as access to SDCWA facilities, as well as a fuelbreak/fire road (NS-4) for the Station.

Regular maintenance activities include weekly patrol and inspection of facilities and access roads and periodic pipeline draining for internal inspections. Access road maintenance to retain existing road width includes repairs and improvements to culverts, road grading, and placement of gravel. Periodic pipeline draining and internal inspections involve discharging water from the pipeline from blow-offs into natural drainages in a manner that minimizes erosion and downstream sedimentation. Less frequently, operations may include repair/replacement of buried pipelines, internal pipeline relining, conduits, and surface structures within the existing easement.

There are some instances where construction and maintenance activities could affect federally listed threatened and endangered species. A Section 7, Endangered Species Act, Biological Opinion (1-6-93-F-28), which was issued to the Navy on July 19, 1993, during easement document modification, contemplated potential impacts to the threatened California gnatcatcher from aqueduct installation and operation. The SDCWA completed a Section 10, Endangered Species Act, Habitat Conservation Plan through the USFWS to cover effects of its activities on threatened and endangered species throughout San Diego County, including those on MCAS Miramar. The plan was approved by USFWS and CDFW in December 2011.

Special Natural Areas

Special natural areas within the boundaries of MCAS Miramar include Miramar Mounds National Natural Landmark and the Research Natural Area.

The Miramar Mounds National Natural Landmark is located on the southern boundary of MCAS Miramar (Figure 2.2). It was designated by NAS Miramar as a natural landmark overlay with the National Park Service in 1972 but remains Station property. The landmark contains approximately 400 acres of vernal pool habitat basin and associated mima mound topography. This area is believed to represent the largest and best example of vernal pool habitat with mima mound topography that remains in coastal Southern California. The Station also focuses some of its vernal pool habitat restoration and mitigation needs in this area. Conservation of this area also maintains compatible land-use with aircraft accident potential zones and preventing encroachment of incompatible land-uses.

The 991-acre Research Natural Area (RNA) contains undisturbed ceanothus chaparral, chamise chaparral, sage and sagebrush, buckwheat scrub, and grassland/herbaceous vegetation communities (Tetra Tech 2014). The RNA was designated by the Navy in 1987 (about 2,000 acres then) to assist in conserving these relatively undisturbed vegetation types to provide educational opportunities and research areas for scientists to study the ecology, successional trends, and other aspects of the natural environment. The RNA designation was viewed as a buffer zone against encroaching development on the Station's southern boundary. There were no listed threatened or endangered species in the RNA at the time of its designation. The current RNA area supports few regionally rare natural resources and no listed threatened or endangered species. Very little ecological research has been conducted in the RNA because on-site vegetation types are relatively common within the region.

Management of the RNA is similar among various federal agencies designating RNAs with the objective of protecting the educational and scientific values. The underlying emphasis in RNA management involves controlling disruptive use, encroachment, and development. Activities such as logging, grazing, and burning are generally prohibited, and many low-impact uses are also discouraged. Managing agencies do not encourage public or recreational use, and as such, the five ground training areas in East Miramar do not

overlap the RNA. Should lands of the RNA be needed for military purposes, the designation may be removed through a formal decision-making process, such as a NEPA document. In 2004, with completion of an EIS for Military Family Housing in the San Diego Region (Record of Decision, August 12, 2004), 1,009 acres of the original RNA were withdrawn for planned use as military family housing.

The Marine Corps evaluates land-use designations based on operational and other mission requirements. The RNA cannot be considered a permanent preserve due to the DoD's requirement to maintain flexibility to adapt the defense mission to political and technological developments. Portions of installations that contain natural resources that warrant special conservation efforts may be designated as special natural areas, where such conservation is consistent with the military mission. However, such areas shall be reassessed if mission requirements change or if the property becomes excess and requires disposal. The INRMP addresses special management provisions necessary for the conservation of each area. (DoD Instruction 4715.03 Enclosure 3, paragraph 9).

2.7 Adjacent Land-use

Land-use in the vicinity of MCAS Miramar is primarily open space, industrial, commercial, office, and residential. Industrial, commercial, and office land surround West Miramar. San Diego County has jurisdiction over unincorporated lands east of East Miramar. Also abutting MCAS Miramar are areas within the Multi-Habitat Planning Area (MHPA), as designated by the MSCP (Figure 5.3). The MHPA is the area within which the permanent MSCP preserve will be assembled and managed for its biological resources. The MHPA includes the majority of undeveloped public lands (excluding military lands) in the MSCP study area.

Communities in the vicinity of MCAS Miramar include Scripps Ranch, Mira Mesa, University City, Clairemont, Kearny Mesa, Tierrasanta, and the City of Santee (Figure 2.1b). Scripps Ranch is along the northern boundary of the Station east of I-15. Land-uses in the western portion of the Scripps Ranch community are primarily industrial, commercial, educational, and residential, while land-use in the eastern portion is primarily residential. Mira Mesa is directly north of Main Station; land-uses are primarily industrial and residential, with some areas of undeveloped land. University City is due west of MCAS Miramar. Land-use in University City is diverse, with the University of California San Diego, commercial, industrial, and medical centers making up the majority of the northern portion of the city and residential, recreation, and open space areas located in the southern part of the community.

Clairemont is to the southwest of MCAS Miramar; predominant land-uses include residential, industrial, commercial, and areas of undeveloped land. Kearny Mesa is south of MCAS Miramar; primary land-uses include industrial and commercial development. Tierrasanta is a residential community south of MCAS Miramar. The City of Santee is to the southeast; predominant land-use is residential, although some large sections remain undeveloped adjacent to the Station.

Other specific land-uses adjacent to MCAS Miramar include the Goodan Ranch-Sycamore Canyon Preserve, Mission Trails Regional Park, Santee Lakes Regional Park, Marian Bear Memorial Park, Alliant International University, and the Sycamore Canyon Landfill.

Goodan Ranch-Sycamore Canyon Open Space Preserve, owned jointly by San Diego County, the Cities of Poway and Santee, and CDFW, lies immediately east of MCAS Miramar. Formerly a large ranch, this 2,272 acre preserve primarily consists of undeveloped recreational facilities and open space. This preserve includes the 325 acre historic Goodan Ranch. The 4-mile segment of Stowe Trail on MCAS Miramar, which provides permitted access for recreational use, terminates on the north end of the Station at the Goodan Ranch-Sycamore Canyon Open Space Preserve. The Goodan Ranch-Sycamore Canyon Open Space Preserve has an existing network of formalized non-motorized, multi-use trails.

Mission Trails Regional Park is operated and maintained by the City of San Diego and, with approximately 8,000 acres, is one of the largest urban parks in the country preserving natural habitat. The park attempts to be a major information resource of Native American and natural history in the region, preserve habitats of plants and animals native to San Diego, and provide appropriate recreational opportunities. An update of the park's Master Plan was initiated by the City of San Diego in 2010. In 2013, a draft of the Master Plan Update was completed and made available to the public. The acreage of the park will potentially increase to approximately 9,700 acres with the acquisition of additional property within East Elliott. Final transfer of property within West Sycamore has been completed. These two expansion areas share common boundaries with MCAS Miramar. For both expansion areas, multiple length trail loops will be a key planning concept to discourage continued recreational trespass into MCAS Miramar. Connection of the East Elliott area to the Goodan Ranch-Sycamore Canyon Open Space Preserve and West Sycamore Area of the Mission Trails Regional Park for non-motorized trail users via the Stowe Trail on the Station has been approved via a permitting process by MCAS Miramar. The Stowe trail is the only authorized trail through MCAS Miramar.

Santee Lakes Regional Park is owned and operated by the Padre Dam Municipal Water District. The approximately 200-acre site was designed as part of an innovative water reclamation system used for irrigation and recreational purposes. This park contains a campground and recreational fishing ponds.

Marian Bear Memorial Park lies to the west of the Air Station. It is a 467-acre natural park owned by the City of San Diego, which is managed and maintained to preserve the wildlife and habitat native to San Clemente Canyon.

Alliant International University is located north of the Station, adjacent to and southwest of Scripps Ranch. The University is located on about 160 acres and has about 1,700 students.

The ***Sycamore Canyon Landfill***, privately operated, is located immediately south of East Miramar. The landfill occupies 354 acres of a 491-acre facility.

Fanita Ranch, a 2,640-acre property east of MCAS Miramar has been proposed for a mixed-use development, primarily residential units. If developed, there will be an extensive on-site biological preserve associated with the Fanita Ranch Project. This preserve will be directly adjacent to MCAS Miramar; the Fanita Ranch Project has specific features designated to maintain connectivity between the preserve and open spaces on MCAS Miramar. Fanita Ranch is designated for and zoned for Planned Development in the City's General Plan and Zoning Code. In August of 2017, the City received an application for development of the property by the owner, HomeFed Corporation. The current proposal clusters development areas in order to provide a large preserve system that will provide connectivity with open space on MCAS Miramar.

Readiness and Environmental Protection Integration (REPI) Project at Lakeside Downs

The REPI program supports partnerships between military Services and conservation groups to acquire easements from willing sellers to preserve compatible land uses and sustain wildlife habitat near military installations. REPI at MCAS Miramar is focused on relieving natural resource-related restrictions in ground training areas and ranges because of listed species and encroachment by incompatible development. Federally listed species within training areas restrict access and use of lands to established roads and occupied areas during the breeding season. Development up to some boundaries constrains military training and increases wildland fire management needs and risks. The USFWS has encouraged the use of offsite conservation to offset impacts to listed species on MCAS Miramar.

The desired state for MCAS Miramar is to be able to conduct necessary field training and wildland fire management in at least 4,700 acres of undeveloped land. The first land that was acquired to accomplish this goal is the Lakeside Downs property, which is 2.3 miles east of MCAS Miramar. The conservation of this land (409 acres) would reduce restrictions on MCAS Miramar's most used training ground area. The property has high quality and regionally rare coastal sage scrub habitat and is occupied by the federally threatened California gnatcatcher and federally proposed Hermes copper butterfly. Preservation of this habitat type complements the regional MSCP plans. Without the initiative of MCAS Miramar to partner for a conservation acquisition of Lakeside Downs, no focused effort would have begun to preserve this property and its regionally valuable resources. Half of the property would likely have been developed into residential housing, and MCAS Miramar would lose this opportunity for off-installation crediting.

The primary partner for the project is Endangered Habitats Conservancy, a California non-profit land trust corporation that facilitated the acquisition of the property and owns and manages the conserved land in perpetuity. DoD funding has been matched by the Endangered Habitats Conservancy through a grant from the San Diego Association of Governments (SANDAG). The Department of Navy purchased a conservation easement for the property, and is working on an agreement to provide long-term natural resource management funds. MCAS Miramar will realize Endangered Species Recovery Credits, easing seasonal restrictions in the most desirable and used field training area on the station.

Other Adjacent Lands

The Fiscal Year 2001 National Defense Authorization Act authorized the transfer of the MCAS Miramar area south of SR 52 (*i.e.*, Parcel "G", refer to Figure 2.5.1) to the USFWS for inclusion in the San Diego National Wildlife Refuge, Vernal Pools Stewardship Project. Long-term mitigation planning is an important consideration if this transfer is completed. USFWS involvement would be used to develop an agreement regarding mitigation credit for the transfer. That mitigation credit from permanent preservation would be used to help offset unavoidable impacts to other areas on MCAS Miramar for exclusive use by the Marine Corps. Concerns regarding the potential presence of munitions of explosive concern at the site have delayed all progress related to transfer of the parcel.

Parcels of land located immediately adjacent to MCAS Miramar with undetermined futures include parcels owned by California Department of Transportation (CalTrans) and the San Diego Unified School District. CalTrans owns a 12.6-acre parcel of land north of SR 52 and east of I-15. The north, west, and east sides of the parcel are directly adjacent to MCAS Miramar. The southern portion of the parcel connects to SR 52. Actions that may affect CalTrans Right of Way requires coordination, especially when sensitive resources are involved, prior to undertaking any proposed action. Ultimate use of this parcel has not been determined. The San Diego Unified School District owns a 58.5-acre parcel of undeveloped land surrounded on all four sides by MCAS Miramar. This parcel is north of SR 52 and east of I-15.

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3.0 PHYSICAL SETTING

3.1 Climate

Precipitation averages just over 10 inches annually at MCAS Miramar, generally associated with low intensity storms in winter and spring. Frosts are light and infrequent, with the growing season ranging from 345 to 360 days. Winds are usually gentle and come from the west, especially during summer afternoons. The average annual temperature is about 63 degrees Fahrenheit. The average daily high is 71 degrees, and the low averages 53 degrees. Weather patterns are dominated by a subtropical ridge with a shallow marine layer and pronounced low-level inversion and moderating effects of the California current off-shore. This Mediterranean climate creates a semi-arid condition, with warm, dry summers and mild winters. Weather data are available from the Marine Corps Meteorology and Oceanographic Command Detachment on MCAS Miramar and from the National Weather Service at Lindbergh Field, the commercial San Diego Airport.

Four climatic aspects affect erosion on the Station (Kellogg and Kellogg 1991):

- ***temperature mildness*** (*i.e.*, warm summers, cool winters), which results in comparatively immature Station soils with a low tolerance to erosive forces;
- ***Mediterranean semi-aridity*** (*i.e.*, Mediterranean precipitation pattern fosters high erosion rates because ground protection is least when precipitation peaks) (Kirkby 1980);
- ***winter storm progression*** (*i.e.*, the amount of soil moisture before an intense storm); such storms create significant sheet and rill erosion unless the ground is dry enough to absorb water quickly; and
- ***"fire weather"*** *(i.e.*, extremely dry, warm fall winds), which results in wildfires that create conditions conducive to extremely high soil loss during storms. Firebreaks[5] used to control wildfire damage are secondary erosion agents.

Hazardous fire conditions occur during fall when there are very dry, warm winds and vegetation is dry. High erosion rates can result when intense storms follow a fire. Fire is a natural component of the southern California landscape, thus, the vegetation at MCAS Miramar is adapted to occasional fires. However, the risk of large-scale, disastrous fire has increased with urbanization and past fire suppression policies.

3.1.1 Climate Change

DoD Instruction 4715.03 requires DoD to address potential impacts of climate change on natural resources in INRMPs using the best science available. The 2014 *DoD Climate Change Adaptation Roadmap*, and the Congressional Report's *National Security Implications of Climate-Related Risks and a Changing Climate*, identify risks of climate change on the mission and specific actions to strengthen planning for natural resource management to adapt to climate change.

Regional Climate Change

In general, the third National Climate Assessment published (May 2014) notes that certain types of weather events have become more frequent and/or intense, including heat waves, heavy downpours, and in some regions, floods and droughts. Sea levels are rising, oceans are becoming more acidic, and glaciers and arctic sea ice are melting. Scientists predict that these changes will continue and even increase in frequency or duration over the next 100 years.

[5] MCAS Miramar has converted its former firebreaks to fuelbreaks, which are less prone to significant erosion.

A few trends in California include a larger proportion of precipitation falling as rain instead of snow (CA Climate Change Center 2012), and in southern California, projections of pronounced springtime warming, a greater increase in summer vs. winter temperatures, and more frequent, hotter, and longer heat waves occurring earlier in the season and lasting through fall (CA Climate Change Center 2012). Several climate models predict that southern California will decrease in precipitation in the future. Some climate models show that in the San Diego region, the 30-year average precipitation will decrease by more than 8 percent by 2050 compared to historical conditions (CA Climate Change Center 2012). Under this scenario, the already highly variable rainfall pattern would continue, but with drier soils there would be less vegetation overall and increased erosion and runoff during large storms.

Future Climate Change Projections

Due to the high complexity and high uncertainty involved with climate change adaptation planning and implementation, the use of best available climate-monitoring data for the region is key. Some of the information that will be used in this INRMP include: historical regional trends, projections of future climate or sea level rise, information from regional collaboration to develop vulnerability assessments, and information developed for other purposes that can be used to assess climate change impacts (DoD Manual 4715.03, 2013).

The U.S. Climate Resilience Toolkit (http://toolkit.climate.gov/) and the California Climate Change Research Center (http://www.climatechange.ca.gov/research/index.html) are good sources for the latest status and trends of climate data and potential risks in the MCAS Miramar region.

Climate Change Management at Miramar

Climate-informed Monitoring (CIM) is a climate change adaptation strategy 1) to develop and deliver essential climate and biodiversity data sets to natural resource managers to enable more robust decision-making in the face of climate change and 2) which involves a process for evaluating, adjusting, and optimizing existing monitoring programs to facilitate tracking of ecological change and evaluating efficacy of management actions in the face of climate change.

MCAS Miramar staff attended an INRMP Climate Change Adaptation Workshop at Naval Weapons Station Seal Beach, Detachment Fallbrook on August 28 and 29, 2013. The goals of the workshop were to develop CIM strategies to support adaptation planning and to develop a process to facilitate integration of climate change adaptation into INRMPs within the context of the military mission and existing threats and management. Key outcomes of the workshop included 1) agreement on conceptual ecological models for coastal sage scrub and riparian ecosystems, 2) identification of practical adaptation strategies that can build ecosystem resilience and support the military mission, 3) identification of information gaps, and 4) development of a shared vision for strategic climate-informed monitoring.

Natural Resources Division staff continue to implement CIM in natural resources management processes and procedures at MCAS Miramar and continue to track the latest status and trends of climate change in the area using the best tools available.

3.2 Geology and Soils

Present day San Diego County soils have developed over millions of years from earth's plate tectonics, uprising magmas, crustal uplift, and erosion. The geologic setting of the general San Diego region consists of a basement complex of granitic rocks associated with the Southern California Batholith that developed during the Jurassic and Cretaceous geologic periods, and mildly metamorphosed volcanic rocks.

Eocene marine and non-marine sedimentary rocks generally have been eroded into flat-lying wave-cut platform surfaces overlying the basement rocks. In many areas, the Eocene sedimentary rocks are capped

with Pleistocene sediments. Quaternary alluvial sediments are present in canyon bottoms. Based on a review of geologic literature (Kennedy 1975), the upper 200 feet at the main facility of MCAS Miramar consists of Quaternary Linda Vista Formation (the main formation throughout much of MCAS Miramar), Tertiary Stadium Conglomerate, and Friars Formation. The Quaternary Linda Vista Formation and the Tertiary Stadium Conglomerate are exposed within canyon walls, with the Linda Vista Formation stratagraphically above the Stadium Conglomerate.

The Linda Vista Formation consists of interbedded sandstones and conglomerate deposited as near shore marine and non-marine sediments on a 10 kilometer wide wave-cut platform. The formation is strongly to weakly cemented by iron oxide (ferruginous cement) resulting in its characteristic reddish-brown color. The Linda Vista Formation also contains moderate amounts of clay and fines. Its resistance to weathering is responsible for the formation of most of the mesas around the main portion of MCAS Miramar; therefore, the formation is the surface unit exposed on the tops of these mesas and marine terraces. The formation is estimated to be a maximum of 10 feet thick (Kennedy 1975). A relatively thin, discontinuous, well-cemented layer is also present in many areas of MCAS Miramar at depths ranging from 4 to 10 feet below ground surface. This well-cemented layer, referred to as a "caliche" or "hardpan" layer, has extremely low-permeability. The hardpan accounts for the numerous vernal pool basins and mima mounds distributed across west and central Miramar. The hardpan is not continuous or uniform and is primarily in the western portion of Miramar.

The Stadium Conglomerate consists of matrix-supported, cobble conglomerate with localized sand lenses that are devoid of the cobble-size clasts. The deposits are moderately well sorted, with the average clast size in the cobble range. The sandstone matrix consists of a dark yellowish brown coarse-grained sandstone and generally comprises less than 20 percent of the unit, but locally up to 50 percent. The conglomeratic clasts are slightly metamorphosed volcanics (rhyolitic to dacitic) and volcaniclastics and up to 20 percent quartzite. The deposit is difficult to excavate.

The Friars Formation is observed beneath the Stadium Conglomerate in the southeastern portion of MCAS Miramar and consists of sandstone and claystone deposits that typically exhibit a high erosion potential. Quaternary alluvium and slope wash occupy the canyon bottoms and lower portions of the tributary drainages.

Undifferentiated alluvium and slope wash (or *colluvium*) consists of poorly consolidated stream deposits and surficial material derived from soils and decomposed bedrock sources that lay within or near the area. The material is deposited along canyon floors by the action of gravity and surface water.

The Natural Resource Conservation Service (NRCS) classifies Miramar's upper surface soils as mostly Redding, Chesterton, Carlsbad, or Altamont series (Figure 3.2a for all soil types). Redding soil is shallow, cobbly, or gravelly loam that range from 2 to 50 percent slopes. Permeability is slow, and fertility is low. Erodibility of the Redding series is considered severe because of shallow depth to rock and, in some cases, steepness. Chesterton fine sandy loam, Carlsbad gravelly loamy sand, and Altamont clay are in the very western portion of Miramar and have characteristics appropriate for raising irrigated crops.

3.2.1 Erosion Hazard Ratings

In addition to the NRCS soil descriptions, a 1991 survey (Kellogg and Kellogg) identified 287 historic and/or active erosion sites on the Station; about 50 of the sites were classified as active. A more recent survey (URS 2005) assessed, documented, and prioritized 98 active erosion sites on Miramar's undeveloped areas and provided recommendations for restoration of 18 priority sites. Soils within the 2005 survey area had moderately severe to severe erosion hazard ratings. Almost all MCAS Miramar's soils are severely erodible, according to the NRCS, because of either steepness, shallow depth to rock, shallow depth to a hardpan, or excessive silt in surface texture composition.

3.2.2 Topography

Elevations on MCAS Miramar range from just over 1,178 feet above mean sea level in the east to 240 feet in the west (Figure 3.2b). Gently sloping, eroded plateaus or mesas where flight line and air operations are located are cut by southwesterly draining canyons. These give rise to a series of terraces, which, in turn, grade to the steep and dissected hills of Sycamore Canyon. The western mesa consists of alternating well-drained to moderately drained mounds and poorly drained swales forming randomly distributed groups of mima mounds and vernal pools.

3.3 Hydrology and Watersheds

3.3.1 Watersheds

Local watersheds drain to the south or southwest (Figure 3.2b). Murphy, Elanus, Oak, Spring, Quail, Little Sycamore, West Sycamore, and Sycamore canyons drain into the San Diego River and then to the coast. San Clemente Canyon enters Rose Canyon and then Mission Bay. Many of these watersheds wholly or partly originate on MCAS Miramar, the main exception being Sycamore Canyon. Most sub-basins are small, which contributes to a high sedimentation rate as particles have less opportunity for deposition before becoming part of a stream system.

3.3.2 Floodplains and Impoundments

One-hundred-year return period floodplains have been completely mapped at a planning level scale for MCAS Miramar (Smith and Lichvar 2001). Areas of potential flooding are narrow because of canyon topography, but these narrow canyons have significant high-water flooding potential. Peak flows (2-year, 24-hour) for Rose Canyon were calculated at between 165 and 268 cubic feet per second (Woodward-Clyde 1986), and more than 14,000 cubic yards per year of sediment were estimated to be deposited into channels (confirmed by City of San Diego dredging records).

3.3.3 Sedimentation Effects on Water Quality

Streambank erosion problems along San Clemente and Rose canyons were identified in a sedimentation study commissioned by the City of San Diego (Woodward-Clyde 1986). Rose Canyon has wide drainages in East Miramar with a defined stream channel. Rose Canyon is narrow through the developed areas of MCAS Miramar and returns to a wide drainage west of Obregon Avenue. Stream banks vary in size through the canyon with stream banks in East Miramar and through the developed area of MCAS Miramar. West of Obregon Avenue Rose Canyon has meandering stream channel with variable stream bank heights. San Clemente Canyon has a wide drainage with a defined stream channel through most of East Miramar. Stream banks are approximately 5 to 10 feet high. West of Highway 15, the stream channel does not have steep banks except due to channelization from flow over dammed areas near the manmade ponds. Channel sides and bottoms are of cobble alluvium. Loose colluvial sand is common in canyon bottoms (Lloyd-Reilly 1987; Woodward-Clyde 1986).

Figure 3.2a. MCAS Miramar Soils

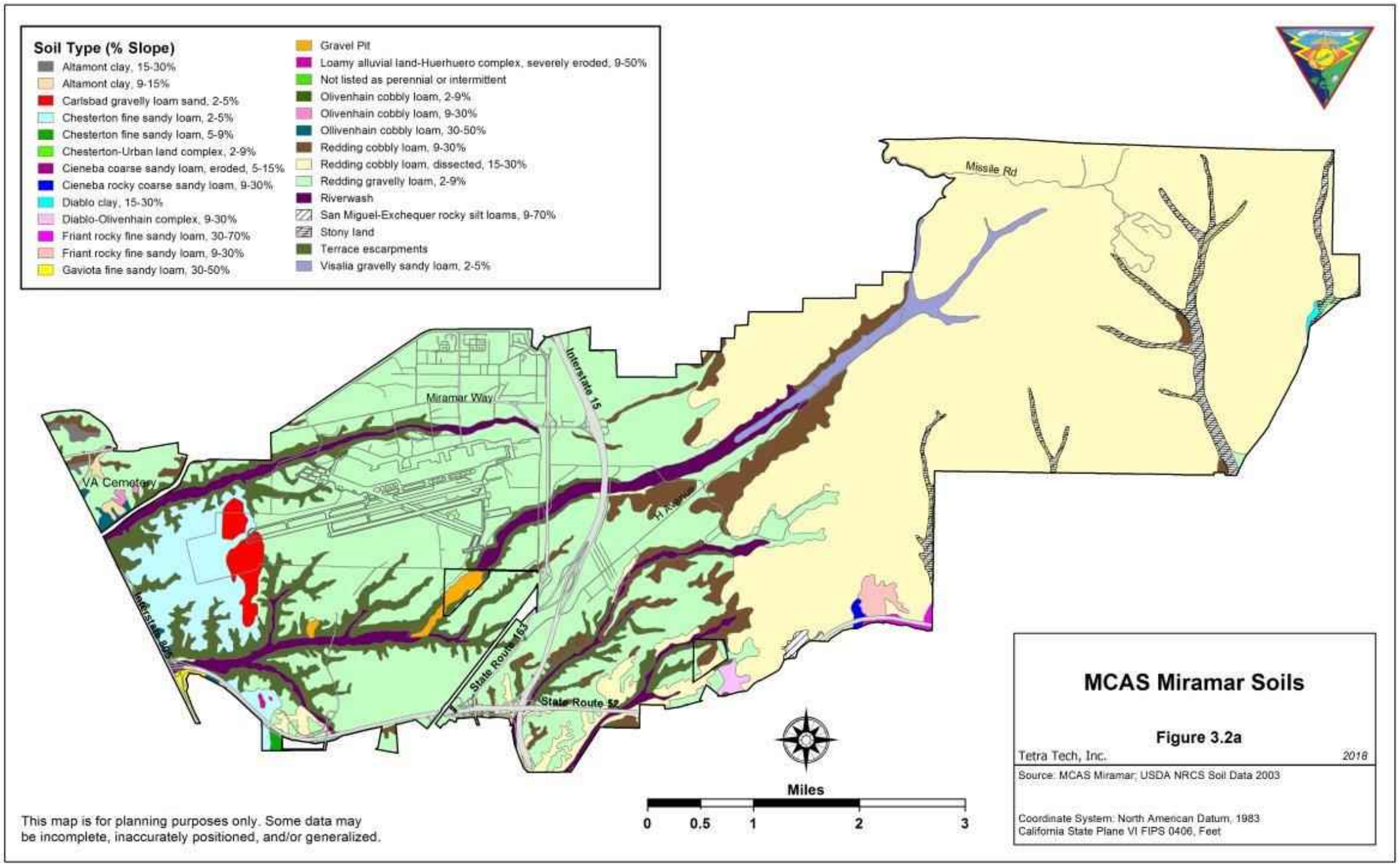

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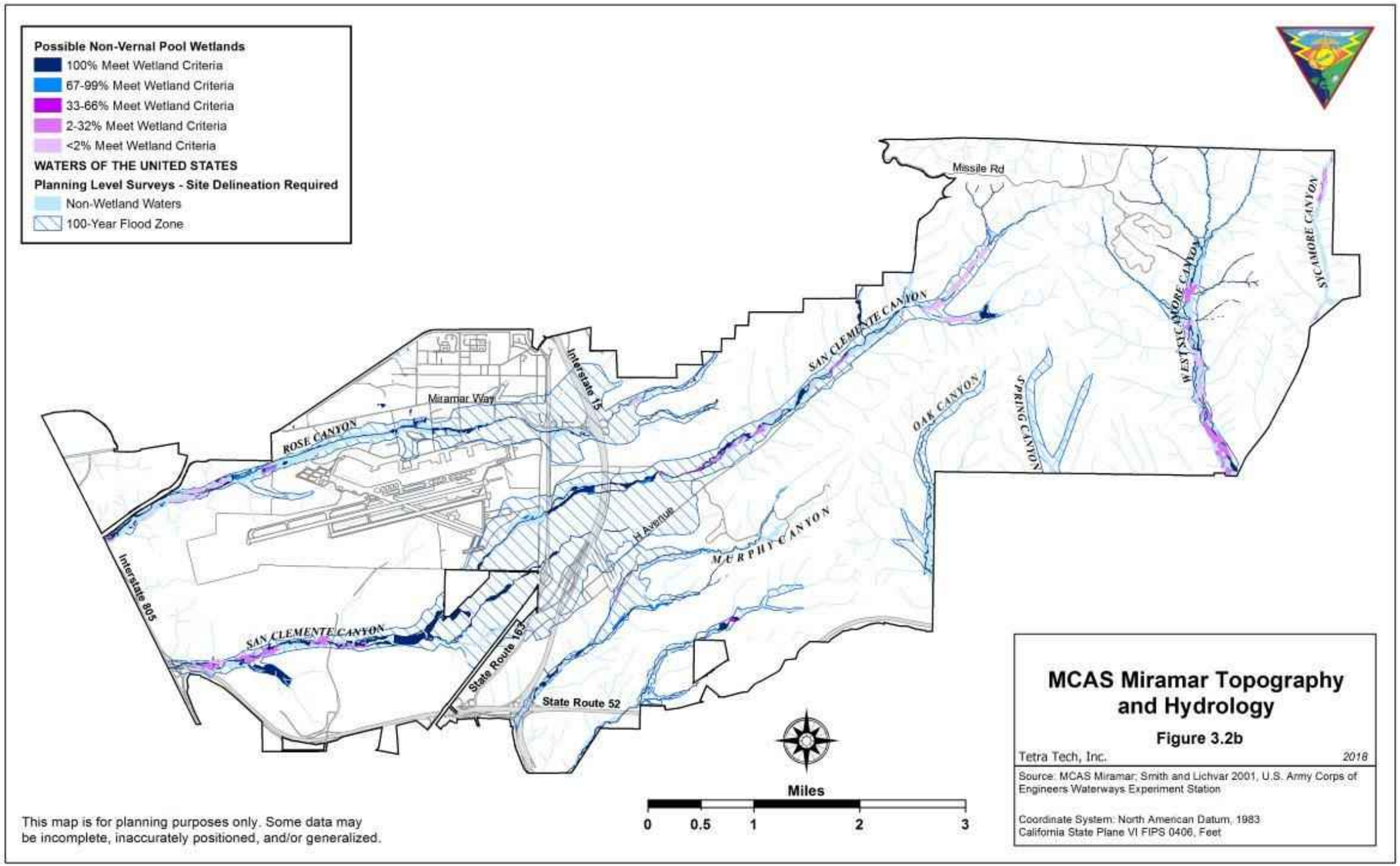
Figure 3.2b. MCAS Miramar Topography and Hydrology



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An earlier study (Tetra Tech, Inc. 1983) had concluded that Rose Canyon was a source of high concentrations of organically rich fine sediments draining into Mission Bay, aggravating the silting of the bay and degrading bottom sediments. In an aerial photo of stream channel conditions in 1928 (when these lands were used for ranching), most channels were found to be well-defined, flowing with water and full of sediment. By 1991, these areas were almost completely vegetated with no defined channel, probably due to bed aggradation (Kellogg and Kellogg 1991). Section 7.2.1, General Vegetation Management and Soil Conservation, has more detail on erosion on MCAS Miramar and programs to reduce its impacts.

Soil Erosion and Revegetation Restoration Projects have been programmed via Marine Corps Headquarters to address identified erosion sites. Nine MCAS Miramar sites are in the process of renovation.

3.4 Potentially Contaminated Sites and Areas Containing Munitions and Explosives of Concern

Areas of MCAS Miramar have been identified as sites where the disposal or discharge of hazardous wastes has resulted in potential environmental contamination. There are also sites where munitions and explosives of concern are potentially and/or confirmed to be present. Description of both types of sites, Installation Restoration Sites and Munitions Response Sites, are summarized in Community Relations Plan. Such sites potentially affect natural resources on the Station, primarily though the following issues: 1) concern about natural resources, particularly restoration work that could unexpectedly encounter contamination or unexploded munitions; 2) execution of a natural resource management action could further complicate a clean-up action; and 3) contamination could result in poor success with a natural resource management action. Further information can be obtained by contacting Installation Restoration and Munitions Response Program manager.

3.4.1 Installation Restoration Program Sites

Sites where hazardous materials disposal or discharge may have resulted in contamination were identified under the Installation Restoration Program, which addresses the identification, investigation, research, and cleanup of contaminated sites. Of the 19 identified Installation Restoration Program sites on MCAS Miramar, 12 have been closed because cleanup action is unnecessary or removal has already been conducted.

Of the remaining seven active Installation Restoration sites on MCAS Miramar, five are actively undergoing investigation, a limited removal action was completed in 2014 at one site, and removal activities are occurring at one site:

- ***IR1 - Fuel Farm Operations Area*** (seven non-contiguous areas, including the existing fuel farm where waste petroleum, oils, lubricants, and tank bottom sludges were sprayed on vegetated areas and bare soil for weed and dust control during early 1940s-1975. In preparation for the construction of the new fuel farm, a hot spot Removal Action removed the soil identified to have the highest concentrations of Polychlorinated Biphenyls and Total Petroleum Hydrocarbons. A limited removal action was completed 2014.);

- ***IR2 - Rose Canyon*** (1940s-1960s industrial materials were commonly discharged into Rose Canyon via storm drains. Concentrated wastes, including oils, greases, hydraulic fluid, fuel, solvent, paint thinners, plating waste water, corrosive wastes, and beryllium dust were reportedly disposed of on this sight. Work on an extended site inspection began in FY 2014.);

- ***IR5 - Old San Clemente Canyon Disposal Site*** (1940s-1972 dump on south side of flight line that received refuse that included hazardous materials (*e.g.*, waste paints, pesticides, solvents, spent lead

acid batteries. An interim removal action was completed in 2012 which included the installation of a landfill cover. A remedial investigation began in FY 2015, followed by a feasibility study.);

- ***IR10 - Old Sycamore Canyon Atlas Missile Test Site*** (East Miramar site contaminated with polychlorinated biphenyl [site assessment completed in 2006] and asbestos-containing material [abatement completed in 1997]; a portion of this facility is used for an Explosive Ordnance Demolition range [Section 2.4.2, Firing Ranges]. A limited removal action was conducted in 2010. An additional removal action is schedule for FY 2015 to remove polychlorinated biphenyl sediment and debris from inside the structures. A remedial investigation began in FY 2015, followed by a feasibility study.);

- ***IR16 - K212 Boiler Plant Mercury Spill*** (adjacent to the K212 Boiler Plant where during a tank excavation, evidence was found of a mercury release, most likely from broken mercury manometers and leaking waste tanks. A site investigation was completed in 2012, and an extended site inspection was completed.);

- ***IR18 - MCX Main Gas Station*** (located near the intersection of Miramar Court and Maxam Way, near the western entrance to MCAS Miramar where old, leaking, underground fuel storage tanks that were removed in 1998 resulted in soil and groundwater contamination. Groundwater sampling in early 2007 indicated additional investigation was required to assess the extent of groundwater contamination. Installation of additional wells was completed in December 2011, followed by an additional site characterization report. The implantation of a passive soil gas venting system pilot test began in FY 2015.); and

- ***IR19-Former Gun Club*** (includes the former San Diego Shotgun Sport Association lease area and the Overshot Area. Lead shot deposits have been observed in both portions of the site. Undocumented fill material resulting from demolition of power plants was used during construction of the western portion of the site. An Engineered Evaluation/Cost Analysis and an Action Memorandum were completed in 2014. A Data Gap Survey and interim removal action began in FY 2015.)

Additional information on these sites is available at http://www.miramar-ems.marines.mil/Portals/60/Docs/MEMS/Inst_Rest/Miramar%20CRP_Final_083112_FINAL.pdf.

3.4.2 Military Munitions Sites

The Military Munitions Response Program was established to manage the environmental, health, and safety issues presented by unexploded ordnance, discarded military munitions, and munitions constituents. The program maintains an inventory of non-operational ranges that contain or are suspected to contain these items, prioritizes site cleanup with site-specific cost estimates to complete the response, and programs and budgets for such cleanup response actions.

The primary concern with munitions and explosives of concern is the risk to installation personnel and visitors associated with the potential presence of unexploded live ordnance (armed with exploding warhead). If disturbed, unexploded live ordnance can be deadly. Inert practice ordnance with unexploded signal cartridges is not as dangerous as unexploded live ordnance, but it is also dangerous.

The second concern is potential for environmental contamination. Hazardous constituents contained in munitions and explosives are usually consumed in a series of chemical reactions that occur upon detonation. Occasionally, munitions do not fully detonate or do not detonate at all. If these non-detonated munitions

are not recovered and the munitions case is damaged or eventually corrodes, hazardous constituents could leach into the environment.

Only non-operational ranges prior to 2002 are included in the Military Munitions Response Program. There are 12 of these sites on MCAS Miramar. Preliminary Assessments (PAs) of all 12 sites were completed in 2007. Military Munitions Response Program sites 2, 3, 7, 8, 9, 12, and 13 have received No Further Action Letters from the Department of Toxic Substances Control Department and/or are closed.

MCAS Miramar currently has five active Munitions Response Sites (MRS) on the air station:

- ***MRS1-Grenade Course*** (was used between 1941 and 1943 as a practice grenade range. This site is located approximately in the center of the installation. The 2007 PA resulted in no observations of Munitions Constituents [MC]; however, during Site Inspection [SI] fieldwork in 2010, munitions debris was present, including one grenade handle and one cap from a can. Although these items represent a relatively low risk, the SI recommended a Remedial Investigation/Feasibility Study (RI/FS) to ensure the site is clear of any potential hazards. An Extended SI began in FY 2015 for MRS1.);

- ***MRS5-Skeet Range 1980*** (overlapped MRS 2 at the former Naval Auxiliary Air Station Camp Kearney and was used between 1964 and 1980 for shot gun skeet shooting. Following the 2007 PA, SI Fieldwork in 2010 resulted in the observation of MC, including results above Human Health Project Screening Levels for metals associated with shotgun shell debris. The SI resulted in the recommendation of an RI/FS with a focus on MC. A Remedial Investigation began in FY 2015.);

- ***MRS6-Pistol Ranges 5-7*** (were in use for two or three years for small arms training with .45 caliber pistols between 1917 and 1920. These three ranges are located north of the airfield, south of Miramar Road, on the northern side of Rose Canyon, and approximately 2,000 feet north of the former Camp Kearny boundary. Since 1920, the site has remained undeveloped. No munitions and explosives of concern [MEC] was observed during SI fieldwork in 2010. Soil samples taken during the SI confirmed that the metals associated with munitions had concentrations above the range installation background metals for soil and ecological screening levels. In addition, concentrations of total lead were detected above human health project screening levels. Based on these results an RI/FS has been recommended for MRS 6.);

- ***MRS10-Pistol Ranges 9-11*** (were used between 1917 and 1920 for small arms training with .45 caliber pistols. This site is located in the southernmost portion of the installation, just north of the southern boundary, south of the airfield on the northern side of San Clemente Canyon, and north of the J. Harris Quarry site. The site currently consists of approximately 1.98 acres of undeveloped land, much of which is located within the area where lead shot from a recreational range would be anticipated to occur. Soil sampling conducted during the 2010 SI resulted in metals values above Human Health Project Screening Levels, possibly due to overshot from the recreational range. An RI/FS with a focus on MC has been recommended for MRS 10.); and

- ***MRS15-Rifle Range—200 Targets*** (used between 1917 and 1920 as a rifle range consisting of a target berm and three firing lines for .30 caliber rifle ammunition. The site is currently located beneath the installation golf course and its parking areas, associated buildings on the east side of Anderson Avenue, as well as beneath the recreational field on the northeast corner of Anderson Avenue and Bauer Road. A PA/SI for MRS was conducted in 2010. No evidence of MEC, munitions debris, or historical range features [berms] were observed during PA/SI fieldwork. However, elevated metals values resulted in recommendation for an RI/FS for MRS 15).

Additional information pertaining to potentially contaminated sites and areas containing MECs can be obtained by contacting the MCAS Miramar, Environmental Management Department, Engineering Division. Additional information on Military Munitions Response Program sites is available at http://www.miramar.usmc.mil/ems/environmental _ programs/mmrp/default.htm.

3.4.3 Historic Ranges

There are 79 historical ranges, testing areas, chemical warfare training areas and other training areas associated with MCAS Miramar. Nineteen of the historical ranges are partially or completely outside the current base boundary. Another 12 historical ranges, mostly on the main side of the base have been added to the Munitions Response Program. The remaining historical ranges are scattered throughout eastern portions of the base.

Most of the historical ranges date back to World War I or World War II. Range types include artillery, bombing, gunnery, combat training, and small arms. Though not likely, the potential to encounter munitions, either unexploded ordnance or discarded military munitions, does exist. High explosive munitions were used on some of the historical ranges. However, even the low explosive munitions used as propellants or for pyrotechnics, can be a safety concern. Furthermore, storm water has been known to wash munitions off a historical range and onto a non-range area or another historical range (MCAS Miramar Community Relations Plan 2012).

The location of the ranges, munitions, and explosives of concern that might be encountered are summarized in *Range Identification and Preliminary Range Assessment, Marine Corps Air Station Miramar* (U.S. Army Corps of Engineers, St. Louis District 2001).

4.0 BIOLOGICAL RESOURCES

4.1 Overview

The following descriptions of vegetation and landcover types are based on the Station-wide mapping effort completed by Tetra Tech (2014). Vegetation has recovered significantly since the 2003 Cedar Fire allowing detailed vegetation classifications to be accurately mapped for the Station. The 2014 mapping effort used the National Vegetation Classification (NVC) Standard to classify vegetation types in undeveloped areas of MCAS Miramar (Federal Geographic Data Committee [FGDC] 2008). Approximately 18,171 acres of MCAS Miramar are undeveloped and were classified into vegetation types, including disturbed polygons, using the descriptions within *A Manual of California Vegetation, Second Edition* (Sawyer *et al.* 2009) and the *Vegetation Classification Manual for Western San Diego County*, which was prepared for the San Diego Association of Governments (SANDAG) in 2011. All undeveloped areas were mapped to the alliance level (NVC level 7). Additionally, areas with willowy monardella (*Monardella viminea*) or riparian habitats were classified to the association level (NVC Level 8).

Vegetation types, such as sage and sagebrush scrub, are not discussed as a habitat type. Discussions of habitat are organism (*i.e.*, species) specific. Vernal pool habitat at MCAS Miramar is discussed separately because it occurs in more than one vegetation type. Nomenclature used throughout the document follows Jones *et al.* (1992) for mammals; American Ornithologists' Union (1983, 1996) for birds; Jennings (1983) for reptiles and amphibians; Baldwin *et al.* (2012) for plants; and vegetation types (plant communities) were selected from relevant descriptions within Sawyer *et al.* (2009) and SANDAG (2011). New vegetation types were also described by Tetra Tech (2014).

Also included in this chapter is a discussion of wildlife and wildlife habitat, habitat linkages and wildlife corridors, Special Status Species, other Species of Regional Special Concern, and a review of the Habitat Evaluation Model developed in the 2000 INRMP. As a result of ongoing biological studies at MCAS Miramar, this information is periodically updated.

4.2 Vegetation and Landcover Types

Tetra Tech (2014) mapped 144 native and non-native vegetation types within 44 alliances in the undeveloped areas on MCAS Miramar. Figure 4.2 is a consolidation of similar vegetation types for graphical purposes (*i.e.*, the vegetation type, grassland/herbaceous, includes 6 native and non-native alliances [NVC Level 7]). Scrub, chaparral, woodlands, freshwater marsh, and sage and sagebrush vegetation types were grouped based on the dominant species within each alliance.

Additionally, 104 acres were identified as disturbed from human activities outside of actively managed lands. These areas did not meet vegetation classification criteria at the time of mapping due to various disturbance types but could eventually become an established vegetation community if future efforts are taken to restore these areas to a natural vegetation community.

Appendix B contains the plant species known to occur on MCAS Miramar. Appendix C includes a table of all vegetation alliances, their associated acreage on MCAS Miramar, and the generic vegetation grouping (*i.e.*, scrub, chaparral, woodlands, freshwater marsh, sage and sagebrush) to which they were assigned.

4.2.1 Ceanothus Chaparral

Ceanothus tomentosus Shrubland Alliance

Chaparral consists of shrubs with small, hard, evergreen leaves that are adapted to prevent wilting during dry periods. Ceanothus chaparral is dominated by woollyleaf ceanothus (*Ceanothus tomentosus*) and wart-stem ceanothus (*Ceanothus verrucosus*). It consists of 4 alliances mapped during the 2014 vegetation mapping effort and covers approximately 2,870 acres of MCAS Miramar (Appendix C).

4.2.2 Chamise Chaparral

Chamise chaparral is dominated by chamise (*Adenostoma fasciculatum*) and chamise co-dominated with other shrubs, including black sage (*Salvia mellifera*) and mission manzanita (*Xylococcus bicolor*). Chamise chaparral composes approximately 6,124 acres of MCAS Miramar and consists of 3 alliances (Appendix C).

Adenostoma fasciculatum Shrubland Alliance

4.2.3 Scrub Oak Chaparral

Quercus berberidifolia/acutidens Shrubland Alliance

Scrub oak chaparral is dominated by California scrub oak (*Quercus berberidifolia*) and Nuttall's scrub oak (*Quercus dumosa).* However, oak species identification on MCAS Miramar is currently under review and preliminary DNA analyses indicate that Torrey's scrub oak (*Quercus acutidens*) may be present on MCAS Miramar instead of California scrub oak. Other trees and shrubs within scrub oak chaparral act as nurse plants, offering the saplings and seedling protection and regulating the environment. MCAS Miramar has approximately 683 acres of scrub oak chaparral. This vegetation type consists of 2 alliances (Appendix C).

4.2.4 Other Chaparral

Cercocarpus betuloides Shrubland Alliance

Other chaparral on MCAS Miramar is chaparral that is not dominated by ceanothus, chamise, or scrub oak. Plants occurring in other chaparral include mountain mahogany (*Cercocarpus betuloides*), hollyleaf cherry (*Prunus ilicifolia*), lemonadeberry (*Rhus integrifolia*), and mission manzanita. Other chaparral composes approximately 208 acres of MCAS Miramar and consists of 4 alliances (Appendix C).

4.2.5 Buckwheat Scrub

Scrub consists of sparsely to densely spaced, low-growing (generally less than 6 feet in height), drought deciduous shrubs. It frequently occurs on south-facing slopes and ridges where the rainfall, drainage, soil type, and exposure to the sun provide conditions necessary for the plant community. Buckwheat scrub at MCAS Miramar consists of shrubland dominated by California buckwheat (*Eriogonum fasciculatum*). Buckwheat scrub composes approximately 2,446 acres of MCAS Miramar and consists of 1 alliance (Appendix C).

Eriogonum fasciculatum Shrubland Alliance

4.2.6 Sage and Sagebrush Scrub

Salvia mellifera Shrubland Alliance

The sage and sagebrush scrub vegetation types consists of highly aromatic shrubs with pliable and thin leaves found in a variety of different soil types. In particular, it is dominated by California sagebrush (*Artemisia californica*), black sage, and white sage (*Salvia apiana*). MCAS Miramar consists of approximately 1,918 acres of sage and sagebrush scrub, which includes 5 alliances (Appendix C).

4.2.7 Riparian Scrub

Riparian scrub occurs in both seasonally and intermittently flooded habitats, and stands are variable depending on the amount of inundation. It typically occurs in open shrublands or thickets in riparian corridors and is generally less than 8 feet in height. This vegetation type is dominated by San Diego sagewort (*Artemisia palmeri*) and/or mule fat (*Baccharis salicifolia* ssp. *salicifolia*). This vegetation type covers approximately 28 acres of MCAS Miramar and consists of 2 alliances (Appendix C).

Baccharis salicifolia ssp. salicifolia Shrubland Alliance

4.2.8 Other Upland Scrub

Baccharis sarothroides Shrubland Alliance

Other upland scrub at MCAS Miramar consists of scrub vegetation that is not dominated by buckwheat or sage and does not occur in riparian habitats. The dominant species in these shrublands include broom baccharis (*Baccharis sarothroides*), deerweed (*Acmispon glaber*), and laurel sumac (*Malosma laurina*). MCAS Miramar contains approximately 1,981 acres of other upland scrub. This vegetation type consists of 7 alliances (Appendix C).

4.2.9 Riparian Woodland

Salix gooddingii Woodland Alliance

Woodlands are comprised of trees that are generally 8 feet in height or taller. Woodlands may include thickets, or dense stands of riparian trees or large shrubs. The shrub layer is generally open to intermittent in riparian woodlands. Riparian woodlands on MCAS Miramar include coast live oak (*Quercus agrifolia*) woodlands, California sycamore (*Platanus racemosa*) woodlands, black willow (*Salix gooddingii*) thickets, and arroyo-willow (*Salix lasiolepis*) thickets. These woodlands cover approximately 253 acres of MCAS Miramar and consist of 4 alliances (Appendix C). This vegetation type is generally associated with bodies of water, such as streams, lakes, or wetlands, or is dependent upon perennial, intermittent, or ephemeral surface or subsurface water drainage.

4.2.10 Freshwater Marsh

Freshwater marshes are flooded sites without significant water currents for extended periods of time. These marshes are dominated by perennial plants that are adapted to flooded conditions. Vegetation present in freshwater marshes at MCAS Miramar include rushes (*Juncus bufonis, J. arcticus* var. *mexicanus, J. dubius*), California bulrush (*Schoenoplectus californicus*), and cattails (*Typha* spp.). MCAS Miramar consists of approximately 26 acres of freshwater marshes with 3 alliances (Appendix C).

Typha (angustifolia, domingensis, latifolia)
Herbaceous Alliance

4.2.11 Grassland/Herbaceous

Avena (barbata, fatua)
Semi-Natural Herbaceous Stand

MCAS Miramar has approximately 1,477 acres of grassland/herbaceous stands consisting of 7 alliances (Appendix C). The most common native species in grasslands on MCAS Miramar is purple needlegrass (*Stipa pulchra*). Non-native grass species represented in this vegetation type are wild oats (*Avena barbata, Avena fatua*), bromes (*Bromus diandrus, B. hordeaceus, B. madritensis* ssp. *rubens*), and Italian rye grass (*Festuca perennis*).

4.2.12 Non-Native Tree

The non-native tree vegetation type on MCAS Miramar is dominated by eucalyptus (*Eucalyptus* spp.) and olive trees (*Olea europaea*). This vegetation type covers approximately 52 acres of MCAS Miramar and consists of 2 alliances (Appendix C).

Eucalyptus (globulus, camaldulensis)
Semi-Natural Woodland Stand

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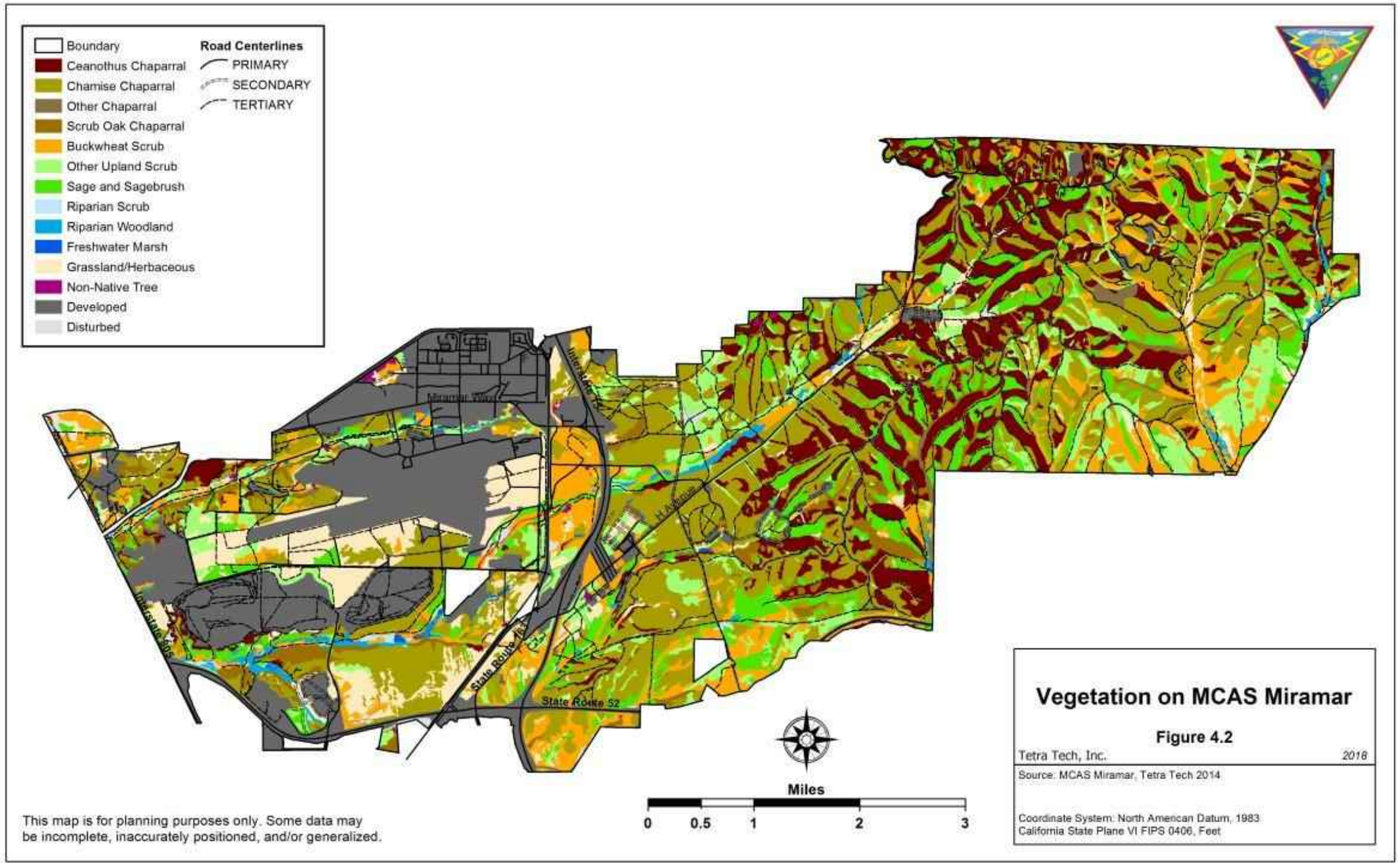
Figure 4.2. MCAS Miramar Vegetation and Landcover Types



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4.2.13 Disturbed Land

Areas classified as disturbed are those that have been impacted by human activities (*e.g.*, brushing, tilling, historic dumping, clearing, graded areas that have been abandoned, or vehicle disturbance), but have the potential to return to a natural vegetation type. This classification also includes active restoration sites (such as vernal pool, fuelbreak, and landfill restoration areas) that do not currently meet vegetation type descriptions but are actively being restored. In addition, this classification includes non-native species that are actively being treated on MCAS Miramar. Approximately 104 acres of MCAS Miramar have been characterized as disturbed land (Appendix C).

IR Site 5 Revegetation Effort

4.2.14 Developed

Developed areas are those that are routinely maintained and do not have the potential to be restored to a natural vegetation community. These include landscaped areas, buildings, pavement, recently graded areas, paved roads, and fuelbreaks that are actively being managed. Fuelbreaks are typically areas where flammable vegetation is reduced but not removed entirely (like in firebreaks) to reduce the heat-intensity of wildfires by reducing the amount of fuel that is available to burn. MCAS Miramar only uses fuelbreaks, not firebreaks. Approximately 4,894 acres of MCAS Miramar are developed (Appendix C).

4.3 Vernal Pool Habitat

4.3.1 General

Vernal pools are ephemeral wetlands that develop on a variety of soils. On MCAS Miramar most pools are found on the Redding soil series which is underlain by an iron-silica hardpan that retards natural rainwater percolation so that ponding occurs in depressions on the soil surface.

Vernal pools develop during the seasonal rainy period that begins in late fall or early winter and extends into the spring. Water rarely ponds before December 1 or remains after May 1. Year-to-year variation in the length and pattern of precipitation affects the depth and duration of standing water. After a heavy rainfall, pools may become interconnected either because of the high water level or shallow surface water flow. In dry years many pools do not fill.

Vernal Pool – Wet Season
Natural Resources Division

Vernal pools are non-tidal waters that are seasonal wetlands and may be subject to provisions of Section 404 of the Clean Water Act (CWA) administered by the Army Corps of Engineers (*Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region, September 2008)*. These pools may have all three wetland indicators (hydric soils, hydrophytic vegetation, and hydrology) during the wet season but may lack wetland indicators during much of normal rainfall years or throughout the entire year in drought years.

4.3.2 Regional Vernal Pool Habitat Issues

Vernal Pool – Dry Season Natural Resources Division

Extensive residential, commercial, agricultural, and infrastructure development has led to the loss of most of San Diego's vernal pool habitat and the endemic plants that grow in this specialized habitat. Bauder (1986) estimated that 93 percent of the original watershed acres of vernal pools had been lost; this estimate was based on Beauchamp and Cass' (1979) estimate of the historical distribution of pools. Oberbauer (1990), using a higher estimate for the original amount of vernal pool habitat, concluded that 97 percent of the pool habitat had been lost. In a report for the California Senate Committee on Natural Resources and Wildlife, Jones and Stokes (1987) stated, "*The severity of habitat loss and species endangerment makes the San Diego vernal pools one of the natural communities most urgently in need of site protection in California*."

Efforts to preserve vernal pool habitat in the private sector have been largely unsuccessful. Between 1979 and 1986, about 68 percent of vernal pools on privately-owned land within the City of San Diego were lost (Bauder and Wier 1991). According to a 2004 Vernal Pool Inventory (City of San Diego 2004), 30 percent of the vernal pools surveyed were on privately owned land (this inventory did not include vernal pools known to occur on military lands).

On the other hand, more intense regional field surveys, such as those done by Beauchamp (1979), Bauder (1986), and the City of San Diego (2004) have revealed pools that were previously unmapped.

Along with destruction of vernal pool habitat, overall habitat quality has declined -- partly from continuing disturbances, but also from fragmentation (Bauder 1986). Fragmentation has led to additional edge effects and altered hydrology. Its impact on animals associated with vernal pools is unknown (Bauder and Wier 1991).

4.3.3 Vernal Pool Ecosystem

Before modern development, the majority of San Diego vernal pools existed in mima mound-pool swale landscapes such as those found currently on the Miramar Mounds National Natural Landmark (Miramar's U North complex) and the EE complex found south of the Miramar runways. Remnant pools still exist in many areas on graded and highly disturbed surfaces. Many seasonally ponding features such as ditches, road ruts, artificial impoundments, etc. also serve as suitable habitat for vernal pool plant and animal species, though their functionality as true vernal pool ecosystems may be compromised by disturbance.

Vernal pool plant and animal communities, which Thorne (1976) labeled "*vernal pool ephemeral*," are unique. On initial fall or winter ponding, over-summering reproductive structures of vernal pool plants and animals in the soil hatch or sprout, grow, and relatively quickly mature and produce new reproductive structures ready to spend months, years, or even decades in dry soils until pools fill again. More than three-quarters of plant species characteristic of these pools are found only in the California Floristic Province (Thorne 1976), an area west of the Sierra Nevada and stretching from southern Oregon to northern Baja California, Mexico. Even within the California Floristic Province, some of the plant species' distributions are exceedingly restricted. San Diego mesa mint (*Pogogyne abramsii*) is found exclusively on the central mesas of San Diego County, and Otay mesa mint (*Pogogyne nudiuscula*) occurs only on the southern San Diego County mesas, extending south into Baja California, Mexico. Likewise, Orcutt's brodiaea (*Brodiaea*

orcuttii) is found only in San Diego County and Baja California. San Diego button-celery (*Eryngium aristulatum* var. *parishii*) is found only in southern and central San Diego County. On a local scale, distributions of many vernal pool species are patchy within pool clusters or "complexes" (Bauder and Wier 1991). In addition to the endemic vernal pool habitat species of restricted distribution, there are a number of plant species, such as California waterwort (*Elatine californica*), American pillwort (*Pilularia americana*), and hyssop loosestrife (*Lythrum hyssopifolium*), belonging to the subcosmopolitan aquatic flora (Thorne 1984).

Similar to the situation with vernal pool flora, pools support freshwater invertebrate assemblages of up to 25 species, some of which (e.g. *Branchinecta lindahli* and *Macrothrix hirsuticornis*) are cosmopolitan and some of which (*e.g*., San Diego and Riverside fairy shrimp) are endemic to Southern California. There are probably several undescribed species of ostracods (Branchiopod Research Group 2003) whose conservation status is unknown. The most widespread freshwater invertebrate in Miramar pools is San Diego fairy shrimp (*Branchinecta sandiegonensis*). The federally listed Riverside fairy shrimp (*Streptocephalus woottoni*) has been found as hatched individuals or cysts only in two large artificial impoundments adjacent to each other in East Miramar. Lindahl's fairy shrimp on Miramar is probably a recent invasive species. The currently known Miramar distribution of this widespread species is only in puddles on the western border of the Station on roads associated with regular utility (gas and electric, water, and sewer) vehicle traffic. This species hybridizes with San Diego fairy shrimp (Simovich *et al.* 2013), and one population (so far) of hybrids has been documented in a large impoundment in Rose Canyon near the Station west boundary.

On MCAS Miramar, vernal pool habitat is essential to the survival of six species protected under the ESA. Five vernal pool associated species are listed as endangered: the San Diego button-celery, California Orcutt grass (*Orcuttia californica*), San Diego mesa mint, Riverside fairy shrimp and San Diego fairy shrimp. Spreading navarretia (*Navarretia fossalis*) is listed as threatened. Table 4.3.4 indicates the presence of these species within MCAS Miramar vernal pool groups. Map 4.3.4 indicates locations of these management units and pool groups.

4.3.4 Vernal Pool Habitat at MCAS Miramar

Vernal pool habitats at MCAS Miramar constitute Southern California's largest, least disturbed, and most contiguous vernal pool landscapes supporting endangered and sensitive species (Bauder and Wier 1991).

Vernal pool habitat typically occurs on the coastal terraces of MCAS Miramar in the western half of the Station. Vernal pools are not uniformly distributed but occur in groups or clusters on mesas where soil and topographic conditions favor their development (*i.e*., presence of a durapan layer). Historically, vernal pool clusters were separated from each other by a system of canyons trending in a northeast/southwest direction and draining toward the ocean. Three of these large canyons drain MCAS Miramar: Rose Canyon, San Clemente Canyon, and Murphy Canyon. Varying degrees of land use (*e.g*., roads, buildings, landfill) have dissected remaining natural habitat into a number of separate parcels varying in size from large (>1,500 acres) to very small (< 1 acre).

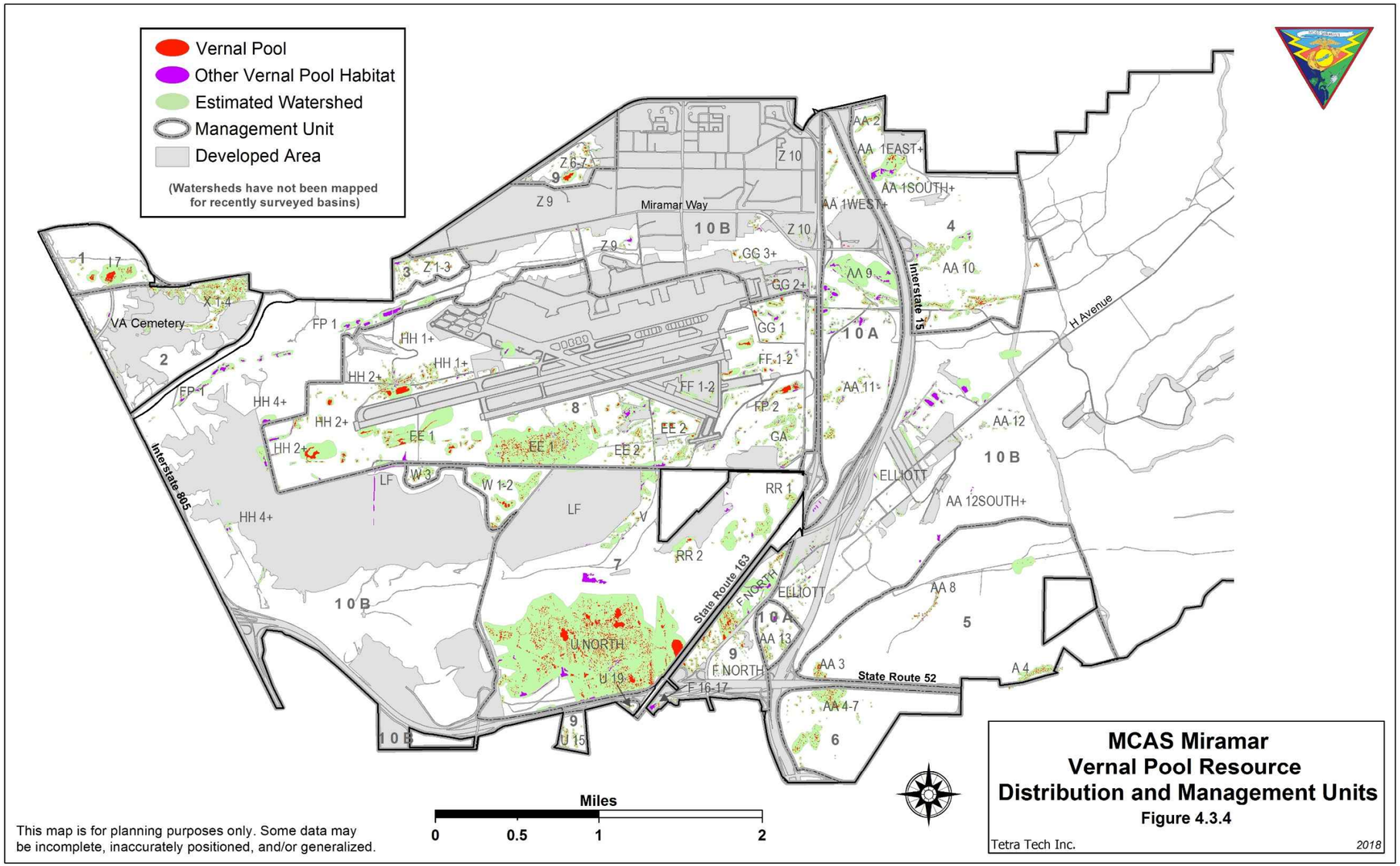
Table 4.3.4 Federal Listed Species Occurrence within MCAS Miramar Vernal Pool Groups*

Pool Groups	California Orcutt Grass	San Diego Button-celery	San Diego Mesa Mint	Spreading Navarretia	San Diego Fairy Shrimp	Riverside Fairy Shrimp	Total Basins in Group #
A	0	0	18	0	43	0	**83**
AA	1	59	165	0	509	2	**1,226**
EE	0	515	146	0	753	0	**1,364**
Elliott	0	1	0	0	73	0	**220**
F	0	12	51	0	162	0	**367**
FF	0	17	0	0	26	0	**59**
FP (Flood Plain)	0	1	0	0	87	0	**312**
GA	0	5	0	0	36	0	**252**
GG	0	26	0	0	60	0	**128**
HH	1	133	51	1	177	0	**400**
I	0	31	3	0	42	0	**68**
Landfill	0	0	1	0	23	0	**25**
RR	0	0	18	0	60	0	**141**
U	1	910	654	3	1,455	0	**1,702**
V	0	12	3	0	23	0	**79**
W	0	13	0	0	65	0	**105**
X	0	227	33	0	375	0	**646**
Z	1	62	32	1	104	0	**297**
Total All Groups	**4**	**2,024**	**1,175**	**5**	**4,073**	**2**	**7,474**

* Numbers of basins, including vernal pools and other seasonally ponded features.
# Total basins in group cannot be calculated by adding rows because some basins have more than one federal listed species, which would result in double counting them. Additionally, basins with no listed species would not be counted at all.

The NAS Miramar Vernal Pool Management Plan (Bauder and Wier 1991) grouped pools into units (Figure 4.3.4). This plan established Management Units that were delineated as geographical areas with similar management needs. For instance, all pools within the flightline security fence were placed in Management Unit 8. A number of pools east of I-15 were assigned to Unit 4, an area that was highly disturbed. Units 1, 2, and 5-7 have the potential for high quality conservation because they were large, contain varied topography and a number of vegetation types, and were distant from intense military activity. Unit 9 contains small groups suitable for public awareness and educational activities; however most groups requesting field trips have asked to visit the Unit 7 area within the Miramar Mounds National Natural Landmark due to the less disturbed and more extensive representation of a vernal pool landscape. Management Unit 10 contains pools which could not be placed logically into other units. This unit is divided into two sections: A) a number of isolated pools at risk for low to moderate disturbance, and B) isolated pools at risk for high disturbance (Bauder and Wier 1991). Current management unit designations continue to be based on Bauder and Wier (1991). Updated pool resource delineations have necessitated adjustment of management unit and group boundaries within units. New management groups have been created to acknowledge differences associated with less typical habitats occupied by San Diego fairy shrimp not recognized in the 1991 plan (*e.g.*, ponded areas of canyon floodplains and artificial drainage ditches in the Landfill area).

Figure 4.3.4. MCAS Miramar Vernal Pool Resource Distribution and Management Units



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Vernal pool habitat on MCAS Miramar has been mapped using several different methods. Initial vernal pool habitat mapping on Station was conducted in 1993 using 1 inch:400 feet, aerial photographs coupled with extensive field surveys. Typically, this method overestimated the surface area of vernal pool habitat basins.

In 1995, the Station began re-mapping individual vernal pool habitat basins using a sub-meter accuracy global positioning system (GPS). Between 1999 and 2010, essentially all of the Station has been resurveyed to precisely map vernal pool habitat basins, estimate watersheds, and determine species presence (Black 2004a, 2004b, 2006, 2007, 2009a, 2009b, 2010; Cobb 2003). As these resurvey efforts have occurred, discrepancies between previously mapped vernal pool habitat and those observed by newer surveys have been resolved by the Natural Resources Division to update the database that replaces previous information using a standardized format. Results from other projects, such as vernal pool habitat restoration and mitigation projects, surveys supporting NEPA analyses, and in-house staff surveys (primarily C. Black), also were used to update the vernal pool habitat database maintained by the Natural Resources Division.

Essentially all areas of the Station supporting both undisturbed natural vernal pools and other basins supporting fairy shrimp and typical vernal pool fauna and flora have now been carefully examined, and basins have been mapped with sub-meter accuracy and sampled for listed vernal pool fairy shrimp and listed pool plant species. More than 7,500 basins have been surveyed (Figure 4.3.4). Many basins surveyed have included puddles in dirt roads, ruts, and sites impounding water as a result of man-made conditions that may not have otherwise ponded sufficient water to warrant survey. Some basins did not support any vernal pool species. Mapping of pools using sub-meter accurate GPS equipment was largely completed in 2010. Since that time, the MCAS Miramar GIS layer for vernal pool resources has been maintained current to add newly identified or created basins and remove the few lost to developments. The current acreage of basin area is 147.2 acres (all basin types surveyed, including puddles, ruts, ditches, pools, etc.).

Based on field observations during surveys, the Station developed descriptive terms for various “types” of basins to provide an indication of apparent origin (natural or as a result of human activity) for mapping and assessment purposes. Use of these “type definitions,” by themselves, is not intended to indicate whether a site supports threatened/endangered species or is subject to Clean Water Act regulatory jurisdiction. “Type” identifiers have been used since 1999 when conducting vernal pool resource surveys and mapping, as a required data entry field in associated GIS layer attributes. Individuals conducting surveys assign the vernal pool “type” description while conducting fieldwork. “Type” definitions contribute to understanding vernal pool habitats and other seasonally ponded features at MCAS Miramar.

Pool: An apparently naturally occurring or purposely created/restored basin that holds water following a series of winter rainfall events. Some evidence of human disturbance may be present (*e.g.*, ruts), but a basin must be present that suggests an origin due to natural processes or purposeful creation/restoration activities. These will usually be very well vegetated with plants indicative of vernal pool conditions unless restoration is ongoing.

Marsh: A wetland frequently or continually inundated with water, characterized by emergent soft-stemmed vegetation adapted to saturated soil conditions following a series of winter rainfall events or urban runoff. On MCAS Miramar, this type is dominated by plants of the families Juncaceae and Cyperaceae; with lesser amounts of assorted forbs and graminoids such as *Lythrum hyssopifolium*, *Ambrosia psilostachya*, *Eleocharis* spp., and *Rumex acetosa* admixed. Use a dominance of Juncaceae and Cyperaceae to distinguish marshes from pools.

Puddle: A depression in an improved (*e.g.*, paved, graded), altered, or unimproved surface that holds water following a series of winter rainfall events apparently as the result of human activities (use and/or

maintenance). No reasonable indication exists of a naturally occurring basin. It will usually be sparsely vegetated, if at all, due to frequent disturbance. Examples of this type would include depressions in dirt roads, dirt parking/storage lots, potholes, and sub-base failures in improved surfaces.

Impoundment: An area of ponding water resulting from human actions that have obstructed natural drainage patterns or flow following a series of winter rainfall events or urban runoff. No evidence of the pre-existence of natural wetlands or other waters remains. The site may often be well-vegetated. Examples of conditions creating impoundments include deposited material "damming" a natural drainage swale, bermed areas, borrow sites, dozer windrows, and similar.

Ditch: A linear depression, often paralleling or extending from developments, including roads, runways, paths, etc. It may retain and hold water following a series of winter rainfall events or urban runoff if the grade of the ditch does not allow water to flow off-site. A ditch may be sparsely vegetated due to periodic maintenance but may be well vegetated if routine maintenance has not been required. If a ditch is wider than normal (*e.g.*, when borrow material was obtained alongside a road under construction), but no clear indication of a naturally occurring basin is present, the entire depressional area should be identified as part of the ditch.

Rut: Vehicle track in soil where there is no indication of a natural vernal pool basin present. These may hold water following a series of winter rainfall events or urban runoff. Older ruts may be vegetated with plants often found in vernal pool conditions.

N/A: This is a depression that has no MCAS Miramar vernal pool database plants, ACOE vernal pool indicator plants, other aquatic weed species, or hatched fairy shrimp or fairy shrimp cysts present. This is used to describe a site that ponded water sufficiently to be surveyed, but results were negative.

Excavation: A deliberate depression that is generally evidenced by rectangular shape when dug with heavy equipment or by abrupt and often deep (> .5 meter) hole. There is usually a pile of extracted material in the immediate vicinity of the excavation. Because of their depth and possibly because of their proximity to hardpan areas, excavations often pond for extended periods compared with shallow ruts, puddles, or natural pools found near them.

Building Foundation: A special class of excavation that is usually characterized by rectangular or angular shapes, and often has outside foundation walls and/or pilings of concrete. Occasionally, there is a concrete slab rather than bare soil within the interior walls.

Watercourse: This is a portion of an ephemeral watercourse/drainage that has a propensity to pond following cessation of storm flows. Duration of water flow varies depending on the associated watershed sizes and degree of topographical change along their lengths. The ponded areas may have fairy shrimp and other freshwater invertebrates present, as well as a wide range of vernal pool plant species.

Southern Pacific Rattlesnake
Natural Resources Division

4.4 Wildlife and Wildlife Habitat

MCAS Miramar provides important habitat for a wide variety of wildlife species. At a minimum, MCAS Miramar supports 7 species of amphibians, 30 species of reptiles, and 39 species of mammals. Well over 200 species of birds have been observed on the Station. A list of animal species observed or potentially occurring at MCAS Miramar is provided in Appendix D; the Station has a pamphlet,

Checklist of Birds, which has been reproduced for general dissemination. Chaparral and coastal scrub are the most common vegetation types on the Station, and many species of wildlife are adapted to both types.

The loss of coastal scrub throughout Southern California has resulted in the listing of the coastal California gnatcatcher as threatened under the federal ESA. Native grasslands, and the wildlife dependent on them, face a similar plight in coastal southern California. Some vegetation types, such as eucalyptus woodlands and disturbed non-native grasslands, provide relatively poor habitat for most native wildlife.

Riparian/wetland/open water areas at MCAS Miramar provide important resources to wildlife, especially amphibians. Even though these areas contribute only 1.3 percent of native vegetative cover on the Station, they are relatively diverse. Riparian vegetation is also important because it may be used as a preliminary indicator of potential wildlife corridors, in addition to being important habitat in its own right (Simberloff and Cox 1987).

Riparian corridors provide good structural diversity of vegetative cover (and sometimes topographic cover), a water source, an abundance of insects and plant food, and less intense temperature fluctuations than surrounding upland habitat (Doyle 1990). Ample cover allows wildlife using corridors to pass through undetected, and ephemeral streams that do not flow year-round may contain small ponds that provide enough water to reinforce the use of corridors in the future. Riparian vegetation generally maintains visual stimuli along the length of corridors, a characteristic that may keep animals moving through it (Ogden 1992). Since many areas within riparian corridors meet criteria of wetlands, they are subject to regulations of the CWA.

4.5 Habitat Linkages and Wildlife Corridors

The following definitions and designations of habitat linkages and wildlife corridors are consistent with those used in the development of the San Diego Multiple Species Conservation Plan (MSCP) (City of San Diego 1996a; Ogden 1993).

Habitat linkages are natural areas that not only provide connectivity among habitat patches, but also provide habitat for native plants as well as year-round foraging and reproduction habitat for resident wildlife. There is particular concern for habitat linkages because they are the key to maintaining contiguous occupied habitat for many species. Breaking the linkages would result in habitat fragmentation and isolated populations.

Wildlife corridors are narrower connections among habitat patches that are intended to allow for wildlife movement and dispersal. Wildlife corridors can be viewed as being local (*i.e.*, within MCAS Miramar) or regional. Local corridors are important because they allow resident wildlife access to resources within MCAS Miramar (Figures 4.5a and 4.5b), and they function as connections with habitat patches in the region (Figure 4.5c). Wildlife corridors generally follow major drainages and open ridgelines.

Work has been performed to assess wildlife movement between MCAS Miramar and adjacent areas. Wildlife movement occurs and has been shown to support genetic connectivity (Bohonak and Mitelberg 2014; City of San Diego 2010; U.S. Department of Transportation [DOT] and California Department of Transportation [CA DOT] 1989). Bohonak and Mitelberg (2014) identified high genetic connectivity within nine populations of southern mule deer (*Odocoileus hemionus fuliginatus*), corresponding to known corridors, preserves, and contiguous areas of open space in southern California and adjacent to MCAS Miramar. Mammal Monitoring and Habitat Assessment at San Diego Mission Trails Regional Park highlighted the importance of prioritizing enhancement and preservation of high quality corridor complexes to ensure long-term viability of diverse wildlife populations (City of San Diego 2010). The Final Environmental Impact Statement for construction of State Route 52 identified multiple wildlife corridors

that connect MCAS Miramar to adjacent areas and cross the proposed route; in addition to strategic fencing and crossing trail connections, a bridge crossing structure was constructed over the highway to permit continued passage of wildlife through these corridors (U.S. DOT and CA DOT 1989).

4.5.1 Habitat Linkages

The entire eastern portion of MCAS Miramar (*i.e.*, east of I-15) functions as an important habitat linkage with adjacent open spaces. Management of East Miramar for military field training and range firing is very compatible with this function as a habitat linkage. Unfortunately, the construction of State Route 52 south of MCAS Miramar fragmented this once open habitat linkage with the Mission Trails Regional Park to the south. Two large bridges of State Route 52, spanning Oak and Spring Canyons, now provide connectivity between MCAS Miramar and Mission Trails Regional Park. The conservation of habitat linkages is preferred over wildlife corridors, which are more constrained. As a result of the rapid urban development in the region, wildlife movement is frequently restricted to narrow corridors, as discussed below.

4.5.2 Wildlife Corridors

Methods Delineating Wildlife Corridors

The following descriptions of wildlife corridors are based largely on investigations conducted in 1992 by Ogden (1992) in an area encompassing MCAS Miramar, Torrey Pines State Reserve, and Los Penasquitos Canyon Preserve. Target species were the mountain lion (*Felis concolor*), bobcat (*F. rufus*), and mule deer.

Presumed corridors were surveyed for animal sign during April-June 1992. Animal sign (tracks and scat) was used as the primary indicator of wildlife use of corridors and was supplemented with other information gathered from more recent sightings. All data were mapped and used to determine major regional corridors in the area and whether they were being used by target species. Also evaluated were 34 road underpasses located within the corridors. Underpasses included box culverts, pipe culverts, bridges, and a freeway interchange. Wildlife use of these underpasses was evaluated based on signs as well as the likelihood of use based on the level of topographic and vegetative cover (Ogden 1992). This information has been supplemented by evaluations reported in the Final Environmental Impact Statement for the Realignment of NAS Miramar (Ogden 1996) and information provided by Station personnel.

MCAS Miramar Corridors

Primary east-west corridors on MCAS Miramar are Rose and San Clemente canyons (Figures 4.5a and 4.5b). Rose Canyon originates east of the Main Station and drains west under I-805 on MCAS Miramar's western boundary. This canyon provides connectivity to habitat patches west of the Station in Rose Canyon Open Space Park. Mule deer, bobcat, and mountain lion use has been documented in this portion of Rose Canyon. Water flows are intermittent in Rose Canyon, and coastal scrub and chaparral vegetation provide cover for wildlife.

San Clemente Canyon originates in northcentral East Miramar and flows south and west through MCAS Miramar before draining under I-805 in the southwestern corner of the property. This canyon also provides connectivity to habitat west of the Station, including that in Marian Bear Memorial Park, as described below in *Regional Corridors through Western Miramar*. Water flows are intermittent in this canyon, which supports coastal scrub, chaparral, wetland, and riparian vegetation. Wildlife traveling west through San Clemente Canyon must pass under I-15 and Kearny Villa Road. Passage under I-15 is through a narrow tunnel measuring 14 feet high, 18 feet wide, and 475 feet long. Passage under Kearny Villa Road is under a bridge. There is a fence along the entire western edge of the roadway at the under-crossing that may be passable by deer. While this portion of the corridor is quite constrained by the two roadways, there is evidence of mule deer use.

Figure 4.5a. Conceptual Wildlife Corridors on Western MCAS Miramar

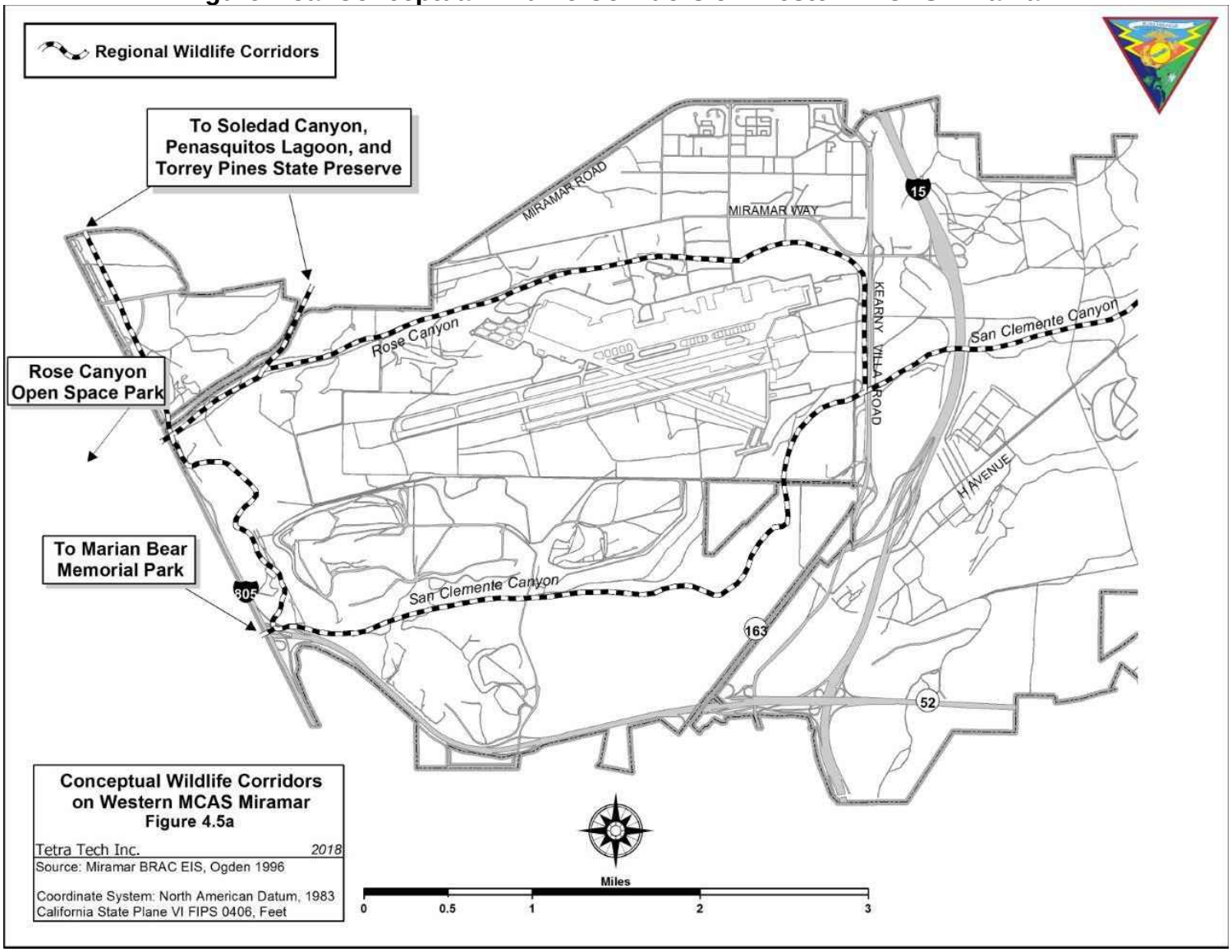

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Figure 4.5b. Conceptual Wildlife Corridors on Eastern MCAS Miramar

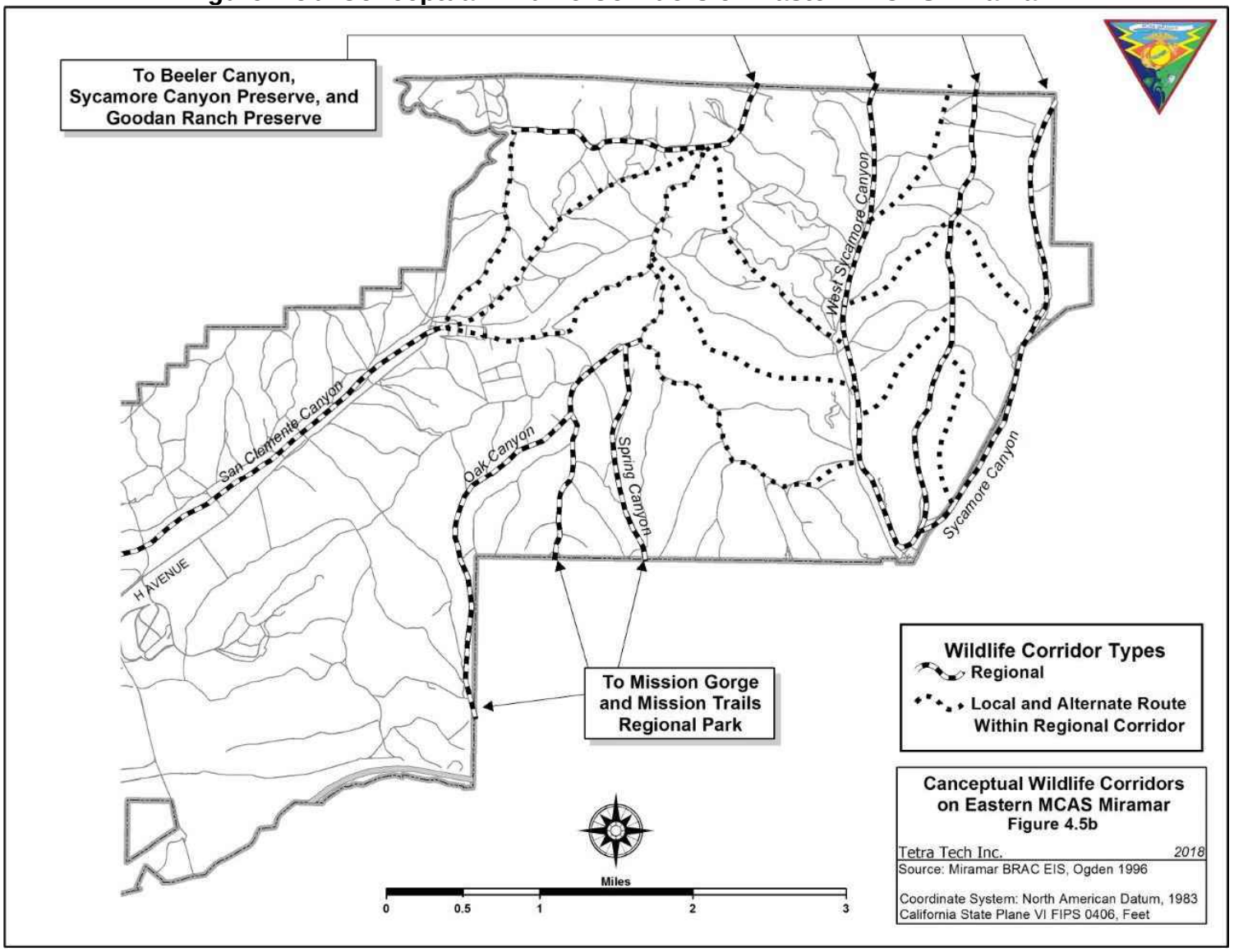

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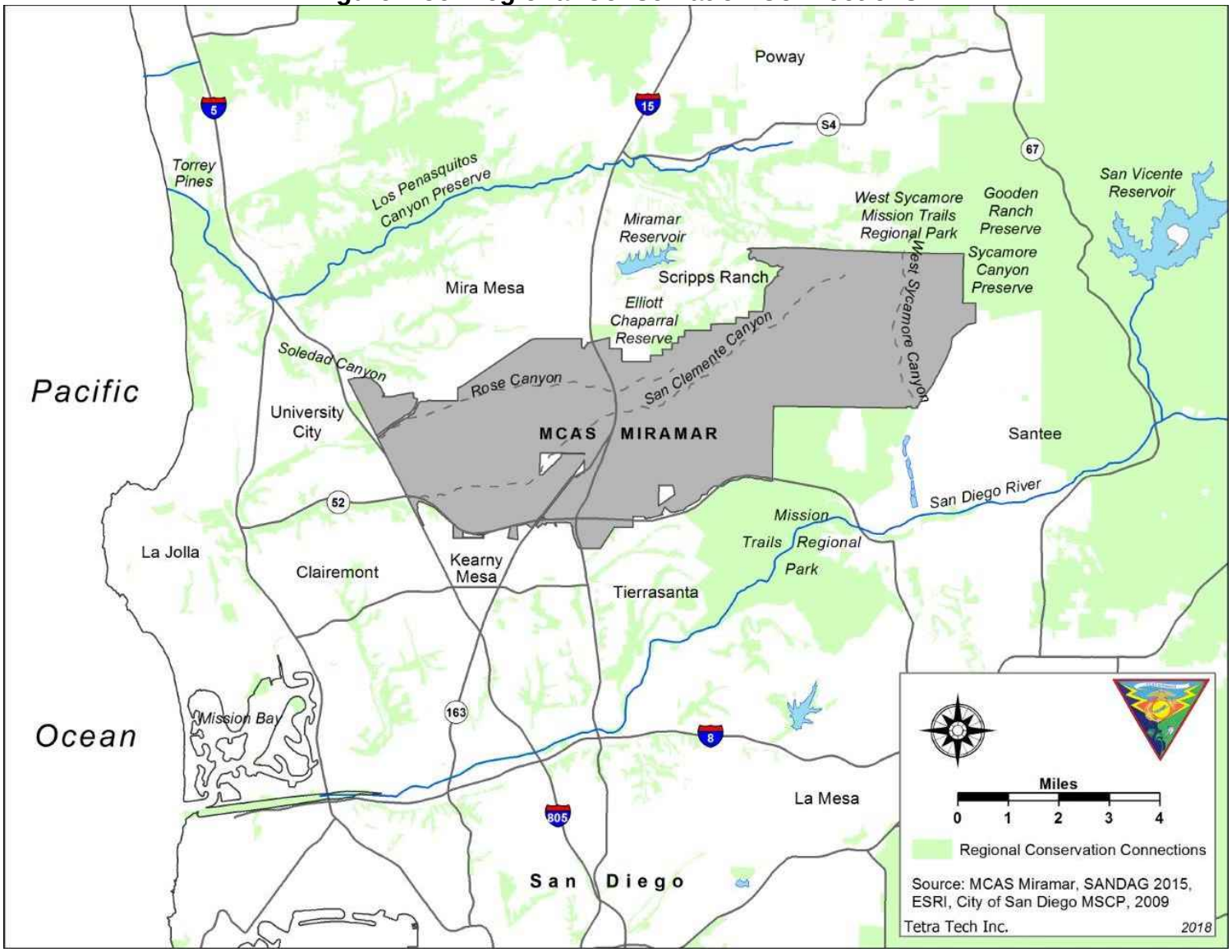
Figure 4.5c. Regional Conservation Connections



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North-south wildlife movement in East Miramar oriented with Oak, Spring, West Sycamore, and Sycamore canyons (Figure 4.5c) is relatively unconstrained where the area functions more like a large habitat linkage than narrower corridors. Along the western edge of MCAS Miramar, a north–south corridor exists along the eastern side of I-805 until the Station boundary is reached and developments substantially constrain the corridor. The following discussion of Regional Wildlife Corridors helps delineate the role of MCAS Miramar corridors within a larger context.

Regional Wildlife Corridors

Regional Corridors through Western Miramar

There are two corridors that link western MCAS Miramar to Los Penasquitos Canyon Preserve to the north (Figures 4.5a and 4.5c). These corridors are already highly constrained and limited in function. However, both were monitored by Ogden (1992) and determined to be functional at that time.

One corridor is the power line easement along the eastern side of I-805 between Los Penasquitos Canyon Preserve and MCAS Miramar. From Los Penasquitos Canyon Preserve, the corridor rises to the south onto a mesa at Lusk Boulevard. Animals must pass between business park developments by staying in the easement, which is bordered by landscaping, undeveloped areas, and parking lots. A ravine leads down to Mira Mesa Boulevard and to Soledad Canyon beyond. The power line easement extends south to Eastgate Mall and Miramar Road before entering the open spaces of MCAS Miramar. This corridor is 400 feet wide at its narrowest section where it crosses over Mira Mesa Boulevard. Several road kills of large mammals have been documented at the crossing of Eastgate Mall and Miramar Road (Ogden 1992). Recent completion of the Nobel Drive connection to Miramar Road has likely eliminated the viability of this connection to MCAS Miramar for large mammals. As development continues along I-805, this corridor may lose its value as a viable wildlife corridor to most wildlife.

A second wildlife corridor follows a railroad under Miramar Road. This short and very narrow corridor connects Rose Canyon on MCAS Miramar to Soledad Canyon, two areas of high-quality habitat. The railroad is situated in a gorge bordered on both sides by steep, 40-foot-high walls carved into the mesa extending for about 1,500 feet; the ridges and terraces are covered with chaparral and sage scrub. This gorge is 175 feet wide at the rim of the mesa. Topography and vegetation combine to completely obscure this corridor from surrounding commercial development.

Two additional corridors connect western Miramar with open space west of I-805. San Clemente Canyon, which runs from the northeastern corner of MCAS Miramar to the southwestern corner, apparently dead ends into the I-805 and State Route 52 interchange. However, there is a system of open drainages with dirt trails along the borders that provide access through the interchange into Marian Bear Regional Park on the west side of I-805. In spite of the apparent restriction, large mammals continue to move regularly in and out of the park through this portal.

Rose Canyon, another east-west corridor within the open space of MCAS Miramar, funnels the movement of wildlife under the I-805 bridge over the railroad easement within Rose Canyon. This is the same railroad easement that connects Rose Canyon to Soledad Canyon north of MCAS Miramar. On the western side of I-805 this wildlife corridor continues along the railroad easement to the west until it connects with Marian Bear Regional Park at the end of San Clemente Canyon and continues south.

Regional Connectivity through Eastern Miramar

Core biological resource areas and linkages maps for the MSCP illustrate two regional connections through eastern MCAS Miramar linking undeveloped lands in eastern San Diego County and the Mission Trails Regional Park to coastal areas. One is to the north of MCAS Miramar and the other is to the south (Figure 4.5c).

The northern connection relies on the linkage of eastern MCAS Miramar to Beeler Canyon to the north. Beeler Canyon eventually leads west to Los Penasquitos Canyon and finally on to Torrey Pines State Reserve and the coast. The wildlife corridor through Beeler Canyon and upper Los Penasquitos Canyon is highly constrained by development but eventually becomes more open as Los Penasquitos Canyon Preserve is reached.

The regional connection extending south from eastern MCAS Miramar requires wildlife to travel under State Route 52. Two travel routes are under large bridges spanning Oak and Spring canyons, and a third is a culvert located west of Oak Canyon immediately east of the aqueduct. These routes allow the safe movement for wildlife in eastern MCAS Miramar to Mission Trails Regional Park compared to movement over State Route 52. In general, bridges are preferred over culverts for wildlife movement. Site visits to the large culvert under State Route 52 indicate that while there is minimal wildlife use, the site is experiencing substantial human visitation, and as such, the Station has fenced this large culvert under State Route 52. The fence at this location contains bars spaced about 6 feet inches apart in the lower half to allow most wildlife passage. Otherwise, it is required for installation safety and security.

Mission Trails Regional Park, in turn, provides access to the San Diego River, which runs through Mission Gorge, Mission Valley, and finally out to Mission Bay. Nearly the entire length of this corridor outside of Mission Trails Regional Park to the southwest is restricted to the riparian vegetation associated with the San Diego River; the rest of the area has been developed.

4.6 Federal Special Status Species

Special Status Species are those listed by the federal government as threatened, endangered, or proposed for listing as threatened or endangered. Also included in this category are species protected by the Bald Eagle Protection Act. The Marine Corps is obligated to conserve Special Status Species under provisions of the federal ESA and Bald Eagle Protection Act. Information on the special status species that currently occur on MCAS Miramar is provided in Table 4.6, and information related to previous surveys conducted on Station is within Chapter 7. Information on federally listed species with the potential to occur that are not currently known to occur on MCAS Miramar is presented at the end of this section, after Table 4.6.

Table 4.6. Special Status Species Occurring on MCAS Miramar

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
		Plants		
1	Del Mar manzanita (*Arctostaphylos glandulosa* var. *crassifolia*) Status: FE/None/1B Family: Ericaceae	Del Mar manzanita occurs in chaparral vegetation that is relatively low-growing with an eroding sandstone substrate.	The local distribution extends from Torrey Pines State Park inland to Rancho Santa Fe and Del Mar Mesa. It is infrequent in coastal San Diego County from Del Mar to Carlsbad. It has been identified at many locales in East Miramar by a station-wide census (Licon Engineering Co., Inc. & Garcia and Associates 2006).	This taxon was listed as endangered (USFWS 1996c) due to loss of habitat from urban sprawl. No critical habitat on Miramar has been designated for this species. Over-shading from nearby plants affects the plant's vigor and hybridization with the more common Eastwood manzanita has limited its population size. Genetic study of Del Mar manzanita is in progress to better understand its distribution on MCAS Miramar.
2	San Diego Button-celery/Coyote thistle (*Eryngium aristulatum* var. *parishii*) Status: FE/SE/1B Family: Apiaceae	San Diego button celery occurs in Redding gravelly loams in and around vernal pool habitat and its watersheds.	This taxon is distributed from Riverside and San Diego counties to Baja California, Mexico. Vernal pool habitat monitoring within Station boundaries has documented populations, west of Fuelbreak NS-4 (San Diego County Water Authority aqueduct easement).	Development, agriculture, and off-highway vehicle use are main threats (Skinner and Pavlik 1994) causing this species to be listed as a federally endangered plant (USFWS 1993b). No critical habitat has been designated for this species across its range.
3	Spreading navarretia (*Navarretia fossalis*) Status: FT/None/1B Family: Polemoniaceae	Vernal pool habitat and vernal swales provide habitat for spreading navarretia. Rarely found in shallow pools, population increases are correlated with heavier rainfalls and greatly reduced during drought (Reiser 1994).	This species' range extends from Riverside and San Diego counties to Baja California, Mexico. Populations exist at Camp Pendleton and Ramona with the largest concentration located on private parcels in the Otay Mesa area. Small populations, in a small number of pools on western Miramar, are documented from recent monitoring efforts	This plant was listed in 1998 (USFWS 1998). It is threatened by urbanization, grazing, road construction, and off-highway vehicle use (Skinner and Pavlik 1994). The USFWS published final critical habitat for this species on October 7, 2010 that identified essential habitat** on MCAS Miramar, but did not propose designation of critical habitat on the Station, based on protections provided by the INRMP (USFWS 2010a).

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
4	Willowy monardella (*Monardella viminea*, Elvin and Sanders 2003; *Monardella linoides* ssp. *viminea*, *(*Abrams 1951) Status: FE/SE/1B Family: Lamiaceae	This perennial herb occurs in riverwash cobbly loams of ephemeral drainages and floodplains. It typically is found on sandbars or low benches in drainage beds intermingled with scrub, chaparral, or riparian scrub woodland vegetation.	The species is a San Diego County endemic. Populations reported on MCAS Miramar are primarily located in East Miramar canyons with a small population segment located in West San Clemente Canyon. In addition, willowy monardella populations occur off-Station in Lopez, Cemetery and Carroll canyons to the north, San Clemente canyon to the west, Sycamore canyon to the east, and Spring and Little Sycamore canyons to the south. (San Diego Natural History Museum 2004a)	It has been reported that about 95 percent of the domestic range of this taxon occurs within the MSCP region, with about 80 percent occurring on MCAS Miramar (USFWS 1998). The USFWS published final critical habitat for this species on November 8, 2006 that identified 1,863 acres of essential habitat** on MCAS Miramar, but did not propose designation of critical habitat on the Station, based on protections provided by the INRMP (USFWS 2006).
5	San Diego mesa mint (*Pogogyne abramsii*) Status: FE/SE/1B Family: Lamiaceae	San Diego mesa mint inhabits vernal pool habitat complexes in chaparral, scrub, and grassland habitats. It may also be found on coastal terraces and mesas in San Diego County (Hickman 1993; Skinner and Pavlik 1994).	This species has been reported from all 10 of the vernal pool habitat management units on MCAS Miramar (Bauder and Wier 1991).	This wetland species continues to be threatened by urbanization, off-highway vehicle use, and road maintenance (Bauder and Wier 1991; Skinner and Pavlik 1994). At completion of this INRMP, no critical habitat has been designated for this species across its range.
6	California Orcutt grass (*Orcuttia californica*) Status: FE/SE/1B Family: Poaceae	This annual grass is present exclusively in vernal pool habitat complexes, usually in wetter portions as pools are drying.	Orcutt's grass is distributed from Riverside and San Diego counties to Baja, California. On MCAS Miramar, it is reported from a few vernal pool habitats in Management Unit 7 and one vernal pool habitat in Management Unit 8 (Bauder and Wier 1991). Current vernal pool habitat survey efforts have not located any new Station distributions thus far.	California Orcutt's grass is known from fewer than 20 locations and is threatened by development, agriculture, non-native invasive plant species, and off-highway vehicle use (Skinner and Pavlik 1994). At completion of this INRMP, no critical habitat has been designated for this species.
Invertebrates				
7	San Diego fairy shrimp (*Branchinecta sandiegonensis*) Status: FE/None Family: Crustacea	San Diego fairy shrimp may be present in seasonally astatic vernal pools and many other seasonally ponded features in coastal areas within grassland, agriculture, coastal sage scrub, and chaparral habitats.	The San Diego fairy shrimp's range extends from Santa Barbara County south to northwestern Baja California, Mexico (USFWS 1997). It occurs throughout San Diego County and is known from all 10 vernal pool habitat management units on MCAS Miramar. A large proportion of the vernal pool habitats on MCAS Miramar contain San Diego fairy shrimp.	This species is threatened by habitat destruction and fragmentation from agricultural and urban development, alteration of wetland hydrology by draining, off-highway vehicle activity, and cattle and sheep grazing (USFWS 1997). The USFWS published a final rule to designate critical habitat for this species on December 12, 2007 that identified essential habitat not designated as critical habitat on MCAS Miramar (USFWS 2007b).

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
8	Riverside fairy shrimp (*Streptocephalus woottoni*) Status: FE/None Family: Crustacea	The Riverside fairy shrimp is found in deep vernal pool habitat and ephemeral wetlands that retain water through the warmer weather of late spring.	This species is known from vernal pools near Temecula, Riverside County; one population in Orange County; vernal pool habitat on Otay Mesa and MCAS Miramar; and two locations in Baja California (USFWS 1993b. On MCAS Miramar, Riverside fairy shrimp are known from two impoundments east of Interstate 15 (Vernal Pool Unit 4, group AA1 south).	Eggs of this species will not hatch in pools that are shallow or receive cool waters from early winter rains. The USFWS published a final rule to designate critical habitat for this species on April 12, 2005 and a proposed rule on June 1, 2011 to revise this designation, both identifying essential habitat not designated as critical habitat on MCAS Miramar (USFWS 2005, 2011a).
9	Quino checkerspot butterfly (*Euphydryas editha quino*) Status: FE/None Family: Nymphalidae	The Quino checkerspot butterfly is restricted to open grassland and openings in chaparral and coastal sage scrub.	The Quino checkerspot ranges from the interior foothills of southwestern California to northwestern Baja California, Mexico. This species was detected in East Miramar in 2017 and 2018.	The USFWS published a final rule to designate critical habitat for this species on June 17, 2009, and no critical habitat was designated on MCAS Miramar (USFWS 2009). Surveys for the species were completed for the 2018 flight season with follow-up surveys to be completed during the 2019 flight season.
10	Hermes copper butterfly (*Hermelycaena* [*Lycaena*] *hermes*) Status: PE/None Family: Hermelycaena	Hermes copper butterfly occurs in coastal sage scrub and southern mixed chaparral containing its host plant, spiny redberry (*Rhamnus crocea*).	This species ranges throughout southern California where appropriate habitat is found. Populations have been found near Lakeside, Fallbrook, Pala, Bernardo Mountain, Harmony Grove, Del Dios, MCAS Miramar, and Northern Baja California. This butterfly was found in San Clemente Canyon and West Sycamore Canyon areas of East Miramar in 1996-1998. All sites were severely burned by the Cedar Fire in 2003. The nearest known location occupied by this species following the Cedar Fire is the southern part of Mission Trails Regional Park.	Although surveys during the 2010 flight season did not find the butterfly on MCAS Miramar, surveys for the species are scheduled for the 2018 flight season. It is anticipated that a proposed listing determination from USFWS will occur during 2018. The USFWS is preparing a species status assessment for listing determination to be published in the Federal Register.

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
			Birds	
11	Golden eagle (*Aquila chrysaetos*) Status: BGEPA/SFP Family: Accipitridae	Golden eagles require large, open spaces for foraging and nesting. Foraging takes place over a wide variety of open habitats, such as desert scrub, grassland, rolling foothills, mountains, and sage scrub. Nest sites typically require large buffers from development.	Golden eagles are known from mountainous regions of the western hemisphere. They are uncommon residents of San Diego County. While not known to breed on MCAS Miramar, golden eagles are known to forage within its boundaries (Cox *et al.* 1994), possibly coming from nest sites on Cleveland National Forest. They are known from East Miramar above West Sycamore and Sycamore Canyon. A golden eagle was sited in April 1998, along "H" Avenue and along the Aqueduct Road in East Miramar by Station personnel.	The golden eagle is a large predatory bird that requires extensive open areas to forage for its prey. The loss of foraging and nesting habitat throughout southern California has resulted in a decline in the species' population.
12	Southwestern willow flycatcher (*Empidonax traillii extimus*) Status: FE Family: Tyrannidae	Preferred habitat of the southwestern willow flycatcher includes riparian habitat along rivers, streams, ponds, lakes, or other wetlands with dense of willows (*Salix* sp.) (USFWS 1995).	The breeding range of this species includes southern California, Arizona, New Mexico, southern parts of Utah and Nevada, southwestern Texas, and northwestern Mexico. Although there are no known nesting occurrences of the southwestern willow flycatcher on MCAS Miramar, it is likely that some of the transient willow flycatchers that have been observed on MCAS Miramar are the listed entity and are migrating through MCAS Miramar on their way to breeding locations in California.	Focused surveys are conducted for this species about every three years concurrent with those for least Bell's vireo (1998-2017). Project-specific surveys need not be conducted for this species. There is no designated critical habitat for this species on MCAS Miramar.

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
13	Coastal California gnatcatcher (*Polioptila californica californica*) Status: FT/None Family: Muscicapidae	This subspecies is generally described as an obligate resident of coastal sage scrub communities; however, investigations suggest that California gnatcatchers also use chamise chaparral near coastal sage scrub as nesting habitat.	The coastal California gnatcatcher's range includes coastal southern California from Los Angeles, Orange, western Riverside, and San Diego counties south to northern Baja California, Mexico. This species is locally abundant on MCAS Miramar where suitable habitat exists; the pre-Cedar Fire (2003) population on Station was 24-62 pairs (1997-2001 surveys). Surveys in 2004, following the 2003 Cedar Fire, found 21 breeding pairs and 1 lone male in unburned areas. Surveys in 2007 found 34 breeding pairs and 3 territorial males with some recolonization of 2003 burned areas (RECON Environmental, Inc. 2008). Surveys in 2009 by Haas found 65 breeding pairs of gnatcatchers, similar to the highest densities recorded in earlier surveys; many were in areas burned by the Cedar Fire. Surveys in 2013 found 43 breeding pairs.	Focused surveys for this species are conducted about every three years to monitor the population and have presence/absence information to support activity planning. Urban and agricultural development, with associated habitat loss and fragmentation, threatens the coastal gnatcatcher's existence in California. The USFWS published a final rule to designate critical habitat for this species on December 19, 2007, that identified essential habitat not designated as critical habitat on MCAS Miramar (USFWS 2007a).
14	Least Bell's vireo (*Vireo bellii pusillus*) Status: FE/SE Family: Vireonidae	This species is found in remnant stands of riparian habitats, requiring willow-dominance with lush understory vegetation. The understory is particularly important since least Bell's vireos frequently nest within three feet of the ground (USFWS 1985).	The range of the least Bell's vireo extends from California to Baja California, Mexico. The bird winters only in Southern Baja. On MCAS Miramar, this bird has been found breeding in Sycamore Canyon, West Sycamore Canyon, San Clemente Canyon, and Murphy Canyon of East Miramar. This species has recently been found breeding in West Miramar along San Clemente Canyon near the Miramar Landfill and Rose Canyon in the Main Station area.	Focused surveys are conducted for this species about every three years. Project-specific surveys need not be conducted for this species. Informal least Bell's vireo surveys in all previously occupied areas and in suitable habitat areas were carried out by Miramar Natural Resources Division staff in the breeding seasons of 2014 and 2015. No attempts were made during these surveys to verify the presence of females or breeding attempts or breeding success. Factors that have led to the decline in least Bell's vireo populations include flood control and water development projects, crop production, livestock grazing, human disturbances, nest parasitism and general habitat degradation. There is no designated critical habitat for this species on MCAS Miramar.

* Federal Status Code/State Status Code/California Native Plant Code

Federal Species Status Codes:

FE = Federally endangered
FT = Federally threatened
PE = Proposed endangered (federal)
PT = Proposed threatened (federal)
FC = Federal candidate for listing
BGEPA = Protected by Bald and Golden Eagle Protection Act

California State Status Codes

SE = State listed endangered
ST = State listed threatened
SR = State listed rare (plants)
SFP = State fully protected species (animals)
SC = State candidate for listing
SCD = State candidate for delisting
SCE = State candidate for listing as endangered
SCT = State candidate for listing as threatened

California Native Plant Society Status Code (only code used is included)

List 1B = Rare, threatened, or endangered and eligible for listing under the California Endangered Species Act

****** While the term "Essential Habitat" has been used in some proposed and final rules for designation of critical habitat, no definition of this term is provided in Endangered Species Act implementing regulations or critical habitat designations where the term is use. Based on usage of the term, essential habitat are areas that have physical and biological features and habitat characteristics that are deemed essential to the conservation of the species involved. Essential habitat is not equivalent to formally designated critical habitat.

The federal classification system for Special Status Species is as follows:

- ***Endangered (FE):*** any species that is in danger of extinction throughout all or a significant portion of its range;
- ***Threatened (FT):*** any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range;
- ***Proposed (PT, PE):*** any species that has been proposed for listing as a threatened or endangered species;
- ***Bald and Golden Eagle Protection Act (BGEPA):*** the Golden Eagle is protected by the Bald and Golden Eagle Protection Act.

Coastal California Gnatcatcher

Distributions of the threatened coastal California gnatcatcher (*Polioptila californica californica*), endangered least Bell's vireo (*Vireo bellii pusillus*), endangered Quino checkerspot butterfly (*Euphydryas editha quino*), federally proposed Hermes copper butterfly (*Hermelycaena* [*Lycaena*] *hermes*), endangered Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*), and endangered willowy monardella (*Monardella viminea*) are shown on Figure 4.6. Figure 4.6 shows the sensitive resources data including the most recent survey results that this Plan was based on at the time of preparation. The most recent Sensitive Resources Map for the Station can be found on the MCAS Miramar webpage, http://www.miramar-ems.marines.mil/Divisions/Natural-Resources-Division/Natural-Resources/.

Figure 4.3.4 shows locations of vernal pool habitat at MCAS Miramar. This habitat, collectively, supports five vernal pool species that are listed as endangered (*i.e.*, San Diego button-celery, California Orcutt grass,

San Diego mesa mint, Riverside fairy shrimp, San Diego fairy shrimp) and spreading navarretia, listed as threatened.

Some special status species are known to occur in the region surrounding MCAS Miramar, but have not yet been documented on the Station. Federally listed species that occur in the region of MCAS Miramar but have not yet been found on Station by surveys include the western yellow-billed cuckoo (*Coccyzus americanus*, federally threatened), San Diego ambrosia (*Ambrosia pumila*, federally endangered), Encinitas baccharis (*Baccharis vanessae*, federally threatened), San Diego thornmint (*Acanthomintha ilicifolia*, federally threatened), and Orcutt's spineflower (*Chorizanthe orcuttiana*, federally endangered).

The western yellow-billed cuckoo was recently listed by the USFWS as a federally threatened species. The western yellow-billed cuckoo is not known to occur on MCAS Miramar and likely observations of this species would have been detected during focused least Bell's vireo surveys if it was present on MCAS Miramar.

Focused surveys have also been performed for all four federally listed plant species, but no individuals have been observed at MCAS Miramar.

4.7 Other Species of Regional Concern

Species of regional Special Concern at MCAS Miramar include federal species of concern; State of California species of concern; state of California listed species; federal candidates for listing as a threatened or endangered species; Bird Species of Concern, defined in Section 6.1.2, *Migratory Bird Legal Instrumentalities*; and species listed by the California Native Plant Society (2010). These species are included for consideration during environmental planning at MCAS Miramar (Chapters 5 and 6).

The following species of regional concern are known to occur in the region surrounding MCAS Miramar, but have not yet been documented on the Station: big free-tailed bat (*Nyctinomops macrotis*), pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Plecotus townsendii*), Mexican long-tongued bat (*Choeronycteris mexicana*), western small-footed myotis (*Myotis ciliolabrum*), and Mission Canyon bluecup (*Githopsis diffusa* ssp. *filicaulis*). A bat survey was conducted on the Station from winter 1992 until fall 1996 to determine whether bat species of regional concern were known to occur on MCAS Miramar (Hunsaker 2001). No natural habitat loss that would change bat populations has occurred since surveys were performed. Botanical surveys performed at MCAS Miramar cover multiple growing seasons. Surveys for willowy monardella, Del Mar manzanita, vegetation mapping, and wildlife are performed regularly and across the entire Station. Although focused surveys for plant species, such as Mission Canyon bluecup, that have not previously been observed on MCAS Miramar have not been performed, other survey work conducted on MCAS Miramar would be expected to identify these species.

The species range for the big free-tailed bat extends from north and central Mexico, most of South America, and the Caribbean Islands northward to southwestern U.S. (Nowak 1991). The species range for the pallid bat is from southern British Columbia and Montana to central Mexico and Cuba, including the western U.S. (Burt and Grossenheider 1976). The Townsend's big-eared bat is present in western North America from Wisconsin and Wyoming to Texas, Arizona, and California. The Mexican long-tongued bat is known to occur from the southern portions of California and Arizona to Honduras and Guatemala (Hunsaker 1997). The western small-footed myotis is found within a large portion of western North America, including southwestern Canada, east to western Oklahoma, and south to central Mexico (Nowak 1991). All of these species are not known to occur on MCAS Miramar.

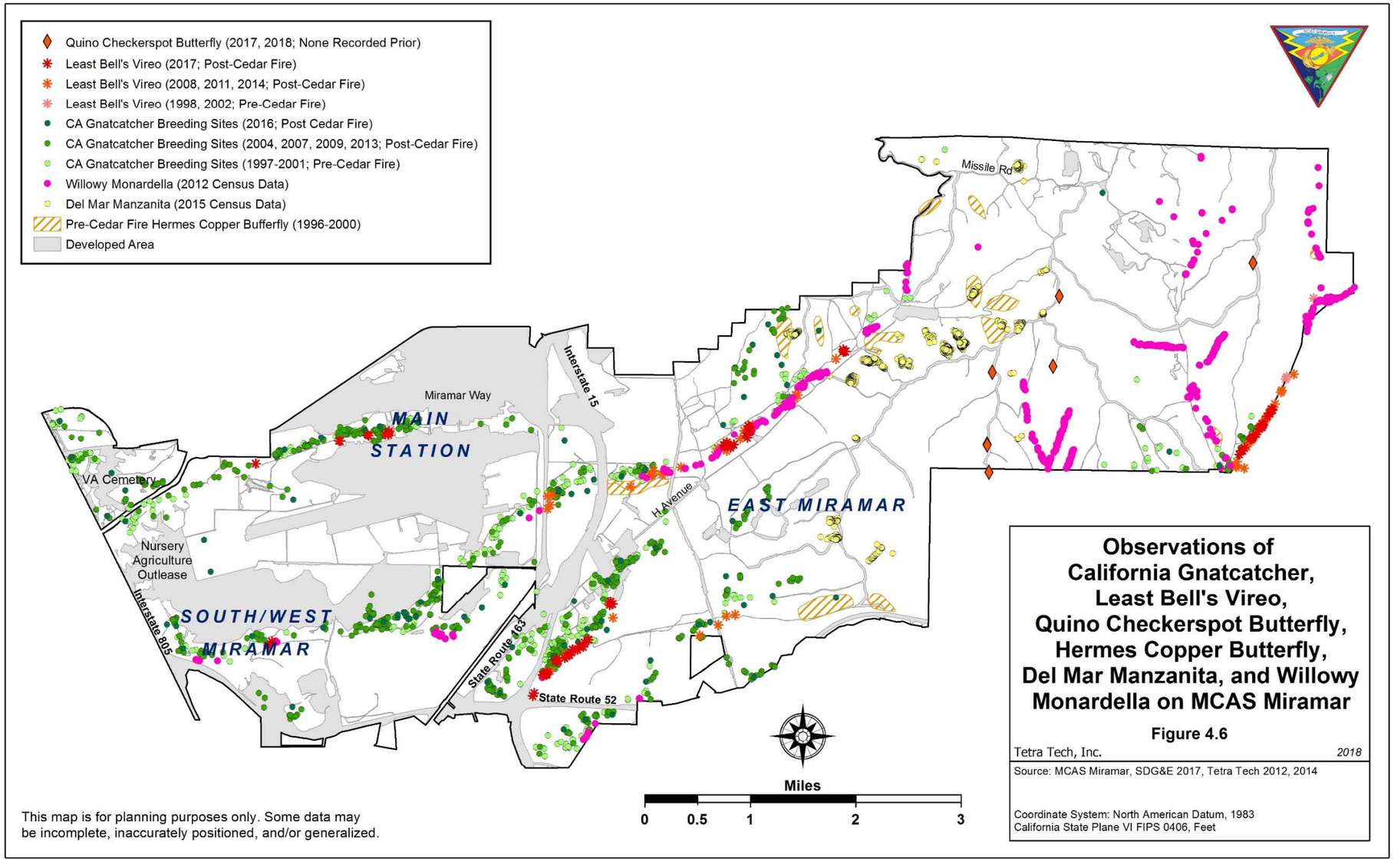
Mission Canyon bluecup has been documented in fewer than five locations in California and is limited to the El Cajon Mount and La Mesa USGS 7.5 minute quadrangles. Current rare and endangered plant surveys

performed on MCAS Miramar have not documented Mission Canyon bluecup on the Station.

Species that are federal listing candidates or whose status is currently under review by the USFWS that have been observed on MCAS Miramar include monarch butterfly (*Danaus plexippus*), western spadefoot toad (*Spea hammondii*), and tricolored blackbird (*Agelaius tricolor*).

The monarch butterfly is known to occur as a transient on MCAS Miramar. No overwinter roosts have been identified on the Station. Small amounts of narrow-leaved milkweed (*Asclepias fascicularis*) have been noted on MCAS Miramar from time to time, but no established patches have developed. This may be due to high temperatures and drought over the past several years that affect seed viability. Sites identified as having its milkweed host plant are located in canyon bottoms and floodplains which mostly occur within Level II Management Areas already identified for special conservation attention. The western spadefoot toad is known to be widely scattered throughout MCAS Miramar in low densities in a variety of habitats. The tricolored blackbird is a colonial nester and not known to breed on MCAS Miramar. It primarily inhabits wetland habitats. Although tricolored blackbirds are not known to breed on MCAS Miramar, individuals have been documented using wetland habitats during the non-breeding season. The USFWS has initiated a status review of these three species to determine whether listing is warranted.

Figure 4.6. Coastal California Gnatcatcher, Least Bell's Vireo, Quino Checkerspot Butterfly, Hermes Copper Butterfly, Del Mar Manzanita, and Willowy Monardella on MCAS Miramar



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Information on these species is in Table 4.7[6]. Applicable classifications for these species are as follows:

- ***Federal Candidate (FC):*** plants and animals for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act, but for which development of a listing regulation is precluded by other higher priority listing activities;
- ***State Endangered (SE):*** taxa in serious danger of becoming extinct throughout all, or a significant portion, of its range within the State of California due to threats to the taxa;
- ***State Threatened (ST):*** taxa likely to become endangered within the foreseeable future throughout all or a significant portion of its range within the State of California;
- ***State Candidate (SCE):*** animal species that is a State candidate for listing as endangered;
- ***State Candidate (SCT):*** animal species that is a State candidate for listing as threatened;
- ***State Fully Protected (SFP):*** species protected by the California Fish and Game Code which states that the species "...may not be taken or possessed at any time and no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected" species, although take may be authorized for necessary scientific research;
- ***California Species of Special Concern (SSC):*** potentially jeopardized taxa; the status of these taxa could possibly change to threatened or endangered, or be removed from the list when further data are available;
- ***State Rare (SR):*** a plant species, subspecies, or variety not presently threatened with extinction but found in such small numbers throughout its range that it may be endangered if its environment worsens; and
- ***Bird Species of Conservation Concern (BCC)*** in Bird Conservation Region 32 which includes species that are of concern because of (a) documented or apparent population declines, (b) small or restricted populations, or (c) dependence on restricted or vulnerable habitat. Bird Species of Concern for Bird Conservation Region 32 can be viewed at http://www.dodpif.org/downloads/BCC2008.pdf. These bird species are listed with the intent of avoiding future designations under the ESA. Due to the frequency at which these lists are updated, specific species data is not included in Table 4.7. However, this list should be reviewed against species known to occur on MCAS Miramar (Appendix D).

Rare plants in California are also listed in the California Native Plant Society's (CNPS) *Inventory of Rare and Endangered Plants of California* (CNPS 2010) as follows:

List 1B (CNPS-1B) plants are recognized by the CNPS as plants that are rare, threatened, or endangered in California and elsewhere. They are judged to be vulnerable under present circumstances or to have a high potential for becoming so because of their limited or vulnerable habitat, their low numbers of individuals per population, or their limited number of populations. All List 1B plants meet definitions of Section 1901, Chapter 10 of the California Fish and Game Code and are eligible for state listing. ***List 2*** includes taxa that are considered to be rare, threatened, or endangered in California but are more common elsewhere. ***List 3*** includes taxa that are probably rare or endangered, but there is insufficient data to make a determination. ***List 4*** indicates taxa that are rare but are found in sufficiently large numbers and distributed widely enough that the potential for extinction is low at this time.

These plants have been adopted by the CDFW as constituting the Special Plants List, which was formerly known as the "species of concern" list. The CNPS regularly updates its lists; these updated lists are accessible via the CNPS website, http://www.cnps.org/. The California Natural Diversity Database

[6]Table 4.7, due to its length, is located after Section 4.9, at the end of this Chapter.

(CNDDB) also provides the current listing status of endangered, threatened, and rare plants via the CNDDB website, https://www.wildlife.ca.gov/Data/CNDDB/Plants-and-Animals.

4.8 Cedar Fire

4.8.1 October 26, 2003, Ecosystem Havoc

On October 26, 2003, a wildfire, named the Cedar Fire, swept through MCAS Miramar and much of the region in general. Blown by strong Santa Ana winds, the Cedar Fire burned more than 280,000 acres extending from the Laguna Mountains and Julian in the east to MCAS Miramar at its westernmost point. The fire affected approximately 17,600 acres on the Station.

Most of the area was severely burned, and it left virtually no unburned areas within the general fire area. Below percentages provide examples of the degree of impacts of this wildfire on MCAS Miramar:

- 74.4% of total vernal pool habitat,
- 67.0% of total California gnatcatcher locations,
- 100% of total Hermes copper butterfly locations;
- 97.8% of total willowy monardella populations,
- 100% of total least Bell's vireo locations, and
- 100% of total Del Mar manzanita locations.

2003 Cedar Fire Impacts – Austin Bridge
Natural Resources Division

4.8.2 Ecosystem Recovery Status

Cedar Fire Area, Photograph taken in March 2016 – Austin Bridge Natural Resources Division

Sensitive species' and vegetation monitoring efforts within station boundaries reveal recovery and recolonization of these populations both within previously identified habitats/territories and some expanded areas. Typical native plant and animal populations for this region re-established according to current rainfall regimes. Immediately post-Cedar Fire, record rainfall eroded barren slopes and minimally re-arranged some drainage areas. This affected the locations of some plant populations (seed and plant clumps were washed downstream; larger populations of annual plants occurred; etc.) and competition intensified between recovering plants and opportunistic plant species. These opportunistic species were a combination of native annuals, known as 'fire followers' (*e.g.*, lupines, ceanothus, poppies), and exotic plant species (*e.g.*, grasses, thistles, mustards) able to quickly colonize an open area. In addition, established perennial natives resprouted vigorously (*e.g.*, manzanita, laurel sumac, lemonadeberry). The fauna component of the Station's ecosystems has fluctuated with the availability of the water and vegetation recovery. As areas have developed more layers and density of vegetation, animals have recolonized according to the resources

utilized. Thus far, Station observations have been similar to other post-fire recovery effects reported in other fire ecology literature (*e.g.*, Zouhar (2008), Cobb 2005, Brown and Smith (2000), Hunsaker and Awbrey 1999, Cox and Austin 1990).

However, regional drought conditions have affected plant vitality. Lifecycles of annuals (both native and exotic) have been shortened, while biennials and perennials show reduced growth. In retrospect, it appears drought conditions have had a more negative effect on the Station's plant population fire recovery than the fire itself. Monitoring efforts continue on a scheduled basis documenting vegetation and sensitive species recovery trends.

4.9 Habitat Evaluation Model

A Habitat Evaluation Model (HEM) was developed as a part of the 2000 INRMP (Section 4.8 within MCAS Miramar 2000)[7]. The primary purpose for initial development of the HEM was to identify and rank important biological resource areas within MCAS Miramar.

The HEM was a GIS model that used information collected on MCAS Miramar relative to the distribution of sensitive biological resources, habitats, and habitat linkages/corridors. Components of the HEM include: (1) vernal pool habitat and its associated watersheds, (2) non-vernal pool threatened and endangered species, and (3) a habitat evaluation index.

Vernal pool habitat watersheds were given a value of Very High in the development of the HEM.

Non-vernal pool species included locations of the coastal California gnatcatchers, willowy monardella, Del Mar manzanita, and least Bell's vireo nests. These locations were given a value of Very High in the development of the HEM.

The ***habitat evaluation index*** combined an evaluation of wildlife corridors and rarity of local and regional vegetation types (and associated habitats).

- Wildlife corridors, including connections to regional wildlife corridors and to adjacent open space areas (Ogden 1992, 1996) (Figures 4.5a-c), were assigned high point values in the HEM development.
- Locally rare vegetation types, that compose less than 100 acres, received a high value.
- Regionally rare vegetation types, used rankings adapted from the MSCP, which categorized habitats (*i.e.*, vegetation types) within four tiers for San Diego County. Tier I represents habitats of the highest value, and Tier IV represents those of the lowest value (City of San Diego 1996b).

Each component was developed as a separate GIS layer and then combined to produce a final HEM map that ranked the entire surface area as Very High, High, Moderate, or Low in terms of biological value. The final evaluation was based on the highest value on any one GIS overlay. Figure 4.9 (taken from MCAS Miramar 2000) shows the final map output of the HEM process. The HEM has not been revised as a result of the new 2014 Station vegetation map.

[7]This model has not been 'rerun' since 2000. All changes to update management layers since then due to changes in natural resources mapping have been done manually.

Use of the HEM

The HEM was used to identify high value areas relative to the known distribution of Special Status Species and associated habitats (*e.g.*, vegetation types, vernal pool habitat, wetlands) present at MCAS Miramar. The composite map assisted in delineating Management Areas on the Station (Chapter 5).

Value ratings of the HEM do not directly equate to levels of management or conservation concern at MCAS Miramar. Areas rated similarly (*e.g.*, high value) may not receive similar attention. This is a reflection of the nature of the resource of interest. For example, vernal pool habitat watersheds and California gnatcatcher territories will require different conservation and management measures. Although not the specific subject of this model, Species of Regional Special Concern will be conserved as part of MCAS Miramar's general vegetation and wildlife management program.

Figure 4.9. Habitat Evaluation Model Composite Map

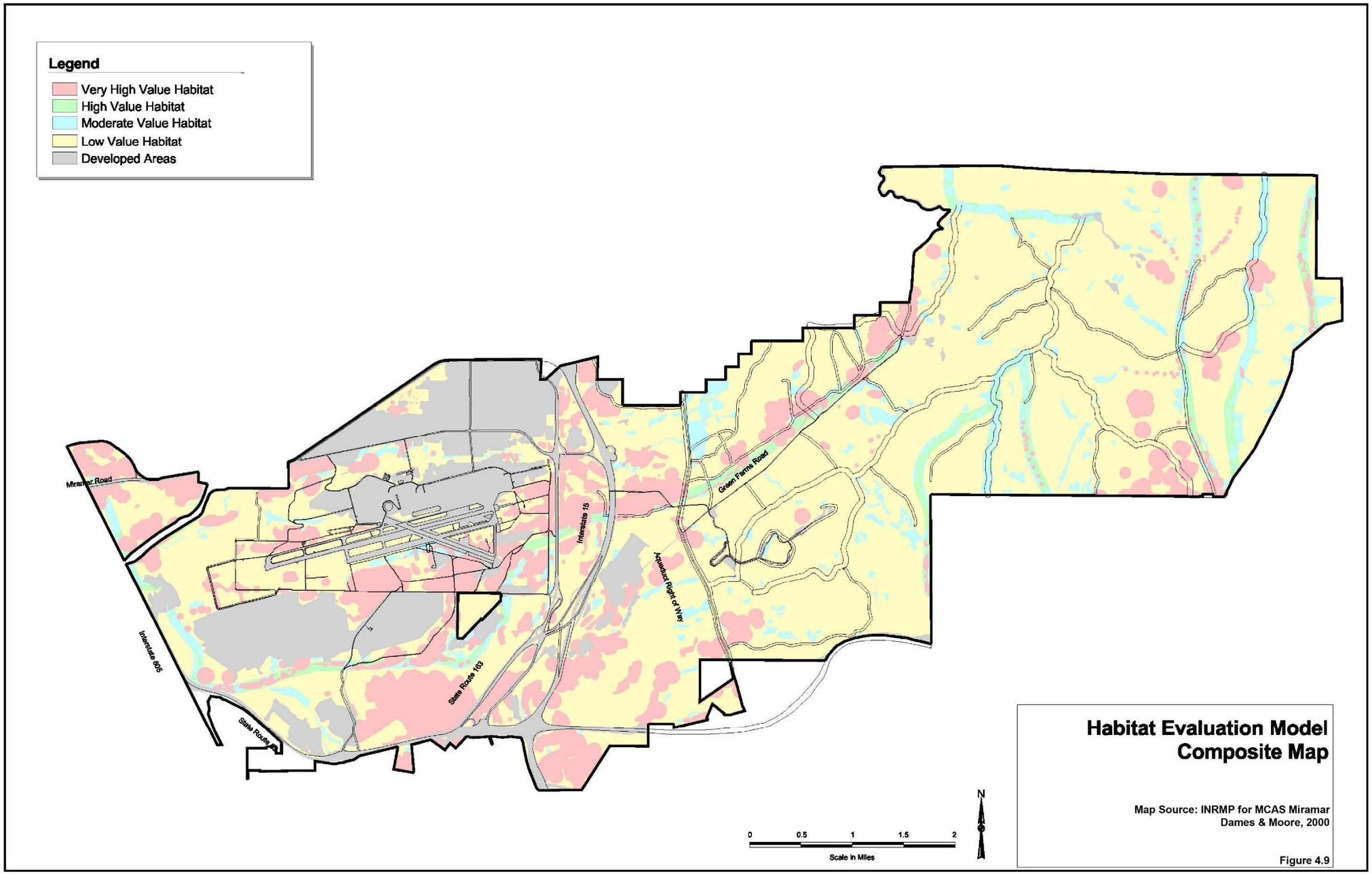

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Table 4.7. Other Species of Regional Concern on MCAS Miramar

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
		Plants		
1	Little mousetail (*Myosurus minimus*) Status: S2/List 3 Family: Ranunculaceae	Little mousetail, an annual herb, occurs in vernal pool habitat and flowers from March to June (Munz 1974). It prefers Bosanko clay and Huerhuero loam soils.	Little mousetail is restricted to several vernal pool complexes on mesas north of San Diego and on Otay Mesa. It was observed in 3 of 10 vernal pool habitat management units on MCAS Miramar (Bauder and Wier 1991).	Populations have declined throughout the region due to urban expansion and its limited habitat range.
2	Nuttall's scrub oak (*Quercus dumosa*) Status: S3/List 1B Family: Fagaceae	Nuttall's (coastal) scrub oak is found in chaparral occurring along the coast of California.	This species is found in appropriate habitat along the coast of southern California and has been morphologically identified on western portions of MCAS Miramar (Station Rare and Endangered Plant Surveys).	Nuttall's scrub oak was once considered to be widespread in chaparral throughout cismontane California, but, that species is now called *Q. berberidifolia or Q. acutidens*. The identification of *Q. dumosa* is currently under review and a genetic study is being performed to verify the presence of this species on MCAS Miramar. Development threatens Nuttall's scrub oak (Skinner and Pavlik 1994).
3	Otay mountain ceanothus (*Ceanothus otayensis)* Status: S1/List 1B Family: Rhamnaceae	Otay mountain ceanothus grows in xeric chamise chaparral; the known soil type is mapped as San Miguel-Exchequer rocky silt loam. This shrub may be restricted to metavolcanic and gabbroic peaks (Reiser 1994).	Previous documented populations of Otay mountain ceanothus are primarily on the San Miguel and Otay Mountain areas of southern San Diego County and Baja, Mexico. The plants found on Miramar (2006) and confirmed (2008) are the northern-most known location for this plant.	H.E. McMinn (1942) recognized this entity as intermediate between *C. greggii* var. *perplexans* and *C. crassifolius*, naming it *C.X otayensis*. Since then, others (R.M. Beauchamp and R. Moran [Beauchamp 1986]) recognized its species status since the proposed parent species' are not nearby.
4	San Diego barrel cactus (*Ferocactus viridescens*) Status: S2S3/List 2 Family: Cactaceae	This species of cactus is found in San Diego County and Baja California, Mexico in scrub, chaparral, maritime succulent scrub, and grasslands (including vernal pool grasslands).	The species range extends from San Diego County to Baja California, Mexico. Numerous fragmented localities exist in San Diego County. It has been reported on south-facing slopes on MCAS Miramar (Station Rare and Endangered Plant Surveys).	The San Diego barrel cactus is threatened by urbanization, off-highway vehicle use, and horticultural collecting (Skinner and Pavlik 1994).

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
5	Summer holly (*Comarostaphylis diversifolia* ssp. *diversifolia*) Status: S2/List 1B Family: Ericaceae	Summer holly occurs on dry slopes in chaparral habitat. It is found predominantly in low elevation situations, usually along the coast.	The species range extends from San Diego County southward to northern Baja California, Mexico. Summer holly has been documented on western portions of MCAS Miramar (Station Rare and Endangered Plant Surveys).	The species is threatened by development and gravel mining (Skinner and Pavlik 1994).
6	Variegated dudleya (*Dudleya variegata*) Status: S2/List 1B Family: Crassulaceae	Variegated dudleya, a perennial herb, is present in a variety of habitats including scrub, cismontane woodlands, grasslands, and chaparral on dry hillsides and mesas in San Diego County.	Variegated dudleya is known from southern San Diego County into Baja California, Mexico. Populations of variegated dudleya have been documented in eastern Miramar and G Parcel south of State Route 52 (Station Rare and Endangered Plant Surveys).	This species is considered threatened by urbanization and grazing (Skinner and Pavlik 1994).
7	Wart-stemmed ceanothus (*Ceanothus verrucosus*) Status: S2/List 2 Family: Rhamnaceae	The wart-stemmed ceanothus is an evergreen shrub that occurs in chaparral habitat on dry hills and mesas in San Diego County.	This species (along with *Ceanothus tomentosus* var. *olivaceus*) is a common component of the ceanothus chaparral distributed in coastal San Diego County and Baja California, Mexico. Wart-stemmed ceanothus has been observed on western portions of MCAS Miramar (Station Rare and Endangered Plant Surveys).	Wart-stemmed ceanothus flowers from January to April (Munz 1974) and is vulnerable to development, which is its primary threat (Skinner and Pavlik 1994).
8	Long-spined spineflower (*Chorizanthe polygonoides* var. *longispina*) Status: S3/List 1B Family: Polygonaceae	Long-spined spineflower is present in western Riverside and San Diego counties where it grows in dry places in chaparral habitat, close-coned coniferous forest, and scrub, usually below 5,000 feet (Munz 1974).	Populations of long-spined spineflower have been documented in western Miramar and portions of eastern Miramar (Station Rare and Endangered Plant Surveys).	The species is threatened by development and by competition with non-native grasses (Skinner and Pavlik 1994).
9	Palmer's grappling hook (*Harpagonella palmeri*) Status: S3/List 4 Family: Boraginaceae	This plant species may be found on dry slopes and mesas below 1,500 feet in clay soil with chaparral, scrub, and grassland habitats.	This species' distribution extends from Orange, Riverside, and San Diego counties southward and eastward to Baja California and Sonora in Mexico, and Arizona. This species has been documented in eastern Miramar (Station Rare and Endangered Plant Surveys).	Palmer's grappling hook flowers from March through April. It is susceptible to development activities and losses of habitat.
10	San Diego sagewort (*Artemisia palmeri*) Status: S3/List 4 Family: Asteraceae	This plant species prefers sandy soils, along drainages or in mesic chapparal (Reiser, 1994).	Although it is known from no more than 20 locations in California, it reportedly ranges from southwestern San Diego County to Baja California, Mexico. It has been documented in western Miramar (Station Rare and Endangered Plant Surveys).	CNPS previously listed San Diego sagewort as a List 2 plant. This species is impacted by projects that disrupt drainages or involve flood control efforts. (Reiser 1994).

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
11	San Diego viguiera (*Bahiopsis [Viguiera] laciniata*) Status: S4/List 4 Family: Asteraceae	This shrub species occurs in chaparral and scrub on dry slopes.	Its range extends from Riverside and San Diego counties into Baja California and Sonora, Mexico. San Diego viguiera has been documented on MCAS Miramar (Station Rare and Endangered Plant Surveys).	San Diego viguiera is threatened by loss of habitat from development.
12	Orcutt's brodiaea (*Brodiaea orcuttii*) Status: S2/List 1B Family: Themidaceae	Orcutt's brodiaea is present in a variety of habitats, including clay soils, close-coned coniferous forest, chaparral, cismontane woodlands, meadows, valleys, grassland, and vernal pool habitat in southern California (Hickman 1993).	This species is known from all 10 vernal pool habitat management units on MCAS Miramar (Bauder and Wier 1991).	This species is threatened by development, road construction, and dumping (Skinner and Pavlik 1994).
13	San Diego goldenstar (*Bloomeria clevelandii*, formerly *Muilla clevelandii*) Status: S2/List 1B Family: Themidaceae	San Diego goldenstar is found in chaparral, scrub, and vernal pool grasslands on mesas in San Diego County.	It is known from San Diego County to Baja California, Mexico. Approximately 112 localities in San Diego County have been documented. It has been documented on MCAS Miramar (Station Rare and Endangered Plant Surveys).	This species is considered sensitive due to loss and degradation of habitat from road construction, urbanization, and off-highway vehicle use (Skinner and Pavlik 1994).
Invertebrates				
14	Monarch butterfly (*Danaus plexippus*) Status: Status under review by USFWS/None Family: Nymphalidae	Milkweed is the host plant for the monarch butterfly. Monarchs lay their eggs on milkweeds and the caterpillars feed on milkweed.	Monarch butterflies can be found throughout the United States, including Hawaii. Monarch butterflies that live west of the Rocky Mountains travel as far south as Baja California. Mexico. Monarch butterflies are known to pass through on MCAS Miramar; however, MCAS Miramar does not winter roost sites. One species of its egg and larval host plant (narrow-leaved milkweed, *Ascelpias fascicularis*) occurs on the Station as a few isolated plants in riparian floodplain areas. This species was not observed during Lepidoptera surveys performed on MCAS Miramar from 1995 through 1998 (Brown and Bash 1999).	This species is threatened by the use of pesticides, habitat loss, and climate change altering the timing of migration and rainfall patterns.

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
Amphibians				
15	Western spadefoot toad (*Spea hammondii*) Status: Status under review by USFWS/SSC Family: Scaphiopodidae	The western spadefoot toad prefers grassland habitats in lowlands, foothills, and plains along the Coast Range from northern California to northern Baja California, Mexico.	Once widely distributed in California, this species has suffered significant extirpation from its previous range. This species is known from the Central Valley and adjacent foothills. This species has been documented on the Station in coastal scrub, disturbed areas, riparian forests, southern mixed chaparral, and vernal marsh habitat (Varanus Biological Services, Inc. and San Diego Natural History Museum 2001; CJSeto Support Services LLC 2012a).	The western spadefoot toad emerges from underground retreats following fall, winter, and spring rains and breeds in the temporary ponds that form.
Reptiles				
16	Southwestern pond turtle (*Emys marmorata pallida*) Status: SSC Family: Emydidae (box and water turtles)	This aquatic species occupies ponds, marshes, rivers, streams, and irrigation ditches. They prefer these habitats especially within woodland, grassland, and open forest (Stebbins 1985).	This species ranges from coastal California near the San Francisco Bay area to northern Baja California, Mexico. Indications are 6-8 viable populations of this species are located south of the Santa Clara River system in California. The southwestern pond turtle was reported on Station (Hunsaker and Cox 2000) but was not present/observed during recent surveys (Varanus Biological Services, Inc. and San Diego Natural History Museum 2001), nor has it been verified during 2009 surveys (CJSeto Support Services LLC 2012a).	Losses of habitat, use of insecticides, and development are major threats to this species.
17	San Diego horned lizard (*Phrynosoma blainvillii*) Status: SSC Family: Equanidae	This horned lizard may be present in coastal sage scrub, chaparral, oak, pine woodland and along washes.	The range of this horned lizard includes southern California west of the deserts, south into northern Baja California, Mexico. The San Diego horned lizard has been reported in chaparral, coastal sage scrub, and vernal pool habitat of the central and western portion of the Station (Hunsaker and Cox 1997).	Like other horned lizards, this species can be identified by the large horns that protrude from the back of its head. Steady declines in population numbers are attributed to habitat loss and fragmentation, as well as over-collecting.
18	Coronado Island skink (*Plestiodon skiltonianus interparietalis*) Status: WL Family: Scincidae	The Coronado skink, a subspecies of the western skink is most commonly associated with oak woodlands and coastal sage scrub habitats.	This skink is found from Los Angeles County into northwest Baja California, Mexico, including San Diego County (Stebbins 1985). This subspecies has been reported as common under pieces of wood and other objects in grasslands and open habitats throughout the Station (Hunsaker and Cox 1997; CJSeto Support Services LLC 2012a).	This small, secretive lizard is thought to be declining as a result of habitat loss due to development.

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
19	Orangethroat whiptail (*Aspidoscelis hyperythra*) Status: WL Family: Teiidae	The orangethroat whiptail may be present in coastal sage scrub, chaparral, and along the borders of riparian zones and washes.	This whiptail is considered part of the endemic herpetofauna of Baja California that includes the entire length of the peninsular ranges from the Moreno Valley, California to the tip of Baja California, Mexico. This subspecies is common in spring and summer in sandy streambeds, open sycamore woodland, and coastal sage scrub areas of the canyons and mesas of the Station (Hunsaker and Cox 1997, CJSeto Support Services LLC 2012a).	The orangethroat whiptail is still relatively common where suitable habitat occurs (Leatherman unpublished data); however, vast areas of its former habitat have been lost to agriculture and urbanization.
20	Silvery legless lizard *(Anniella pulchra pulchra)* Status: SSC Family: Anniellidae	This species inhabits loose sandy soils that often have habitat containing little cover. Optimal conditions consist of a dry sandy layer overlaying damp soil with free movement between both.	This species is known to occur in the vicinity of Antioch, Contra Costa County, California, south through the Coastal Ranges, Transverse Ranges, and Peninsular Ranges into northwestern Baja California. Observations on MCAS Miramar consists of one individual in Sycamore Canyon (Varanus Biological Services, Inc. and San Diego Natural History Museum 2001). This species was not observed during 2009 surveys (CJSeto Support Services LLC 2012a).	The silvery legless lizard is a species of special concern due to habitat loss, possibly resulting from development, grazing practices and off-road vehicle use. Status evaluation has been difficult due to insufficient and incomparable species data.
21	Coast patch-nosed snake (*Salvadora hexalepis virgultea*) Status: SSC Family: Colubridae	This diurnal species is found in grasslands, chaparral, and desertscrub (Stebbins 1985). It is commonly associated with open grasslands with friable or sandy soils and enough cover to escape predation.	This snake may be found in coastal southern California and northern Baja California, Mexico. Five observations have been reported on MCAS Miramar (Hunsaker and Cox 2000) and (Varanus Biological Services, Inc. and San Diego Natural History Museum 2001). This species was not observed during 2009 surveys (CJSeto Support Services LLC 2012a).	The coast patch-nosed snake is a subspecies of the western patch-nosed snake present in coastal southern California and northern Baja California, Mexico.
22	Two-striped garter snake (*Thamnophis hammondii*) Status: SSC Family: Colubridae	The two-striped garter snake is found along permanent streams, creeks, and vernal pool habitat with protective cover. It may occasionally be present in chaparral or other habitats far from water.	This garter snake is known from coastal California near the Monterey Bay area south through northern Baja California, Mexico. This species has been reported in or near temporary ponds in throughout the Station (Hunsaker and Cox 1997; CJSeto Support Services LLC 2012a).	Urban development has greatly reduced the range of this species in southern California (Stebbins 1985), although it is locally common in creeks throughout San Diego County (Ogden 1996).

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
23	Red-diamond rattlesnake (*Crotalus ruber*) Status: SSC Family: Viperidae	This rattlesnake prefers coastal sage scrub and chaparral, and may be found in oak woodland and canyon bottoms and along borders of riparian zones and washes.	Included in the range of this snake is the entire length of the peninsular ranges from the Moreno Valley, California area to the tip of Baja California, Mexico. This species has been commonly observed in brushy, rocky upland areas of central and eastern portions of the Station, and occasionally observed on stony slopes of lower San Clemente Canyon (Hunsaker and Cox 1997; CJSeto Support Services LLC 2012a).	Loss of habitat due to development is a continual threat to this species existence.
Birds				
24	Least bittern (*Ixobrychus exilis*) Status: SSC (nesting) Family: Ardeidae	This species is associated with freshwater marshes dominated by cattails and bulrush in San Diego County.		
25	Northern harrier (*Circus cyaneus*) Status: SSC (nesting) Family: Accipitridae	This species is fairly common in marshes and fields where it may be seen flying close to the ground in search of prey. The northern harrier breeds in marshes and grasslands and forages in grasslands, wetlands, fields, and open coastal sage scrub.	This species is widespread throughout temperate regions of North America and Eurasia. San Diego County is at the southwestern corner of the northern harrier's breeding range. T. Conkle (personal communication) has reported an observation of harriers nesting on the Station in East Miramar along the west side of West Sycamore Canyon.	This raptor is a species of concern because of the decline in nesting pairs in California. This decline is the result of continued loss and degradation of breeding and foraging habitat (Remsen 1978).
26	Peregrine falcon: (*Falco peregrinus anatum*) Status: SFP (nesting) Family: Falconidae	This species prefers open habitat, usually near water, which can be comprised of tundra, marsh, high mountain, more open forest, deserts, and urban settings.	The peregrine falcon breeds south of the tree line in Alaska and Canada, throughout most of the U.S., and from central to southern Mexico. Northern birds winter from Mexico south to southern South America.	
27	White-tailed kite (*Elanus leucurus*) Status: SFP (nesting)	This species forages in open grassland, emergent wetlands, and agricultural areas, often utilizing nearby trees with dense canopies for cover.		
28	Short-eared owl *(Asio flammeus)* Status: SSC (nesting) Family: Strigidae	The short-eared owls inhabits wide-open spaces, such as grasslands, prairie, agricultural fields, salt marshes, estuaries, mountain meadows, and alpine and Arctic tundra.	This species is distributed throughout much of the world. It was observed during reptile and amphibian surveys, but the location of the sighting/sightings was not discussed.	

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
29	Long-eared owl *(Asio otus)* Status: SSC (nesting) Family: Strigidae	Long-eared owls inhabit open woodlands, forest edges, riparian strips along rivers, hedgerows, juniper thickets, woodlots, and wooded ravines and gullies.	Long-eared owls are widely distributed in North America, Eurasia, and northern Africa. Five to six pairs are known to nest regularly in Sycamore Canyon (Varanus Biological Services, Inc. and San Diego Natural History Museum 2001).	
30	Western burrowing owl (*Athene cunicularia hypugaea*) Status: SSC (burrowing sites & some wintering sites) Family: Strigidae	This species prefers open, level terrain within grassland or desert scrub vegetation (Johnsgard 1988). Farmland and airfields are among the Owl's preferred locations. Burrowing owls typically nest in holes made by ground squirrels and other burrowing animals.	A resident species in California, the breeding range of the burrowing owl includes southwestern Canada and much of the western U.S. into central Mexico. The species is uncommon and rapidly declining in California. One pair of burrowing owls was observed in San Clemente Canyon west of Kearny Villa Road in April 1994 (Ogden 1996). Several burrowing owls were sited on the Station during deer surveys conducted in fall 1997 (South and East Miramar). This species is a fall/spring migrant and an occasional winter resident. It can occur virtually anywhere on the Station; it is most frequently observed just east of Interstate -15 and on ridgetops of East Miramar (T. Conkle, personal communication). In 2012, one burrowing owl was detected off of fuelbreak road EW-4 in East Miramar, flushed from underneath wooden pallets close to the road (Naval Facilities Engineering Command Southwest 2013).	Continued loss and degradation of habitat have resulted in rapidly declining population numbers in California (Remsen 1978). CDFW believes this species is under imminent threat of extirpation in San Diego County. CDFW suggested survey methods, passive relocation guidelines, and mitigation measures are found in the CDFW 1995 and 2012 *Staff Reports on Burrowing Owl Mitigatio*n and the Burrowing Owl Consortium's *1993 Burrowing Owl Protocol and Mitigation Guidelines*. Effects to burrowing owls will be analyzed during NEPA analyses of proposed actions.

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
31	Vaux's swift *(Chaetura vauxi)* Status: SSC (nesting) Family: Trochilidae	This species is often found in coniferous forested regions, but it forages and migrates over open country, rivers, and lakes.	The Vaux's swift breeds from southeastern Alaska, western Canada, northern Idaho, and western Montana, south to central California. It winters in southern portions of its breeding range, central New Mexico, southern Louisiana, and western Florida. It occurs on MCAS Miramar only as a migrant (Varanus Biological Services, Inc. and San Diego Natural History Museum 2001).	Habitat on Station is unsuitable, with exception of this species possibly utilizing buildings for roosting sites (Varanus Biological Services, Inc. and San Diego Natural History Museum 2001).
32	Black swift *(Cypseloides niger)* Status: SSC (nesting) Family: Trochilidae	The black swift is found in areas with rocky cliffs available for nesting, varying from ocean cliffs to mountain ledges, at elevations from sea level to 11,000 feet.	Breeding occurs from southeastern Alaska and western Canada, south to southern California, northwestern Montana, Colorado, Utah, northern New Mexico, and southeastern Arizona. It winters in Mexico and Costa Rica. This species was observed during reptile and amphibian surveys, but the location of the siting/sitings was not identified.	
33	Olive-sided flycatcher *(Contopus cooperi)* Status: SSC (nesting) Family: Tyrannidae	It inhabits montane and northern coniferous forests up to 10,000 feet. It prefers tall spruces, firs, balsams, and pines; groves of eucalyptus and Monterey cypress; taiga; subalpine coniferous forests; mixed woodlands near edges and clearings; and wooded streams and borders of northern bogs and muskegs.	It is distributed from Alaska to Canada south to southern California across to Texas and east of the Rocky Mountains to North Carolina. It winters in southern California and South America. This species was observed as a migrant in 1994 (Hunsaker and Cox 2000), during the Reptile and Amphibian Survey (Varanus Biological Services, Inc. and San Diego Natural History Museum 2001), and during the 2003 Long-Term Ecosystem Survey (Vararanus Biological Services, Inc. and San Diego Natural History Museum 2003).	One individual was observed during the 2000 survey. No details were provided in the 2001 or 2003 reports for numbers of individuals observed or distribution.
34	Willow flycatcher *(Empidonax traillii)* Status: SE (nesting)	The willow flycatcher is found in willow thickets and other brushy areas near streams, marshes, or other wetlands and in clear-cuts and other open areas with nearby trees or brush.	This species breeds from southern British Columbia, Alberta, North Dakota, New York, and Maine south to central California, Nevada, Southwest, Arkansas, and Virginia. It winters in the tropics. Flycatchers (unknown species) were observed on Station in 1993 (Hunsaker and Cox 2000), and willow flycatchers were observed on Station during the Reptile and Amphibian Survey (Varanus Biological Services, Inc. and San Diego Natural History Museum 2001). Willow flycatchers were not observed during surveys in 2014 or 2017 (San Diego Natural History Museum 2014 and 2017).	Willow flycathchers *(Empidonax traillii)* have been identified on Station, but the southwestern willow flycatcher *(Empidonax traillii extimus)* subspecies has not been found nesting on MCAS Miramar.

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
35	Loggerhead shrike (*Lanius ludovicianus*) Status: SSC (nesting) Family: Laniidae	Loggerhead shrikes occupy a variety of habitats but are most common wherever bushes or trees are scattered on open ground.	The loggerhead shrike has a large distribution that includes much of the western portion of the U.S. Substantial declines in the eastern portion of its range have been observed. This species is known to breed from numerous locations on the Station.	
36	Coastal cactus wren (San Diego) (*Campylorhynchus brunneicapillus sandiegensis*) Status: SSC Family: Troglodytidae	San Diego (coastal) cactus wrens may be present in coastal sage scrub, chaparral, and grassland habitats.	This cactus wren is known from coastal areas in southern California. Vagrants may rarely occur on the Station; there is one record in the vicinity of the Station. One pair was a permanent resident in native grassland in the central portion of the Station. This subspecies is no longer known to breed on the Station (Hunsaker and Cox 1997).	One cactus wren was observed during 1999 (Varanus Biological Services, Inc. and San Diego Society of Natural History 2001). In 2013, one singing male near a partially built nest was observed in early spring near Sycamore Canyon by C. Black, Natural Resources Staff biologist. Nesting at this site did not subsequently occur.
37	Yellow warbler *(Setophaga [Dendroica] petechia brewsteri)* Status: SSC (nesting) Family: Parulidae	The yellow warbler prefers moist habitats, such as willow- and alder-lined streams and ponds, brushy bogs, and the edges of marshes, swamps, or creeks. It also utilizes dry sites, such as hedgerows, roadside thickets, orchards, farmlands, and forest edges.	This species is distributed from northwestern and north-central Alaska and northern Yukon to northern Ontario, central Quebec, and southern Labrador south to Mexico. This species was sighted four times in May 1999. These sightings may have consisted only of migrants due to the sighting occurring during the normal migration period (Varanus Biological Services, Inc. and San Diego Society of Natural History 2001).	
38	Yellow-breasted chat (*Icteria virens*) Status: SSC (nesting) Family: Parulidae	This species inhabits ravine or streamside thickets of vines, briars, small trees, tall shrubs, forest edges, hedgerows, overgrown pastures, scrub country, and early successional stages of forest regeneration.	The yellow-breasted chat ranges from southern British Columbia, North Dakota, southern Minnesota, southern Ontario, Vermont, and New Hampshire south through Central America and western Panama. This species is a summer resident in low numbers and localized populations (Varanus Biological Services, Inc. and San Diego Society of Natural History 2001).	

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
39	Summer tanager (*Piranga rubra*) Status: SSC (nesting) Family: Thraupidae	It generally inhabits dry, open woodlands of oaks, pines, hickories, and willow, cottonwood, and streamside vegetation in canyons.	The species ranges from southeastern California and southern Nevada to central Oklahoma, and from southeastern Nebraska to New Jersey south to Mexico to Bolivia. This species was observed during the 2001 Reptile and Amphibian Survey (Varanus Biological Services, Inc. and San Diego Society of Natural History 2001). A description of numbers or distribution was not provided.	
40	Tricolored blackbird (*Agelaius tricolor*) Status: Status under review by USFWS/SCE Family: Icteridae	The tricolored blackbird nests in large colonies in marshes and pond edges, edges of fields, and in cattails throughout western California.	The tricolored blackbird ranges from the Central Valley of California, west of the Sierra Nevada Mountains. It is a common but localized resident in San Diego County. San Diego State University biologists have reported this species from Harris Pond, south of MCAS Miramar Way between Kearny Villa Road and the Main Station gate; near the horse stables north of Miramar Way; and in Sycamore Canyon near Santee Lakes (Ogden 1996). They are colonial nesters and are not known to breed at MCAS Miramar (T. Conkle, personal communication). Although they are not known to breed on MCAS Miramar, individuals have been documented using wetland habitats during the non-breeding season.	
Mammals				
41	Pocketed free-tailed bat (*Nyctinomops femorosaccus*) Status: SSC Family: Molossidae	Pocketed free-tailed bats inhabit pinon-juniper woodlands, desert scrub, mixed cacti, riparian woodland, and palm oasis. They are most often found in rocky areas with high cliffs, crevices, or rock outcrops (Hunsaker 1997). Artificial structures are also used for day and night roosts.	This species is known from southern California, Arizona, and New Mexico and south into northern and western Mexico (Nowak 1991). It is also thought to be widely distributed in the Trans-Pecos region of Texas. It is considered rare in California. This species has been observed foraging at several locations at MCAS Miramar but has not been observed roosting (D. Stokes, personal communication).	This species is not considered migratory; however, some populations seasonally migrate locally; some migrate short distances into Mexico; and others over-winter in their summer use areas (Hunsaker 1997, Nowak 1991).
42	San Diego black-tailed jackrabbit (*Lepus californicus bennettii*) Status: SSC Family: Leporidae (rabbits and hares)	The San Diego black-tailed jackrabbit prefers open grasslands or open shrublands, usually adjacent to sage scrub or chaparral habitats where it may find cover.	This coastal southern California subspecies occurs from southern Santa Barbara County to Baja California, Mexico. It is relatively common in open areas of San Diego County. It is common in suitable habitats on MCAS Miramar	Areas that are unsuitable for the San Diego black-tailed jackrabbit include densely vegetated areas that are overgrown with thick ground cover.

No.	Species Name, Status*, Family	Habitat	Rangewide and MCAS Miramar Distribution	Comments
43	Dulzura California pocket mouse (*Chaetodipus californicus femoralis*) Status: SSC Family: Heteromyidae	The Dulzura California pocket mouse occurs in coastal sage scrub, chaparral, oak woodland, and montane hardwood habitats. It is known from sea level to 7,900 feet.	This pocket mouse's range extends from the coastal slope and mountains of northern San Diego County southward into the mountains of Baja California, Mexico. This subspecies was reported as being observed at MCAS Miramar by Kellogg (1994). This subspecies has been observed at MCAS Miramar during the 2000 and 2009 Vertebrate Surveys.	The type specimen was described from the vicinity of Dulzura, San Diego County in 1891. The range of this taxon overlaps with that of the northwestern San Diego pocket mouse (see below); however, the Dulzura pocket mouse is larger and heavier.
44	Northwestern San Diego pocket mouse (*Chaetodipus fallax fallax)* Status: SSC Family: Heteromyidae	This pocket mouse is associated with open, arid habitats, including coastal sage scrub, annual grassland, and desert habitat.	This subspecies occurs on the coastal slope of southern California from southwest San Bernadino, western Riverside, eastern Los Angeles, and San Diego counties to northern Baja California, Mexico. It was detected in the eastern portion of MCAS Miramar, adjacent to I-15, and is expected to be present in suitable habitat throughout the Station (Hunsaker and Cox 2000). This species was detected during the 2009 Vertebrate Survey.	Population information is lacking for the northwestern San Diego pocket mouse.
45	Southern grasshopper mouse (*Onychomys torridus ramona*) Status: SSC Family: Muridae	The southern grasshopper mouse occurs in arid, open country with sandy or gravely soil; it is associated with grasslands, open sagebrush and chaparral.	This subspecies ranges from northern Los Angeles County along the coastal slope to extreme northwest Baja California, Mexico. This species was detected on MCAS Miramar during the 2000 Vertebrate Survey (Hunsaker and Cox 2000), but not during the 2009 Vertebrate Survey.	This large mouse is mainly carnivorous, eating insects, scorpions, lizards, and other mice, as well as some seeds (Burt and Grossenheider 1976). It lives in burrows of other rodents, including probably Botta's pocket gopher and California ground squirrel.
46	San Diego desert woodrat (*Neotoma lepida intermedia*) Status: SSC Family: Muridae	The San Diego desert woodrat favors xeric and coastal habitats. Preference is given to chaparral and coastal sage scrub, especially in rock outcrops.	This subspecies is restricted to the coastal slope of southern California. It inhabits arid portions of coastal California, mostly on south-facing slopes. Known locations include east of I-15 in the northern portion of the Station, it is expected to be present in suitable habitat throughout MCAS Miramar (Hunsaker and Cox 2000). This species was observed during the 2009 Vertebrate Survey.	A subspecies of the desert woodrat, the San Diego desert woodrat must be trapped to distinguish it from the sympatric dusky-footed woodrat (*Neotoma fuscipes*). Population data for this species is lacking.

* Federal Status Code (if applicable)/State Status (or Plant Ranking) Code/California Native Plant Code

Species Status Codes

FC = Federal candidate for listing
SE = State endangered
SCE = State candidate for listing as endangered
SSC = California species of special concern
WL = California watch list

California State Plant Ranking List

S1 = **Critically imperiled** in the state because of extreme rarity (often 5 or fewer populations) or because of factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.
S2 = **Imperiled** in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state.
S3 = **Vulnerable** in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation from the state.
S4 = **Apparently Secure**, uncommon but not rare in the state; some cause for long-term concern due to declines or other factors.
S5 = **Secure**, common, widespread, and abundant in the state.

California Native Plant Society Ranking List

List 1B = Rare, threatened, or endangered and eligible for listing under the California Endangered Species Act
List 2 = Rare, threatened, or endangered in California, common elsewhere
List 3 = Taxa about which more information is needed
List 4 = Rare, but low potential for extinction

5.0 MANAGEMENT AREAS AND LAND USE COMPATIBILITY

The MCAS Miramar strategy for conservation and management is to 1) limit activities, minimize development, and mitigate actions in areas supporting high densities of vernal pool habitat, threatened or endangered species, and other wetlands and 2) manage activities and development in areas of low densities, or no regulated resources, with site-specific measures and programmatic instructions. MCAS Miramar has developed Management Areas (MAs) to highlight the area's supporting differing regulated resources.

This INRMP does not dictate land-use decisions but rather provides important resource information to support sound land use decisions and natural resource management. The MA designations reflect Station priorities for conservation when future land uses are contemplated. While the Station's overall strategy is to minimize developments and limit activities in areas supporting high densities of endangered species and wetlands, this may not always be possible given competing demands or operational needs.

MAs also serve as a basis for planning natural resource management actions. Regardless of sensitivity, all of MCAS Miramar's undeveloped areas are subject to natural resource management, conservation, and best management practices (BMPs). This includes lands occupied by tenants, leases, easements, and similar occupancy or use of Station property. As a result, all undeveloped areas of MCAS Miramar will continue to provide for wildlife movement and dispersal.

5.1 Management Area Designations

MAs were identified primarily to support the conservation and management of Special Status Species, wetlands, and other areas identified by the HEM as warranting special attention as integrated with the operational mission of the Station. These designations reflect MCAS Miramar's general management strategy and are intended to be interpreted by program managers and technical experts for application to specific issues.

Many MA boundaries follow existing landmarks, such as roads, fuelbreaks, fence lines, and ridgelines, to facilitate identification in the field. Generally, there was a tradeoff between the use of existing landmarks as MA boundaries and the inclusion of all similar resources within the area. The decision of whether to change from following landmarks as borders was subjective but was based on using landmarks while minimizing the inclusion of other resource levels within a MA. In some cases, where high value resources did not exist, boundaries were set off from developments to acknowledge and support their use. Similarly, there was a tradeoff between the inclusion of areas with differing management requirements that are isolated and those easily grouped and included in a MA. The MA boundaries have been reviewed and updated to reflect current Station operations, facilities, missions, and resource management needs.

The proximity of high value resources (*e.g.*, vernal pool habitat) on the Main Station and South/West Miramar to developed areas made the design of a MA with a low edge-to-area ratio impractical in those sectors. However, due to the generally undeveloped nature of East Miramar, there was an opportunity to design the MAs in a less confined manner using existing landmarks (*e.g.*, roads, fuelbreaks, ridge lines), thereby improving field identification of boundaries. In most cases, using field landmarks also increased the area encompassed within the MA, thereby increasing the area receiving a higher level of conservation and reducing the edge-to-area ratio. MAs specifically delineated for Special Status Species were drawn relatively tightly around those resources (*e.g.*, California gnatcatcher habitat), reflecting the need for special management and attention to these areas in consideration of the special regulatory compliance requirements for Special Status Species and their habitats.

The entire MCAS Miramar land area has been placed into MAs (Figure 5.1). For planning purposes, MAs are organized by levels based on differing resource conservation requirements and management concerns[8]. Table 5.1 provides vernal pool habitat and Special Status Species information for each MA.

5.1.1 Level I Management Areas

Level I MAs (2,683 acres) support nearly all vernal pool habitat basins and watersheds and some closely associated coastal California gnatcatcher territories (Table 5.1). These areas receive the highest conservation priority. Areas planned and used for compensatory vernal pool wetland habitat mitigation are included as a Level I MA because of the regulatory obligations for assuring long-term conservation. Proactive measures to prevent damage to vernal pool habitat are being taken in many of these areas. Special conservation requirements necessary to maintain the integrity of vernal pool habitat on the Station are highlighted by this MA designation for incorporation into Station Orders and the National Environmental Policy Act planning process.

Measures include posting signs and fencing, identifying potential impacts from activities by lessees and right-of-way holders, developing procedures to respond to and fix accidental impacts on vernal pool habitat and Special Status Species, and developing education programs to create and maintain awareness of the values of vernal pool habitat. These proactive measures are taken to avoid accidental impacts in Level I MAs. Inventory of vernal pool habitat basins and watersheds will continue to be maintained and updated to support proactive planning and impact avoidance. Details of these management and conservation initiatives are provided in Chapter 7 (Section 7.2).

5.1.2 Level II Management Areas

Conservation needs in Level II MAs (5,898 acres) focus on non-vernal pool, federally listed species (Table 5.1). Other regulated resources, such as isolated vernal pool habitat basins, within the MA also will be conserved with additional site-specific measures, as needed. Conservation goals for Level II MAs are to maintain and, where feasible, enhance populations of California gnatcatchers, least Bell's vireos, willowy monardella, Del Mar manzanita, and other natural resources while maintaining maximum compatible use for operational requirements. Surveys for Hermes copper and Quino checkerspot butterflies are in progress (2018-2019). Many Pre-Cedar fire historic Hermes copper butterfly occupied areas occur within Level II MAs; however, as new information from current surveys is finalized, the relationship of currently occupied locations to Level II MAs cannot be fully accounted for. Management considerations include avoiding or minimizing the effect of planned actions on endangered species and wetlands, thereby also minimizing associated activity approval delays and mitigation to meet regulatory requirements.

[8]2011 Management Areas and their associated planning considerations were incorporated into the MCAS Miramar Master Plan (Southwest Division, Naval Facilities Engineering Command) for use of land areas throughout the Station.

Figure 5.1. MCAS Miramar Management Area Designations

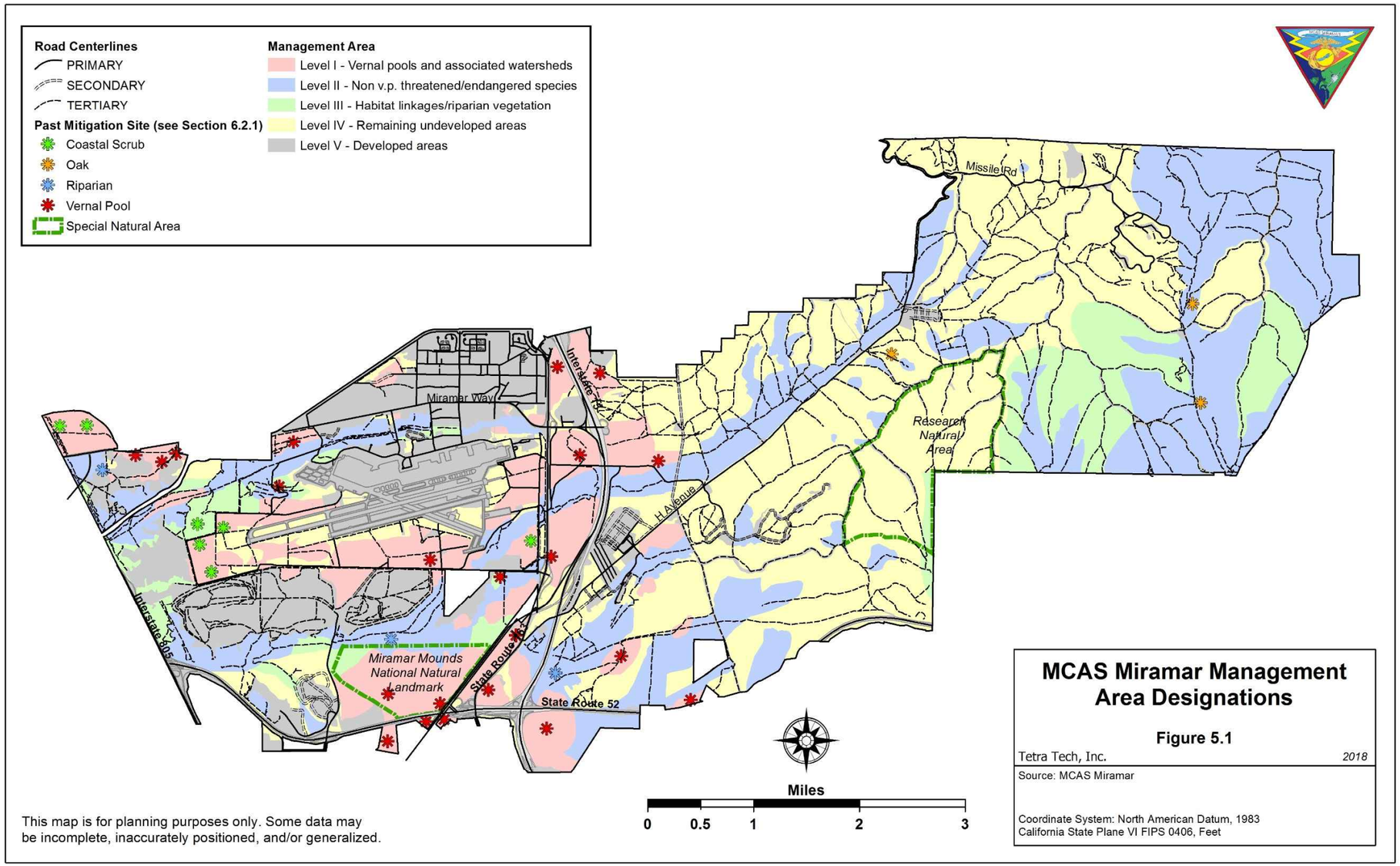

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Table 5.1. Vernal Pool Habitat and Special Status Species of Concern by Management Area

Vernal Pool Habitat/Threatened and Endangered Species	Management Area Level						
	I	II	III	IV	V	2016 Totals	2011 Totals
Vernal Pool Basins: number	4714	123	27	39	44	4,947	4,825
Percent of total	95.3	2.5	0.5	0.8	0.9		
Vernal Pool Basins: acres	90.2	2.8	0.3	1.5	0.7	96	95
Percent of total	94.4	2.9	0.3	1.6	0.8		
Other Seasonally Ponded Features[1] Basins: number	1,877	394	17	240	233	2,761	2,706
Percent of total	68.0	14.3	0.6	8.7	8.4		
Other Seasonally Ponded Features[1] Basins: acres	30.8	9.3	1.0	4.6	5.9	52	52
Percent of total	59.7	18.0	1.9	9.0	11.5		
Vernal Pool Habitat Watersheds: acres	918.6	45.3	9.9	50.9	33.9	1,059[2]	1,069
Percent of total	86.8	4.3	0.9	4.8	3.2		
San Diego Button-celery[3, 9]: # basins	1,824	6	2	9	4	1,845	1,795
Percent of total	98.9	0.3	0.1	0.5	0.2		
San Diego Button-celery: basin acres	51.5	0.2	0.2	0.5	0.2	53	53
Percent of total	97.9	0.4	0.4	1.0	0.4		
Spreading Navarretia[9]: # basins	6	0	0	0	0	6	6
Percent of total	100.0	0.0	0.0	0.0	0.0		
Spreading Navarretia: basin acres	2.5	0	0	0	0	3	3
Percent of total	100.0	0.0	0.0	0.0	0.0		
Spreading Navarretia: acres of Essential Habitat[4]	69	0	0	0	0	69	69
Percent of total	100.0	0.0	0.0	0.0	0.0		
San Diego Mesa Mint[5, 9]: # basins	1,153	6	0	3	3	1,165	1,112
Percent of total	99.0	0.5	0.0	0.3	0.3		
San Diego Mesa Mint: basin acres	38.5	0.2	0.0	0.1	0.2	39	39
Percent of total	98.7	0.5	0.0	0.3	0.5		
California Orcutt Grass[9]: # basins	4	0	0	0	0	4	2
Percent of total	100.0	0.0	0.0	0.0	0.0		
California Orcutt Grass: basin acres	5.5	0	0	0	0	6	6
Percent of total	100.0	0.0	0.0	0.0	0.0		
San Diego Fairy Shrimp[6, 9]: # basins	3,790	146	9	54	73	4,072	4,051
Percent of total	93.1	3.6	0.2	1.3	1.8		
San Diego Fairy Shrimp: basin acres	98.4	6.4	0.9	3.8	4.9	114	114
Percent of total	86.0	5.6	0.8	3.3	4.3		

Vernal Pool Habitat/Threatened and Endangered Species	Management Area Level						
	I	II	III	IV	V	2016 Totals	2011 Totals
San Diego Fairy Shrimp: acres Essential Habitat[4]	1,862.5	148.6	48.2	108.1	187.9	2,355[2]	2,379
Percent of total	79.1	6.3	2.0	4.6	8.0		
Riverside Fairy Shrimp[9]: # basins	2	0	0	0	0	2	2
Percent of total	100.0	0.0	0.0	0.0	0.0		
Riverside Fairy Shrimp: basin acres	2	0	0	0	0	2	1
Percent of total	100.0	0.0	0.0	0.0	0.0		
Riverside Fairy Shrimp: acres of Essential Habitat[4]	79.6	0.2	0	11.0	4.5	95	95
Percent of total	83.5	0.2	0.0	11.6	4.7		
Willowy Monardella[7]: # clumps	0	1,137	0	0	0	1,137	401
Percent of total	0.0	100	0.0	0.0	0.0		
Willowy Monardella: acres of Essential Habitat[4]	97.7	1,464.2	20.1	112.7	146.6	1,841	1,842
Percent of total	5.3	79.5	1.1	6.1	8.0		
Del Mar Manzanita: # individuals	0	2,706	0	14	4	2,724	2,341
Percent of total	0.0	99.3	0.0	0.5	0.2		
Coastal California Gnatcatcher: # breeding pair locations pre- and post-Cedar Fire[8]	67	552	0	44	17	680	471
Percent of total	9.9	81.2	0	6.5	2.5		
Coastal California Gnatcatcher: # breeding pair locations from post 2003 Cedar Fire[8]	21	157	1	15	11	205	120
Percent of total	10.2	76.6	0.5	7.3	5.4		
Coastal California Gnatcatcher: acres of Essential Habitat[4]	143.7	4,059.9	185.8	714.4	465.3	5,569	5,569
Percent of total	2.6	72.9	3.3	12.8	8.4		
Least Bell's Vireo (territory): # locations (2008, 2014)	0	37	0	0	0	37	5
Percent of total	0.0	100	0.0	0.0	0.0		
Hermes Copper Butterfly: acres of Pre-Cedar fire occupied habitat	0	118.7	0	165.3	4.4	N/A	288.4[10]
Percent of total	0.0	41.2	0.0	57.3	1.5		
Quino Checkerspot Butterfly	All Quino checkerspot butterfly locations have been found along maintained fuelbreaks on ridge tops; however, some adjacent lands fall within Level II and III Management Areas. Surveys are ongoing in 2018-2019.						

Vernal Pool Habitat/Threatened and Endangered Species	Management Area Level						
	I	II	III	IV	V	2016 Totals	2011 Totals

[1] MCAS uses the term "Other Seasonally Ponded Features" to refer to basins mapped as a type other than a Pool (*e.g.*, Puddle, Road Rut, Ditch, Excavation); see Section 4.3.4, *Vernal Pool Habitat at MCAS Miramar*.
[2] A previous GIS error was fixed (double counting GIS entries that were beyond the Station boundary or similar). This number does not represent a decrease from 2011.
[3] Several basins with San Diego button celery are not designated within one of the pool groups in Table 4.3.4, however, they are included in this table. As a result, the total number of basins for this species shown here is different than what is shown in Table 4.3.4.
[4] Essential Habitat includes areas not designated as Critical Habitat due to the conservation benefit provided to the species by this INRMP, in accordance with Section 4(a)(3) of the ESA. Some portions of Essential Habitat identified by the USFWS may occur in MAs that do not target conservation of the species and its habitat due to less precise mapping used by the USFWS for Essential Habitat designation than used by MCAS Miramar for resource mapping. Some locations of Essential Habitat overlay developed areas (*i.e.*, Management Area V).
[5] Several basins with San Diego mesa mint are not designated within one of the pool groups in Table 4.3.4, however, they are included in this table. In addition, 1 of the basins within Table 4.3.4 is off-base and therefore not in a Management Area or in this table. As a result, the total number of basins for this species shown here is different than what is in Table 4.3.4.
[6] Several basins with San Diego fairy shrimp are not designated within one of the pool groups in Table 4.3.4, however, they are included in this table. In addition, several of the basins shown within Table 4.3.4 are off-base and therefore not in a Management Area or in this table. As a result, the total number of basins for this species shown here is different than what is in Table 4.3.4.
[7] A new mapping technique was utilized in 2015 for mapping willowy monardella, which is the reason for the difference between 2011 and 2015 data. The population of willowy monardella is declining, the increase shown in this table is due to the change in mapping methods.
[8] 2011 Totals are reported from the 2013 California gnatcatcher survey report (Tierra Data 2014); 2015 Management Area Totals are from the GIS.
[9] In order to determine which Management Area each basin was in for San Diego button celery, spreading navarretia, San Diego mesa mint, California Orcutt grass, San Diego fairy shrimp, and Riverside fairy shrimp, the centroid of the basin was used. This method was applied to avoid counting the same basin within more than one Management Area. For example, 1 of the San Diego mesa mint basins has a small amount of area within Management Area III. But, this overall basin is already counted within Management Area I. So, the table shows all basins within Management Area I, however, there is a small amount of area within Management Area III.
[10] This is the total acres of Pre-Cedar fire occupied habitat (1996-2000). Surveys are being performed during the 2018 flight season to determine the current occupied habitat on MCAS Miramar.

Such considerations include avoidance of adverse effects on California gnatcatcher or least Bell's vireo reproductive success by limiting activities within the MAs during the California gnatcatcher breeding season (15 February through 31 August), which includes the least Bell's vireo breeding season. Guidance for off-road activities, including foot traffic, includes minimizing such activities near endangered plants during their active growth stage to avoid habitat damage and crushing of plants and allowing vehicle operation only on roads and fuelbreaks. Similar measures to limit activities that may affect endangered butterflies will be

West Sycamore Canyon (mostly Management Area II)
Natural Resources Division

undertaken in the interim until we better understand the species distribution from current surveys, the potential for impacts from operational activities, and ESA consultations have been completed. Interim measures at sites known to be occupied by listed butterflies include limiting activities during the flight seasons and minimizing off-road activities, including foot traffic, to avoid habitat damage to host plants and crushing eggs and larval stages. Use and maintenance of established roads and firing ranges will remain unchanged.

Accidental or unintentional damage is reduced by implementing site-specific measures, such as fencing where an isolated vernal pool habitat may be threatened. Mitigation directed at habitat enhancement or compensation for impacts to California Gnatcatcher, Hermes copper butterfly, Quino checkerspot butterfly, willowy monardella, and Del Mar manzanita will be targeted for implementation in Level I and II MAs prior to implementation in Level III, IV, or V MAs.

5.1.3 Level III Management Areas

Level III MAs (1,740 acres) support riparian vegetation, wildlife movement corridors, and habitat linkages not contained within Level I and II MAs. While all undeveloped areas on MCAS Miramar function as important habitat linkages, Level III MAs support areas also identified as local or regional wildlife corridors (Section 4.5, *Habitat Linkages and Wildlife Corridors*). Outside of wetlands, these areas can support vehicle traffic on roads, fuelbreaks, and developed sites, as well as off-road foot traffic without adversely affecting the area's natural resource values.

Wetlands encompassed by these MAs include vernal marshes, fresh water marshes, and portions of some riparian vegetation types. As is the case with vernal pool habitat, management and use of these areas gives careful consideration of the CWA, ESA, and the national policy (Executive Order 11990, *Protection of Wetlands*) to permit no overall net loss of wetlands. MCAS Miramar has completed a planning level delineation of wetlands and CWA jurisdictional Waters of the U.S. in all major watersheds of the Station. Additionally, more precise mapping of the Main Station and Flightline Areas was completed in 2008 (Lichvar and Dixon 2008).

5.1.4 Level IV Management Areas

Remaining undeveloped areas not in Levels I, II, or III MAs have been delineated as Level IV MAs. Level IV MAs (7,859 acres) do not support substantial high value/regulated natural resources, such as vernal pool habitat basins or occupied California gnatcatcher habitat (Table 5.1). High value natural resources within Level IV MAs are very isolated and will be managed and conserved with site-specific management and conservation measures, as needed. When planning future actions in Level IV MAs, potential impacts on wildlife movement will be considered.

Level IV MAs can support foot and vehicle traffic for a wide variety of MCAS Miramar operational requirements with minimal overall impact on the Station's special natural resources. While these areas have not been highlighted as requiring special consideration, this does not imply that they will be developed in the future. New required developments would be considered for placement in Level V MAs first.

5.1.5 Level V Management Areas

Level V MAs (4,858 acres) are associated with developed land-uses; they support few unaltered natural landscapes and therefore almost no high value natural resources (*e.g.*, fuelbreaks, maintained dirt access roads and lots, paved surfaces, constructed facilities and ranges, buildings). These areas will be considered first for placement of new facilities or other new land uses that would be likely to impact regulated resources. Management objectives for these Level V MAs include working to accomplish grounds maintenance and landscaping operations consistent with natural resource goals and objectives. The Station

discourages the use of invasive plants, such as those listed by the California Invasive Plant Council and California Native Plant Society, for landscaping; conducts flightline mowing practices consistent with the Bird/Animal Air Strike Hazard (BASH) program and endangered species management; and keep pesticide use to a minimum. The proximity of many developed areas, to high value and sensitive natural resources highlights the importance of these measures. High value natural resources within Level V MAs are very isolated and will be managed and conserved with site-specific management and conservation measures, as needed. Natural resource-related management objectives for these developed areas are detailed in Chapter 7.

5.1.6 Other Management Area Design Considerations

In the Biological Opinion (1-6-95-F-33) for the Realignment of NAS Miramar to MCAS Miramar (USFWS 1996a), the USFWS provided specific considerations that were included in the development of past INRMPs (MCAS Miramar 2000, 2006, 2011a) and this updated INRMP. MCAS Miramar must maintain undeveloped open space in its accident potential zones, ground training areas, and safety arcs to meet military operational requirements (Figure 2.1), which results in retaining large, interconnected blocks of unfragmented habitat that support a wide range of species.

Another consideration is the need to retain full viability of the core California gnatcatcher population, which is accomplished through the design of the Level II MA that supports California gnatcatcher territories. Linkages between Level II MAs are maintained largely through the conservation of Level I and III MAs as well as undeveloped areas within Level IV MAs. Level I, II, and III MAs delineate various levels and types of management attention needed to conserve Special Status Species, vernal pool habitat, habitat linkages, and other important resources. They do not represent intentions for disregarding natural resources in Level IV and V MAs.

On the Main Station and South/West sectors of MCAS Miramar, Level I, II, and III MAs are relatively discrete and reflect the distribution of vernal pool habitat watersheds, California gnatcatcher locations, riparian/wetland areas, and east-west wildlife corridors associated with Rose and San Clemente canyons. These areas are interspersed and in close proximity to developed areas. The configuration of MAs in eastern Miramar highlights the need for conservation of California gnatcatcher habitat, sites occupied by endangered plants (willowy monardella, Del Mar manzanita) and riparian wetlands with consideration for maintenance of tracts of undeveloped lands to provide for wildlife habitat connectivity. Easternmost MCAS Miramar serves as an important regional linkage to adjacent open areas, including Mission Trails Regional Park and Goodan Ranch-Sycamore Canyon Open Space Preserves. These larger MAs in the eastern portion of the Station reflect both differing land use history (*e.g.*, training areas versus concentrations of facilities) and the distribution of the resources.

5.2 Land Use Compatibility

The Station follows NEPA procedures in evaluating environmental impacts, alternatives, and mitigation measures expected to result from each action to ensure land use compatibility of actions at MCAS Miramar with conservation of natural resources. Part of this process is to ensure compliance with all applicable environmental and natural resources regulations.

The Environmental Management Department involves appropriate regulatory agencies in planning processes to obtain federal permits and concurrences. MCAS Miramar accomplishes its legal requirements (for permits, consultations, and authorizations) under the ESA, CWA, and NEPA, and other laws and regulations, while considering compatibility between military readiness needs and conservation (see Chapter 6, *Project and Mitigation Planning* for more information regarding MCAS Miramar's legal requirements for compliance as well as planning time lines for regulatory compliance).

Approval of actions is provided programmatically with appropriate conditions, where possible, for incorporation into other Station Orders, instructions, guidelines, standard operating procedures, plans, projects, and maintenance actions. MCAS Miramar Station Order 3500.2A (Range and Training Area Regulations) with its environmental protection section is one such example. Information provided in this chapter, and other portions of this INRMP, is for technical guidance to persons planning and/or preparing such Station approvals. This INRMP does not dictate land use decisions but rather provides important resource information to support sound land use decisions and natural resource management.

5.2.1 General Compatibility Considerations Relative to Management Areas

MAs reflect the degree to which the natural resources are regulated, and therefore limit planning options. Regulatory constraints on land uses relative to MAs are hierarchical in nature. The greatest priority for habitat conservation is for vernal pool habitat and associated watersheds (Level I) with the priority decreasing with each MA level (*e.g.*, Level V has the lowest priority for habitat conservation). MA levels are used by those proposing actions at MCAS Miramar to become aware of regulatory requirements and potential use limitations early in the planning process. Reconfiguration of an MA would be considered if changes in protective status of a species occurs (*e.g.*, new listings) or land use requirements change. Accordingly, revision of the MA's was done for this INRMP update.

Land-use within ***Level I MAs*** takes into consideration the integrity of vernal pool habitat since the vast majority of vernal pool habitat is supported by these areas. For many uses, potential impacts will be eliminated, or greatly reduced, by specific conditions.

Avoiding adverse impacts on the survival, reproduction, or habitat of non-vernal pool special status species, is the primary consideration in ***Level II MAs***. Frequency, duration, and intensity of the use are important factors to consider.

Use of ***Level III MAs*** takes into account the importance of conserving connections of larger habitat blocks, conserving riparian areas, and the presence of wetlands associated with the riparian vegetation. Avoiding habitat fragmentation is an important consideration at the Main Station and South/West Miramar sectors.

Level IV MAs support some sensitive and protected resources, but they do not support extensive areas of regulated resources contained within Level I, II, and III MAs. As a result, Level IV MAs have fewer limitations on uses since areas with greater regulatory constraints would have been avoided early in the planning process. While impacts on high value patches of habitat are still avoided to the extent possible, Level IV MAs are given first consideration for siting new uses outside of developed areas, consistent with the Station Master Plan (Southwest Division, Naval Facilities Engineering Command, in preparation). Any new uses remain subject to all general requirements for use as well as other applicable regulations.

Level V MAs, given that they are mostly developed, are considered first for placement of needed development. Many developed areas at MCAS Miramar occur adjacent to sensitive natural resource areas, which are taken into consideration when planning and conducting activities. Further, some isolated, high value natural resources (*e.g.*, vernal pool habitat, California gnatcatcher habitat) occur within Level V MAs, which also require appropriate management and conservation considerations.

5.2.2 General Requirements for All Areas

Many actions at MCAS Miramar require prior consultation with, and approval by, the Environmental Management Department and other cognizant departments. The Environmental Management Department determines the type and level of regulatory agency coordination and permitting that is required. Refer to project planning guidance in Chapter 6 for more detailed information. These general requirements reflect MCAS Miramar's strategy to take site-specific measures to provide special protection to isolated sensitive

resources regardless of MA designation. General requirements for all areas include, but are not limited to, the following:

- Actions with the potential to affect the environment require NEPA compliance with MCO 5090.2 (Chapter 12), Station Order 5090.2, *Standard Operating Procedures for National Environmental Policy Act (NEPA) Compliance*, and Chapter 11, *National Environmental Policy Act (NEPA) Compliance* in Station Order 5090.4, *Environmental Compliance Program Standard Operating Procedures (ECPSOP)*.
- Actions with the potential to affect natural resources require compliance with MCO 5090.2 (Chapter 11) and Chapter 10, *Natural Resources Management* in Station Order 5090.4, *Environmental Compliance Program Standard Operating Procedures (ECPSOP)*. Particularly important are actions that may affect federally-listed plant or animal species, wetlands, riparian areas, general soil and vegetation sustainability, and other rare and protected species.
- When planning to locate new facilities or concentrated military operations in or adjacent to MAs supporting large concentrations of threatened and endangered species habitat or wetlands (Levels I, II, and III MAs), effects of such actions on those resources must be evaluated. This is particularly important when considering actions in smaller areas rated as Level I and II MAs.
- Public Works Division site approval is required for all facilities-related activities, including, but not limited to, development, reconstruction, repairs, utilities, leases, and easements. Holders of existing licenses, leases, and easements are not required to obtain Public Works site approval to exercise rights granted under existing documents. For ground operations and training, the Training Area Management Office must be contacted.
- The Training Area Management Office of Station Operations (S-3) manages military ground operations and training in coordination with the Environmental Management Department. Military operations are usually considered compatible if they do not affect species protected under the ESA, wetlands, or cultural resources. Activities that are unique, unusual, or inconsistent with environmental protection measures of the Station Range and Training Area Regulations (Station Order 3500.2A) are reviewed and evaluated.
- Unless it is an emergency, no animals may be killed without prior approval from the Environmental Management Department coordinated with the Natural Resources Division staff. Activities that may affect birds, their nests, and/or eggs may require a Migratory Bird Treaty Act permit from the USFWS, which needs to be coordinated through the Environmental Management Department.
- Actions that result in the possible introduction of hazardous material and actions to clean up accidental spills into a non-contained area must be approved by the Environmental Management Department. Any action that involves the use of hazardous substances in areas not designed for containment of these substances must be coordinated through the Environmental Management Department.
- Guidance on posted environmental protection signs and fencing must be followed.
- Actions that will dredge, fill, or damage a wetland (including vernal pool habitat) may require prior CWA permitting from the U.S. Army Corps of Engineers and Regional Water Quality Control Board, pursuant to sections 401 and 404 of the CWA. Permitting actions and/or consultation with regulatory agencies are coordinated through the Environmental Management Department.
- Actions that may affect a threatened or endangered species require prior consultation with, and the approval of USFWS pursuant to Section 7 of the ESA. Consultation with regulatory agencies is coordinated through the Environmental Management Department.
- Consideration should be given to effects of proposed actions on wildlife movement corridors, especially those in the western portion of the Station, which are already highly constrained (see Chapter 4).

- Consideration of the preservation requirements of the National Historic Preservation Act must be addressed with the California Office of Historic Preservation through the Environmental Management Department.

5.2.3 Actions Programmatically Compatible with Natural Resource Conservation

The following activities are considered programmatically compatible with natural resource conservation and do not require MCAS Miramar, Environmental Management Department, Natural Resource Division review. However, other Station approvals, such as from the Training Area Management Office, Public Works site approval, and NEPA compliance, may be required. Reviews are used to ensure that the general requirements for all areas (Section 5.2.2, *General Requirements for All Areas*) are met prior to conducting the following activities:

- operation and use of developed facilities where no new natural resource damage occurs;
- foot and vehicle traffic on existing roads, fuelbreaks, approved trails, and developed sites;
- off-road foot traffic in Level II MAs between 1 September and 14 February; and in Level III, IV, and V MAs all year;
- minor ground disturbance in Level IV and V MAs, when wetlands are not involved (*e.g.*, fighting holes), except where specifically marked out in the field;
- the use of blanks, smoke (smoke grenades only), and simulated IEDs/artillery explosions, with approval from the MCAS Miramar Fire Department, in Level IV and V MAs all year and Level II and III MAs between 1 September and 14 February; where smoke is used, it will be only authorized in previously cleared areas, such as roads, fuelbreaks, or other developed sites;
- aircraft operations at more than 300 feet above ground level and take-offs and landings at designated sites (includes use of and transit to and from Confined Area Landing, Mountainous Area Landing, and Heavy Lift sites);
- aircraft operations below 300 feet above ground level in Level IV and V MAs year-round and in Level I, II, and III MAs between 1 September and 14 February;
- undeveloped site landings in Level IV and V MAs year-round;
- maintenance activities where disturbance and activities occur entirely on developed or heavily disturbed sites except where vernal pool habitat occupied by endangered species is involved;
- maintenance activities in Level IV and V MAs, when wetlands are not involved and appropriate recontouring and seeding is done with seeding mixtures approved by Environmental Management Department, Natural Resources Division;
- pesticide (including herbicides, rodenticides, miticides, and fungicides) application in Level V MAs and all developed facilities and maintained landscaping in accordance with product labels and use guidelines;
- routine invasive plant and weed control throughout the Station, managed by the Natural Resource Division;
- activities exercising existing rights granted by licenses, leases, and easements, because such activities would have applicable conservation provisions included as a part of the existing real estate documents when originally issued, subsequent modifications, or applicable regulatory permitting requirements (the Natural Resources Division regularly shares resource information with these tenants); and
- additional compatible actions as identified in future revisions of this INRMP.

5.3 MCAS Miramar's Regional Conservation Contribution

Miramar is located within a regional Multi-Habitat Planning Area (MHPA), more specifically The City of San Diego's Multiple Species Conservation Program (MSCP), whose approach to conservation is to establish permanent MSCP preserves within the MHPA (Figure 5.3). Portions of the MSCP planning area

outside of the MHPA that have not been identified for preservation are open to development because they have been mitigated by conservation inside the MHPA. This is a different conservation approach to that taken by MCAS Miramar. The Station is not a signatory to the MSCP or within any part of the MHPA, but the Station contributes to their conservation goals through the INRMP.

The entire Station is managed to support military readiness requirements. However, regional conservation values are also important considerations. MCAS Miramar recognizes the value of conserving natural resources, both locally and regionally, on the Station. Through maintaining open space for military operations, MCAS Miramar maintains important wildlife corridors and habitat linkages (Section 4.5, *Wildlife Linkages and Wildlife Corridors*); populations of rare, threatened, and endangered species (Section 4.6, *Federal Special Status Species* and Section 4.7, *Other Species of Regional Concern*); and other natural resources (Chapter 4.0, *Biological Resources,* in general). These military land-use considerations, coupled with MCAS Miramar's management and conservation measures (Chapter 7, *Natural Resources Management*), result in the Station continuing to make a significant contribution to the conservation of the region's natural resources.

MCAS Miramar's commitment to conserve high value natural resources is reflected in vernal pool and special status species habitat within Level I, II, and III MAs (Table 5.1). The delineation of MAs is intended to focus conservation and management efforts. The distribution of vegetation and landcover types relative to MAs is reported in Table 5.2. This table clearly indicates the value, in terms of acreage, of the Station's open space and associated vegetation/landcover types.

As Figure 5.3, combined with Table 5.2, shows, MCAS Miramar with its relatively naturally functioning ecosystems, plays a very important role in maintaining such ecosystems within the region affected by the MHPA and its MSCP.

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Figure 5.3. Multi-habitat Planning Area for the Multiple Species Conservation Program Study Area

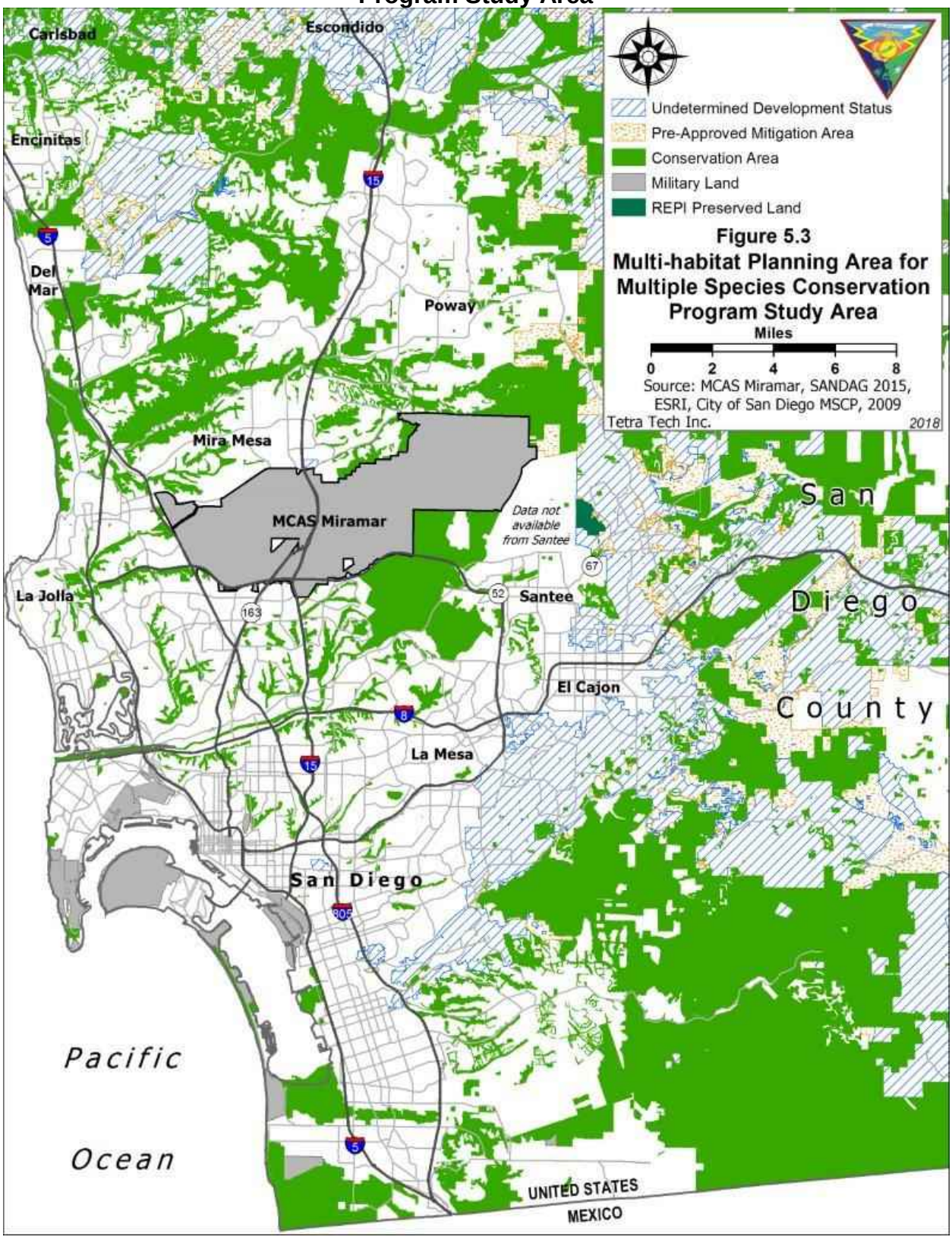

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Table 5.2. Vegetation and Landcover Types by Management Area

Vegetation/Landcover Type	Management Area Level (acres)					2016 Totals
	I	II	III	IV	V	
Buckwheat Scrub	473.3	1,180.4	204.9	490.1	95.4	2,444.1
Sage and Sagebrush	80.8	765.8	162.1	858.7	48.6	1,916.0
Other Upland Scrub	204.3	600.0	397.8	659.3	119.0	1,980.5
Ceanothus Chaparral	9.9	782.3	183.3	1,847.2	42.7	2,865.5
Chamise Chaparral	925.8	1,661.4	473.6	2,800.7	257.4	6,118.9
Scrub Oak Chaparral	61.5	194.0	87.6	317.1	21.9	682.1
Other Chaparral	1.9	80.3	33.5	89.3	1.7	206.9
Grassland	757.7	215.3	77.2	325.4	100.5	1,476.0
Riparian Scrub	0.0	26.3	0.1	0.0	1.4	27.9
Riparian Woodland	2.1	194.8	41.4	9.1	4.5	251.9
Freshwater Marsh	2.0	17.9	3.4	3.0	0.0	26.4
Non-Native Tree	6.5	16.8	1.8	23.6	3.0	51.7
Disturbed	24.8	24.9	10.2	28.1	15.7	103.7
Developed	132.7	137.6	63.4	407.4	4,146.1	4,887.2
Grand Total	**2,683.3**	**5,897.9**	**1,740.4**	**7,859.0**	**4,858.1**	**23,038.7**

A comparison of sage and sagebrush scrub conservation on the Station with preservation goals of the MSCP provides a good example of the Station's commitment to regional conservation. Level I, II, and III MAs on the Station require special management and conservation attention when making land-use decisions. Collectively, these MAs encompass 53 percent of sage and sagebrush scrub on the Station. While these areas are not dedicated to preservation, regulatory and land use constraints, such as threatened and endangered species conservation, will prevent any substantial loss of habitat value from these areas.

This compares closely with conservation of the MSCP Multi-Habitat Planning Area (Figure 5.3), which plans to preserve 62 percent of similar vegetation types occurring within the Planning Area. Further, because MCAS Miramar has no specific plans to develop the remaining 47 percent of the vegetation type occurring in other MAs, a portion of this will be conserved due to operational requirements for open space and safety considerations. MCAS Miramar's natural resource management, as outlined in this INRMP, will ensure that Station lands continue to support regional conservation efforts. MCAS Miramar recognizes that degradation of the land degrades its use for realistic training, and thereby degrades readiness.

The 409-acre Lakeside Downs REPI acquisition project relieves restrictions to on-installation military operational land-use by conserving threatened coastal California gnatcatcher habitat beyond the Station boundary with in-perpetuity management. The property has high quality and regionally rare coastal scrub habitat and is occupied by the federally threatened coastal California gnatcatcher and a federal candidate for listing, the Hermes copper butterfly. The Lakeside Downs property has supported up to 13 breeding territories of coastal California gnatcatcher. Conservation of this property significantly contributed to the regional California gnatcatcher metapopulation and subregional MSCP preserve design and function.

Sage and Sagebrush Scrub Natural Resources Division

An important difference between the MSCP and an INRMP is that participants in the MSCP process receive authorization from the USFWS to incidentally take species protected under the ESA in exchange for dedicating land to preservation. There has been no commitment by this agency to extend such authorizations to MCAS Miramar through implementation of this INRMP. Additionally, no "safe harbors" agreements are being provided by the INRMP. As detailed in Chapter 6, MCAS Miramar is required to obtain incidental take permits for future proposed actions that may affect species protected under the ESA.

Also, the goals of the two processes are fundamentally different. The primary goal of the INRMP is to support military readiness requirements while the MSCP seeks to conserve biodiversity in the MSCP Area and achieve certainty of conservation in the land development process for both private and public sector projects. MCAS Miramar lands cannot be set aside as permanent environmental preserves due to DoD requirements to maintain the flexibility to adapt the defense mission to political and technological developments. Accordingly, MCAS Miramar may participate in off-station conservation banks and recovery credit systems, and off-site mitigation may provide a preferred alternative to meet species protection and recovery to meet future mission requirements (DoD Instruction 4715.03 Enclosure 3, para. 1.f(3)&(4)). Habitat enhancement or restoration may also be an acceptable means for mitigating mission impacts to listed species (DoD Instruction 4715.03 Enclosure 3, para. 1.f(4)); however, due to the need to provide for long-term conservation of habitat mitigation sites, on-station mitigation shall only be done where operationally compatible and essential to supporting the mission. Even though MCAS Miramar is precluded from establishing permanent environmental preserves, the Station makes a significant contribution to conservation of regionally important natural resources.

In terms of MCAS Miramar's relation to regional planning, it must also be recognized that the Station cannot be used for mitigating impacts of actions that do not support the mission of MCAS Miramar (DoD Instruction 4715.03, Enclosure 3, para. 1.f(4)), such as those occurring within portions of the MSCP planning area. MCAS Miramar will not accept an unequal or disproportionate burden for conservation of species unless .... *it is required by legal authority or it has been expressly determined that it is in the DoD's best interest.*

Shearer *et al*. (2005) developed potential future scenarios to evaluate ecological interrelationships

associated with human population growth of 500,000 and 1,000,000 in watershed regions between Marine Corps Base, Camp Pendleton and MCAS Miramar. The potential habitat modeled for all of the 10 regionally rare, threatened, or endangered species studied predicts that Marine Corps and Navy installations of the study area would assume an equivalent or larger percentage of the total potential habitat. The study highlights that habitat conservation beyond boundaries of existing large federal, state, and local lands, and particularly Department of Defense lands, is very important for the conservation of regional biodiversity. Further, it illustrates how off-installation land use change can impact on-installation natural resource conservation management and suggests that environmental concerns may bring additional or stricter regulations that may limit the use of military installations needed to maintain military readiness. Actions to preserve off-installation habitat for sensitive species can benefit the Station by reducing this on-station conservation pressure.

California's Wildlife Action Plan (CDFW 2015) identifies species and habitats of greatest conservation need, major stressors affecting native wildlife and habitats, and actions needed to conserve wildlife throughout California, including within the South Coast Province, where MCAS Miramar is located. One of the main Conservation Strategies used in the Wildlife Action Plan is the use of land acquisition, easements, and leases as a method to conserve these species and habitats.

Stressors affecting wildlife and habitats identified within the Wildlife Action Plan for the South Coast Province are: 1) housing and urban areas, 2) invasive species, 3) recreational activities, 4) annual and perennial non-timber crops, and 5) climate change. MCAS Miramar has these stressors to one degree or another. Chapter 7 of this INRMP specifically identifies actions and projects that contribute to the minimization of these stressors. Implementation of California's Wildlife Action Plan and this INRMP are mutually beneficial to California wildlife and habitats.

Following the Wildlife Action Plan, land acquisition by MCAS Miramar would provide habitat for wildlife species at risk, have sensitive plant species and vernal pools, and serve as wildlife corridors for the region. Conserving adjacent lands to the Station will benefit biodiversity in the region. Such protection would both support the goals of the Wildlife Action Plan and buffer MCAS Miramar from development that may not be compatible with the Station's military mission. Wildlife Action Plan implementation would identify suitable mitigation opportunities beyond installation boundaries. Implementation of this INRMP would minimize some stressors to wildlife and its habitats identified in the Wildlife Action Plan. Encroachment partnering through initiatives such as the DoD REPI program (see Section 6.2.4) offers an excellent opportunity to meet the goals of both the Wildlife Action Plan and this INRMP.

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6.0 PROJECT AND MITIGATION PLANNING

This chapter addresses project and mitigation planning at MCAS Miramar relative to natural resources. This guidance is intended to be used by persons planning and/or preparing Station approvals, projects, management actions, orders, instructions, standard operating procedures, other plans, and NEPA documentation. This will assist such persons in the integration of natural resource issues with their planning and decision-making process. The project planning section presents regulatory compliance requirements as they relate to natural resource concerns. The section on mitigation planning defines mitigation, explains the MCAS Miramar approach to mitigation, briefly describes existing mitigation commitments, and presents information for mitigation planning at MCAS Miramar.

This planning and mitigation guidance is provided for application to new projects, activities, and Station authorizations being processed by the Station. This guidance is not intended to be applied retroactively to activities and actions for which environmental planning and resource agency authorizations have already been completed, such as NEPA documentation and Endangered Species Act Section 7 Biological Opinions or Section 404 Clean Water Act Permits.

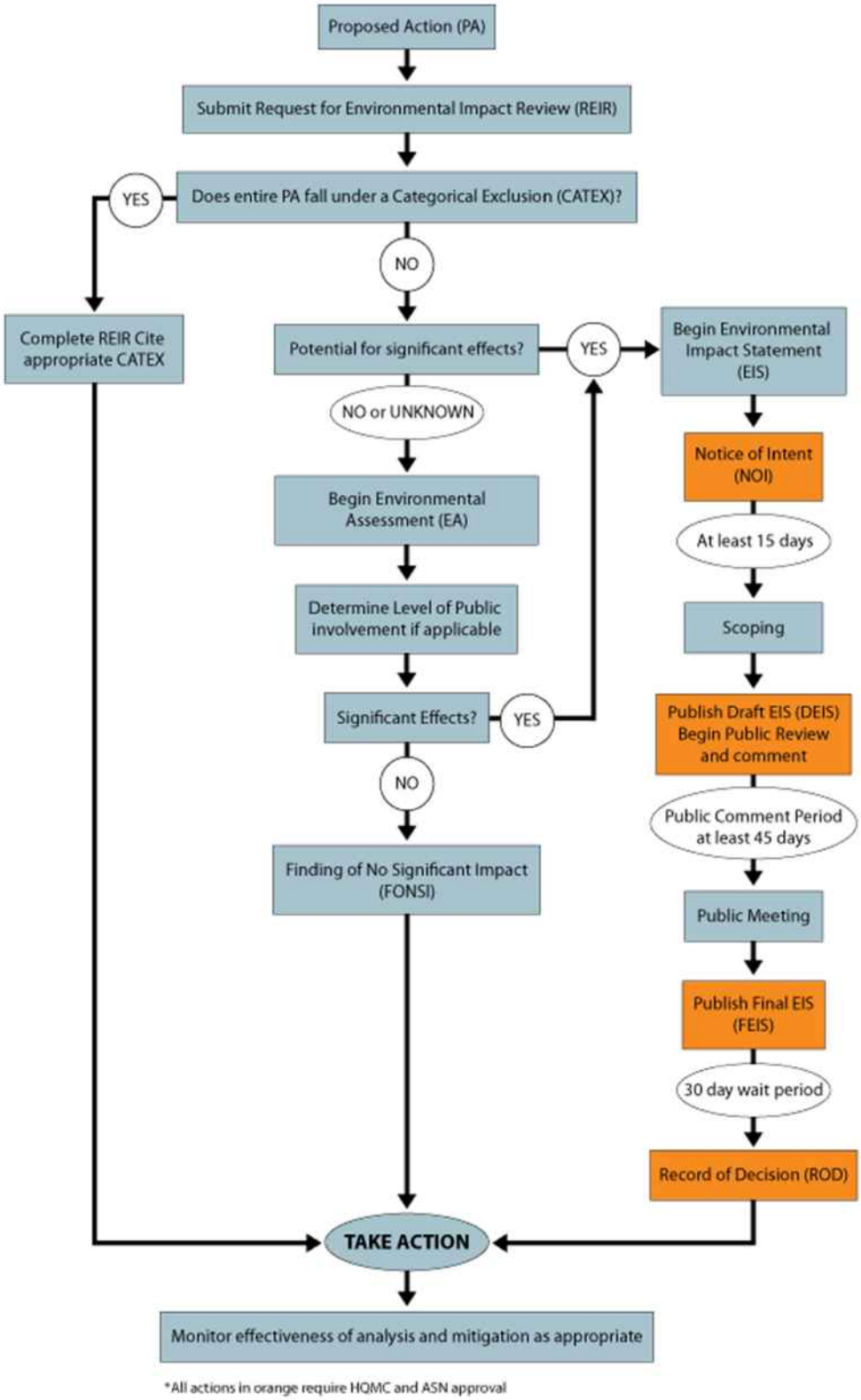
6.1 Project Planning

6.1.1 National Environmental Policy Act Considerations

NEPA requires federal agencies to assess, in detail, potential environmental impacts of their actions that could significantly affect the quality of the environment. At MCAS Miramar, the Environmental Management Department administers NEPA planning and ensures that NEPA compliance is accomplished in consultation with legal counsel. Department of Navy and Marine Corps policies require action proponents to fund and ensure completion of NEPA planning and other necessary documentation for their proposed actions, such as construction, maintenance, land development, leases, and easements (SECNAVINST 5090.6A; MCO 5090.2, Change 3, Chapter 12; *Marine Corps NEPA Manual* (Headquarters Marine Corps 2009); Miramar Station Order 5090.4).

NEPA is intended to help decision-makers make informed decisions based on an understanding of environmental consequences and take actions that protect, restore, and enhance the environment. Agencies are to use a systematic, interdisciplinary approach that integrates natural and social sciences and environmental design. While NEPA requires consideration of more than the natural environment, NEPA provides planners with a process (Figure 6.1.1 [Headquarters Marine Corps 2009]) to identify and initially assess natural resource issues requiring compliance. Additional information on the NEPA process and the guidance for evaluating impacts to natural resources on MCAS Miramar is included in Appendix A.

Figure 6.1.1. NEPA Process Chart



6.1.2 Other Natural Resources Specific Compliance Considerations

NEPA cannot be finalized (*i.e.*, publication of final Environmental Impact Statement or signing a Finding of No Significant Impact) until "*all consultation and authorization processes required by law, including but not limited to, those set out in the Endangered Species Act, …, Migratory Bird Treaty Act, Coastal Zone Management Act, Clean Air Act, are complete*." (Memorandum for Chief of Naval Operations and Commandant of the Marine Corps, *Supplemental Policy Guidance to SECNAVINST 5090.6A for Consultations and Regulatory Coordination*, May 6, 2009, Assistant Secretary of the Navy [Installations and Environment], Washington, DC). This guidance was further clarified by the Commandant of the Marine Corps (*Supplemental Policy Guidance to SECNAVINST 5090.6A for Consultations and Regulatory Coordination*, July 27, 2009).

As part of project planning at MCAS Miramar, careful consideration will be given to project siting relative to Management Areas (MAs). This effort will support the Station's overall conservation strategy of minimizing the development of areas supporting high densities of predominantly vernal pool habitat, threatened or endangered species, and other wetlands (*i.e.*, Level I, II, and III MAs). Benefits of this strategy are reduced delays in project approvals (consultation timelines may be eliminated or minimized) and decreased costs (mitigation requirements may be minimized).

Two major considerations relative to potential impacts on Special Status Species (as defined in this INRMP) and wetlands are compliance with the Endangered Species Act and Clean Water Act. Requirements of these two acts are summarized in Appendix A to facilitate consideration early in the planning process at MCAS Miramar. In addition, Appendix A also summarizes the Migratory Bird Treaty Act and requirements and exemptions applicable to military services.

6.2 Mitigation Planning

Mitigation, as discussed here, is lessening adverse effects an undertaking may cause relative to natural resources. Mitigation can include the following actions (DoD Instruction 4715.03; Definitions):

- avoiding the effect altogether;
- limiting the magnitude of the action;
- repairing, rehabilitating, or restoring the affected resource;
- reducing or eliminating the effect over time by preservation and maintenance operations during the life of the action; and/or
- compensating for the effect by providing substitute resources or environments.

In general, regulatory agencies' preferred order of performing mitigation is avoidance, then minimization, then compensation. For compensation, the latest DoD Instruction 4715.03 and the *Presidential Memorandum: Mitigating Impacts on Natural Resources from Development and Encouraging Related Private Investment* to the Secretary of Defense, Secretary of Interior, Secretary of Agriculture, Administrator of the Environmental Protection Agency, and Administrator of the National Oceanic and Atmospheric Administration (November 3, 2015), state that agency policies should seek to encourage, and give preference to, advance compensation mechanisms, including mitigation bank-based approaches.

Mitigation proposed for a specific impact will be addressed on a case-by-case basis. Mitigation requirements shall be planned for, funded, and implemented as part of the proposed action by the action proponent (MCO 5090.2 para. 12306). Generally, mitigation requirements in compensation for impacts by non-military actions on MCAS Miramar will be accomplished off-Station. Further, the Station lands cannot be used for mitigation credits by non-DoD entities (DoD Instruction 4715.03).

One typical form of mitigation is restoration of disturbed areas to compensate for lost resources (as noted above). Restoration of disturbed areas is one of the few means of creating additional habitat for Special Status Species, such as the Coastal California Gnatcatcher, on MCAS Miramar. Methods used to restore disturbed areas include soil stabilization, irrigation, inoculating with mycorrhizal fungi, planting/seeding of native plants, prescribed burning, imprinting, and invasive species control. Techniques may involve ripping and cultivating, transplanting, mulching, soil additives, plant fencing, erosion wattles, water-holding devices and other newer technologies. Any restoration plan would contain a monitoring schedule, as well as performance standards (success criteria). As with other mitigation, early involvement of resource agencies is important. Regulatory agency approval of restoration/mitigation plans is usually required as a condition of ESA and CWA permit approvals.

Careful consideration will be given early in the planning process to the siting of proposed actions and potential compensating mitigation relative to MA designations (Chapter 5). As part of MCAS Miramar's ongoing efforts to avoid and/or minimize impacts on Special Status Species, vernal pool habitat, other wetlands, and constrained regional habitat linkages, first consideration for siting construction projects and new activities will be given to the use of Level V, then Level IV MAs (see Figure 5.1). Locating suitable mitigation sites on MCAS Miramar that will not conflict with military operation requirements is becoming increasingly difficult. Compensating mitigation actions will first be considered for siting in Level I and II MAs or preferably using off-Station conservation and mitigation banks or in-lieu fee programs.

Restoration of habitat on-station effectively puts restored habitat sites "off limits" to most military operational activities. Use of off-Station mitigation opportunities do not restrict on-Station land uses by creating additional "sensitive habitat" and such opportunities are often more cost effective when considering indirect, as well as, direct costs. DoD Instruction 4715.03 and the Presidential Memorandum dated November 3, 2015, now authorize and encourage the use of conservation and mitigation banks off installations. Off-station mitigation shall be the preferred approach where these opportunities exist and these shall be considered early in the planning process.

Persons planning and/or preparing mitigation actions need to be aware that military lands cannot be set aside as permanent environmental preserves. The DoD and the Marine Corps in particular (Section 2.2, *Overview*), must maintain the flexibility to adapt its defense mission to political and technological developments (DoD Instruction 4715.03). Nevertheless, resource agencies providing authorizations or permits require mitigation projects to have long term conservation protections and management. Subsequent incompatible use of mitigation sites requires additional compensation for lost resources with agency approval.

The following briefly describes ongoing mitigation and presents mitigation planning information.

6.2.1 Mitigation Actions

Some projects and/or operations at MCAS Miramar result in damage to natural resources that cannot be avoided through planning and minimization efforts. Mitigation is an important part of these projects. Figure 5.1 identifies sites used for mitigation actions, and specific location mapping can be found in final restoration reports and the associated GIS data layer. Mitigation commitments that require continued active management on MCAS Miramar include the following items.

- West Coast Basing of MV-22 Osprey at MCAS Miramar committed to compensation for the loss of vernal pool wetland habitat supporting San Diego fairy shrimp (0.11 acres), coastal scrub vegetation (2.2 acres), and ephemeral streambed and associated wetlands (0.27 acres) (2009 Department of the Navy, Notice of Record of Decision, West Coast Basing of the MV-22 Aircraft; ESA Biological Opinion FWS-MCBCP-08B0678-09F0860; U.S. Army Sec. 404 CWA Permit

SPL-2013-01147-PJB). The coastal scrub vegetation mitigation was compensated through purchase of credits from the Daley Ranch conservation bank off-station. The vernal pool mitigation site is located between Kearny Villa Road and Interstate 15, and north of State Route 163. A total of 17 vernal pools were established within the restoration area, with a combined surface area of approximately 0.41 acre. The streambed and wetland mitigation site is located in San Clemente Canyon and included the restoration of 0.28 acre of stream and 0.20 acres of wetland habitat. The fourth year of maintenance and monitoring was completed for both projects in 2016 (NAVFAC SW 2016).

In addition to the above, planning has begun for mitigation associated with the Joint Strike Fighter F-35 stationing at MCAS Miramar and a vernal pool advance mitigation program.

Mitigation commitments already undertaken by the Station include:

- Establishment of 0.443 acre and enhancement of 0.067 acre of vernal pool habitat at the Miramar National Cemetery for the Miramar National Cemetery vernal pool restoration project (ESA Biological Opinion 1-6-06-F-4652.3; U.S; Army Sec. 404 CWA Permit SPL-2008-00970-PJB). A total of 37 basins, of which 33 are established basins and 4 are enhanced basins. Additional upland watershed restoration was also conducted at the vernal pool restoration site. Compensation for the loss of coastal scrub and coastal California gnatcatcher habitat was done through the purchase of off-Station credits by the Dept. of Veterans Affairs. Completed in 2016.
- Joint Regional Confinement Facility Southwest (Miramar Naval Consolidated Brig alteration and expansion), Navy (NAVFAC SW) purchased a permanent conservation easement for 8.9 acres of coastal scrub occupied by California gnatcatcher on the Sycamore Westridge Preserve of the San Dieguito River Park (reference ESA Biological Opinion). Completed in 2009.
- The Replacement of the Jet Fuel Underground Storage Tanks and Distribution System project involved the restoration of areas temporarily disturbed during construction, including enhancement of surrounding habitat and compensation for the loss of coastal California gnatcatcher habitat with restoration of 7.2 acres of coastal scrub habitat in the Eastgate Mall parcel of the Station (reference ESA Biological Opinion 1-6-06-F-4755.2). Completed in 2008.
- Replacement of Engelmann oak trees at a 5:1 ratio in San Clemente and West Sycamore canyons to compensate for impacts from the construction of the Rifle/Pistol Training Range Complex at MCAS Miramar (reference EA/FONSI, 22 June 2001). Completed in 2001.
- Restoration of 0.50 acres of vernal pool habitat for impacts to San Diego fairy shrimp to compensate for maintenance, improvement and use of existing roads, lots, driveways, and loading docks at MCAS Miramar (reference ESA Biological Opinion 1-6-99-F-64); restoration work was completed in the Miramar Mounds National Natural Landmark area. Completed in 1999.
- Restoration of 0.6 ac of coastal scrub vegetation (*Artemisia californica* Alliance or *Eriogonum fasciculatum-Baccharis sarothyroides* Alliance) within the southeastern corner of the Flightline Area to compensate for impacts associated with repair and widening of Ammunition Road (reference ESA Informal Consult letter 1-6-98-I-32). Completed in 1999.
- Mitigation obligations relative to impacts from the Realignment of NAS Miramar to MCAS Miramar, as described in the 1995 BRAC EIS (Ogden 1996), U.S. Army Sec. 404 CWA Permit (95-20158-ES) Biological Assessment (Ogden 1995), and Biological Opinion/Conference Opinion (1-6-95-F-33) for the realignment (USFWS 1996a). Regarding mitigation for the realignment of NAS Miramar to MCAS Miramar, the primary form of mitigation was restoration of previously degraded sites. Habitat mitigation actions beyond impact avoidance and on-site revegetation included restoration of 87.5 acres of coastal scrub at the west end of the Flightline, 1.03 acres of riparian wetland habitat in lower Murphy Canyon on Station, and restoration of 9.4 acres of vernal pool habitat widely distributed throughout the Station. Completed in 1999.

- Restoration of 25 acres of land in the Eastgate Mall portions of the Station to obtain 20 acres of coastal scrub vegetation to compensate for loss of 20 acres off-station by the Eucalyptus Hills (Ridge) Navy Housing Development in Lakeside, CA (reference ESA Biological Opinion 1-6-93-F-33). Completed in 1993.

Restoration of Vernal Pool Habitat (MV22 Mitigation Action) *Natural Resources Division*

- Restoration of 0.4 acres of vernal pool habitat basin south of the Navy-Marine Corps Reserve Center that were damaged by tank training (reference ESA Biological Opinion 1-6-92-F-31). Completed in 1992.
- Creation of 8,250 square feet of vernal pool surface area and associated watershed in the northwestern portion of the Station (X1-3 Group) to compensate for vernal pools lost from construction of the West Coast Consolidated Brig (reference ESA Biological Opinion 1-6-87-F-34). Completed in 1987.

As a part of the mitigation for the 1995 BRAC ESA Biological Opinion and CWA permit, the Department of Navy also committed to preserving existing vernal pool habitat on a 1:1 basis on the Station. All vernal pools in the G Parcel (Vernal Pool Management Unit 6, Group AA4-7) are to be preserved in partial fulfillment of the realignment action preservation commitment. The remaining mitigation commitment of 1.14 acres was met by preserving 1.14 acres of the 1.78 acres of vernal pools located south of State Route 52 (Vernal Pool Management Unit 9, Groups U-15, U-19, and F16-17) to minimize effects on military activities on MCAS Miramar.

It is important to note that with the exception of the BRAC commitment to preserve vernal pools at a ratio of 1:1 (prior to DoD Inst. 4715.03), no other mitigation commitments made for resource impacts have committed to permanent preservation of restoration sites. While this is the case, regulatory agency expectation is that all compensatory mitigation projects will have long-term conservation. Compensating mitigation sites should be treated as though they have reached their restoration success criteria if ever considered for a use that would be incompatible with conservation of the resource. The final rule for Compensatory Mitigation For Losses of Aquatic Resources (FR 73:19594 of 10 Apr 08) authorized by Clean Water Act permits requires that mitigation sites receive long-term management and protection. As

an example, the CWA permit conditions associated with the MV-22 In-Line Fueling Facility specifically address this requirement.

A Finding of No Significant Impact was signed in August 2015 to establish and manage mitigation areas at MCAS Miramar to compensate for impacts to federally listed vernal pool species and/or jurisdictional areas. A site-specific plan and crediting agreement with the USFWS and ACOE will also be developed. These mitigation areas may include a formal joint ESA and CWA conservation/mitigation bank, in-lieu fee mitigation program, or advance mitigation.

6.2.2 Mitigation Planning Guidance

This section provides **guidance for persons responsible for planning** construction, facility maintenance, and other actions on MCAS Miramar that may adversely affect natural resources. This needs to be reviewed and incorporated into early stages of the planning process to avoid and minimize adverse effects and, if necessary, plan for compensation of lost natural resources regulated by federal law or are otherwise important to the natural ecosystem of the Station. Where adverse impacts to threatened and endangered species, their habitat, or wetlands are involved, planners must demonstrate that such impacts have been avoided and minimized to the maximum extent practicable prior to proposing an action that will adversely affect these resources. This must be demonstrated in relevant planning documents, such as Environmental Assessments, Biological Assessments, and Clean Water Act permit applications. Often, these will be presented as "conservation measures" or "mitigation measures" to be implemented as a part of the proposed action.

This guidance applies to all federal actions on MCAS Miramar lands. Entities exercising rights granted under existing license, leases, easements, or any other form of permission are expected to follow this guidance as a minimum standard and as Station policy, to the extent applicable. As new real estate documents are developed and modifications to existing permissions are prepared, this INRMP guidance will be reinforced.

This guidance outlines general requirements that would commonly be expected to result from regulatory consultation and permitting processes in support of a proposed action and should be viewed as a consistent starting point. Additional project-specific requirements and details that are appropriate for a proposed action cannot be provided with this guidance since such specifics must be tailored to each individual project.

This guidance does not replace planning, consultation, and conservation requirements discussed earlier in this chapter (6) and in Appendix A with respect to the National Environmental Policy Act, ESA, and CWA. Rather, the guidance is intended to help planners:

- evaluate environmental costs of siting facilities and actions;
- avoid impacts throughout the planning process;
- minimize construction delays due to seasonal timing constraints; and
- identify suitable mitigation for NEPA documents, biological assessments, and section 404 CWA permit applications.

On November 21, 2016, USFWS published a Notice of Final Policy in the Federal Register that announced revisions to their established Mitigation Policy, which has guided USFWS recommendations through the consultation process on mitigating the adverse impacts of land and water developments on fish, wildlife, plants, and their habitats since 1981 (USFWS 2016). The revisions are motivated by recent changes in conservation challenges and practices, including accelerating degradation of habitats and ecosystem function, spread of invasive species, epizootic disease outbreaks, effects of climate change, and advances in conservation science, as well as the substantially altered Federal statutory, regulatory, and policy context

of fish and wildlife conservation since 1981. In regards to the latter, this particularly relates to including the conservation of species that are listed as threatened or endangered under the ESA (expressly excluded from the 1981 Policy). The revised Policy provides a framework for applying a landscape-scale approach to achieve, through application of the mitigation hierarchy and informed conservation strategies, the goal of net gain or no net loss of resources and their values, services, and functions resulting from proposed actions. The revised policy integrates all authorities that allow the USFWS to issue mitigation recommendations and/or requirements, and serves as an umbrella under which more specific policies or guidance documents can be implemented in the future (USFWS 2016). Implications of this revised Policy on proposed MCAS Miramar projects would occur in mitigation decisions made by the USFWS during the coordination, consultation, and regulatory approval process.

Likewise, the U.S. Army Corps of Engineers and U.S. Environmental Protection Agency jointly published a Final Rule on April 10, 2008, governing permittee-responsible compensatory mitigation, mitigation banks, and in-lieu fee mitigation programs for activities authorized by permits issued by the Department of the Army (U.S. Army Corps of Engineers and U.S. Environmental Protection Agency 2008). This rule improves the planning, implementation, and management of compensatory mitigation projects (i.e., restoration, enhancement, establishment, and/or preservation) by emphasizing a watershed approach in selecting compensatory mitigation project locations, requiring measurable, enforceable ecological performance standards and regular monitoring for all types of compensation, and specifying the components of a complete compensatory mitigation plan, including assurances of long-term protection of compensation sites, financial assurances, and identification of the parties responsible for specific project tasks (U.S. Army Corps of Engineers and U.S. Environmental Protection Agency 2008). A follow-on Regulatory Program Standard Operating Procedure was implemented by the U.S. Army Corps of Engineers, South Pacific Division in 2012 (12501-SPD). 12501-SPD introduces a more detailed procedure for determining compensatory mitigation ratios, as required for Department of the Army permits under Section 404 of the Clean Water Act, Section 9 and 10 of the Rivers and Harbors Act, and Section 103 of the Marine Protection, Research, and Sanctuaries Act. Implications of this rule on MCAS Miramar would occur during the permitting process for projects that require Department of the Army-issued permits.

Mitigation costs are the responsibility of the action proponent as they are a cost of any proposed action (MCO 5090.2 para. 12306). Final mitigation details and requirements for a specific proposed action are determined during the NEPA and regulatory consultation and permitting processes. Project and construction planning must include timelines for regulatory processes and execution of mitigation. Mitigation may include seasonal timing limits on an action, or the start of an action. Additionally, substantial effort may be required to plan compensatory mitigation, either through purchase of off-Station conservation/mitigation credits/easements or restoration on-station at a site compatible with operations.

Definition of Terms

For the purposes of interpreting this planning guidance, the following definitions are provided.

Developed **-** Area that is devoid of naturally occurring vegetation or is maintained in a continuous state of disturbance displaying primarily disturbance adapted plant species or bare ground. It is usually paved, graded or landscaped, with little or no short-term potential for colonization and succession of native plant communities. This type may have other vegetation/habitat types and regulated resources immediately adjacent that must be considered, such as the disturbed vegetation type and wetlands. Additional information on developed areas can be found in Appendix C and in Section 4.2.14, *Developed*.

Disturbed Land **-** Areas where past or present physical disturbance (*e.g.*, grading, tilling, repeated vehicle use that has severely damaged plant root zones or removed above-ground plant cover) has caused the area to be covered by disturbance-adapted species or bare ground but have a potential to support native

vegetation if left undisturbed. Additional information on disturbed lands can be found in Appendix C and in 4.2.13, *Disturbed Habitat (Vegetation)*.

Growing/Breeding Season - The period within which active growth (plants) or breeding (animals) occurs. For wetlands, including vernal pool habitat and associated species, the growing/breeding season would occur during the rainy season or when the soil remains wet (about November through May, depending on annual precipitation). For other threatened and endangered species, the growing/ breeding season would generally be within the period of 15 February – 31 August. Conservation of migratory birds may warrant different project-specific timelines for different species as applicable.

Compensation (and "compensating") - Action that compensates for lost values and functions for the target resource by providing them at another site. Often accomplished by restoring a disturbed or degraded site but may also be accomplished by securing and permanently protecting resources off-Station. This may include conservation and/or mitigation bank credits or an in-lieu fee program for mitigation. More specific guidance is provided later in this section regarding the application of compensatory mitigation for MCAS Miramar projects.

Enhancement - Action that heightens, intensifies, or improves one or more habitat function. Improvement of a habitat can be made through such methods as weeding, invasive plant control, trash removal, protective marking or fencing, soil stabilization, reseeding, and/or supplemental planting with native plants. Typically, habitat enhancement is intended to occur on sites that are unsuitable for restoration (see below). Habitat enhancement may often be feasible on the same site that is restored to original condition, following a temporary impact, if the pre-impact condition is a disturbed vegetation type, or "disturbed land", and the goal is a higher quality end state. Enhancement is often undertaken for a specific purpose such as to improve water quality, flood water retention, or wildlife habitat. Enhancement work must be described in a plan, either in association with other restoration activities or separately. This plan must specify enhancement actions to be undertaken, anticipated benefits, and detailed, site-specific success criteria based on the needs of the Special Status Species involved. As much as is possible, planning for a specific proposed action should identify locations and site-specific enhancement methods and goals during biological assessment work.

Establishment - The development of a resource where it did not previously exist through manipulation of the physical, chemical, and/or biological characteristics of the site. Successful establishment results in a net gain in the desired habitat, plant, aquatic, or wetland community.

Restoration (and "restore") - Re-establishment of habitat values and functions (including soils, topography, hydrology, and key biota) in a plant, aquatic, or wetland community following some condition that caused severe degradation or loss of those on a site, for the purpose of returning natural or historic functions and characteristics. Evidence of the former existence of the target habitat on proposed restoration sites and connectivity to existing habitats are important factors to consider when selecting a restoration site. Restoration may be done on a recently disturbed site, such as that from a temporary construction action, or a site disturbed long ago.

Active Restoration Active restoration involves positive actions to improve soil stability, reduce erosion, establish vegetation, irrigation of establishing plants during dry periods, specifically controlling competing species, applying amendments if necessary, maintenance and monitoring, and applying adaptive management during changing conditions.

Passive Restoration Passive restoration may include any combination of revegetation techniques (*e.g.*, erosion control device installation, native seed sowing, appropriate invasive species control, etc.) to assist

open/disturbed areas revegetate in a naturally evolving manner with minimal active management following initial treatment. Sites should be checked periodically to ensure that invasive weeds are not invading, adequate soil protection is being realized, and that desired plants are becoming established at the site.

Revegetation - Action that focuses on the re-establishment of native vegetation after an area has been disturbed or degraded. This improvement involves seeding (manually by hand or by hydroseeding) and/or installing container plants or plugs. Sites should be revegetated to plant communities that existed prior to disturbance.

Where the pre-impact site condition was a disturbed vegetation type, "disturbed land", or developed, additional restoration actions may be feasible on area temporarily disturbed by projects to meet enhancement and/or compensation commitments.

Occupied Habitat - Land known to be occupied by a species of interest during at least some period of the year.

Permanent Habitat Loss - Conversion of land area where above-ground vegetation, seed bank, soil fertility and root zones are severely damaged/removed or soil is severely disturbed to the point that the area will not support species of interest. Return to the appropriate native landscape without extreme restoration activities (e.g., replacement of soil, total replanting and reseeding of the area, etc.) is unlikely.

Temporary Habitat Loss - A disturbance causing damage to a naturally vegetated area that can once again support naturally occurring vegetation following cessation of the disturbance. Often, temporary impacts occur in association with construction projects and can be restored following completion of the project. Temporary impacts can be restored actively or passively, although a substantial time and plant composition difference would result depending on which approach is performed.

U.S. Army Corps of Engineers Regulated Vernal Pool - A vernal pool as defined by the Regional General Conditions to the Nationwide Permits published in a U.S. Army Corps of Engineers Special Public Notice dated November 25, 1997. This Public Notice defines a vernal pool and lists indicator species for vernal pools. As a result of 2001 Supreme Court Decision[9], vernal pools that are isolated from navigable Waters of the U.S. may not be U.S. Army Corps of Engineers Regulated Vernal Pools.

Vernal Pools - Wetlands that seasonally pond in depressions as a result of a shallow, relatively impermeable layer (*i.e.*, clay or other impervious soil or rock layer) that restricts downward percolation of water. The dominant water source for vernal pools is precipitation with pools typically filling after fall and winter rains and evaporating during spring and summer. These seasonal ponds are fragile, easily disturbed ecosystems that provide habitat for indigenous, specialized assemblages of flora and fauna, including several species which are either proposed or already federally listed as threatened or endangered. It is important to differentiate between true vernal pools and other depressions that may seasonally pond water and support species typically associated with vernal pools (seasonally ponded features). The Natural Resources Division can provide assistance regarding identification of true vernal pools.

Wetlands/Waters of U.S. - Includes navigable waters (including intermittent streams), impoundments, tributary streams, and areas inundated or saturated by surface or ground water to the extent that they support vegetation adapted for growing in saturated soils (CWA regulatory discussion in Appendix A).

[9]Solid Waste Agencies of Northern Cook County (SWANCC) vs. the U.S. Army Corps of Engineers.

Instructions for Using this Guidance
This section provides only general guidance for mitigation. Clarification and additional detail are required for application to specific proposed actions. Project planners and contractors are expected to draw upon their internal resource specialists for detailing specific measures for a proposed action, which should then be verified with the Station Natural Resource Division.

Unplanned and unauthorized damage to natural resources regulated by the CWA and ESA can cause substantial project delays while supplemental authorization and permitting are obtained. There are special allowances for emergency situations in the regulations of NEPA, CWA, and the ESA. The definition of "emergency," however, is very narrowly written to address actions that could not be planned for in advance or required immediate response.

Tables 6.2.2a and 6.2.2b provide mitigation guidance for ***temporary*** and ***permanent*** habitat loss, respectively. These tables rely on information provided in other chapters of this INRMP. Management area boundaries are identified and described in Chapter 5 (Figure 5.1). Vegetation types, vernal pool habitat, and threatened and endangered species[10] are described in Chapter 4 along with maps showing the general distribution on the Station.

The following points are particularly important when planning mitigation.

- ***Mitigation plans involving a threatened and endangered species or wetland often require regulatory approval prior to project approval and implementation.***
- ***The quality of vegetation/habitat types affects compensation ratios for habitat impacts presented in Tables 6.2.2a and 6.2.2b.*** When degraded vegetation/ habitat types are involved, ratios should be adjusted to achieve an equitable compensation. Thus, a lower compensation ratio would be appropriate where high quality habitat or off-station habitat preservation is being offered for impacts to a degraded habitat and equivalent biological value to the target species or resource. Disturbed or degraded habitat that is demonstrated to be actively used by listed species should still be offset at a minimum compensation ratio of 1:1 to ensure no net loss of habitat. Important factors when evaluating biological value include density of target species, proximity to the coast (for gnatcatcher, in particular, proximity to the coast is closely tied to biological value), importance for habitat connectivity, and contribution to long term regional conservation plans, such as the MSCP.
- ***Differentiate between true vernal pools and other depressions that may look like vernal pools, such as road ruts, puddles, and ditches.*** The loss of ***true vernal pools*** must be mitigated at least on a 1:1 ratio to achieve "no net loss" of wetlands; however, regulatory agencies typically require higher mitigation ratios due to uncertainties of complete replacement of functions and values. Contact the Natural Resources Division regarding the identification of true vernal pools. Planners must be aware that some vernal pool-associated species, including five vernal pool-associated threatened and endangered species, do occur in puddles, ruts, and ditches that pond water during the vernal time of the year. In such cases, mitigation for the loss of endangered species habitat may be required for sites not considered to be true vernal pools.
- ***Data within this INRMP and its associated maps should not be used without additional field verification and up-to-date and detailed project site evaluation.*** These data are provided to help with initial planning. Before budgeting supplemental surveys, planners should contact the Natural Resources Division for the most up-to-date resource data.
- ***Sensitive habitats and species are more susceptible to damage or harassment during active growing and breeding seasons; therefore, contract timelines are extremely important.*** This is especially true where vernal pool habitat occurs in close proximity to other threatened and

[10] Do not rely exclusively on INRMP lists for these species as USFWS/CDFW/CNPS lists are updated regularly.

endangered species. As such, careful project planning and coordination with the USFWS are necessary to minimize overall effects of a proposed action to all resources involved. See definition of ***Growing/Breeding Season*** in *Definitions of Terms* earlier in this section. Action proponents and planners should consider these timeframes in early project development.

- ***Impacts to differing resources often can be phased or avoided through careful planning.*** For example, where impacts to vernal pool habitat can be avoided by careful conduct of activities, limitations on activities based on vernal pool habitat conservation needs would not apply while avoidance of other species sensitive periods could still apply. Where the conduct of activities cannot be planned to avoid these most sensitive periods, project specific authorizations and appropriate impact minimization measures should be planned for and expected from regulatory agencies.
- ***Identification of suitable sites for compensatory actions must be an early consideration when planning for impacts to natural plant communities and habitats.*** Authorizing resource agencies have specific requirements for siting compensatory mitigation actions. Usually for actions where habitat compensation is for permanent impacts, habitat restoration may only occur at degraded sites that would not naturally provide such resources in the reasonably foreseeable future. Suitable sites for permanent habitat compensation that do not infringe on operational requirements are becoming increasingly rare on MCAS Miramar. Compensation for habitat impacts shall be considered in areas beyond Station boundaries. DoD policy now encourages use of off-installation mitigation banks and credits stating that they "may provide a preferred alternative" (DoD Inst. 4715.03, Enclosure 3). Federal Clean Water Act mitigation requirements identify the use of approved mitigation banks as the most preferred alternative. Compensating mitigation requirements for impacts by non-DoD actions must be planned for off-station.
- ***Effects on future land use must also be considered.*** These "costs" can seriously affect the future flexibility of military mission accomplishment on the Station. As an example, if one acre is permanently lost and must be compensated for at a 2:1 ratio, the compensation would require two acres of habitat elsewhere. The two acres of compensation must then be treated as high habitat value whereas those acres previously had a very low habitat value, thus resulting in twice the amount of restricted acreage on Station.
- ***Costs of mitigating impacts to natural resources must be considered when evaluating proposed action alternative locations and planning for funding***. Mitigation is a part of the project that must be fully funded by the action proponent. Resource mitigation costs can be highly variable depending on specific details of the project (*e.g.*, extent of habitat impacts, type of habitat impacted, duration of impacts, habitat compensation site conditions, and technologies). Cost considerations for impact prevention during action implementation need to be accounted for, as well as habitat restoration and/or compensation (*i.e.*, biological monitoring, placing protective signs/fencing, sedimentation controls, etc.). Construction costs may be higher for an alternative or design that avoids impacts, however, total project costs may turn out to be lower when compensatory mitigation costs are included.
- ***CWA compensatory mitigation requirements must now be determined using the U.S. Army Corps of Engineers, Regulatory Program Standard Operating Procedure (12501-SPD).*** For determination of mitigation ratios associated with section 404 permits, this SOP provides guidance, checklists and worksheets needed to determine the compensatory mitigation requirements.
- ***Utilization of off-station opportunities for compensation or habitat created in advance that is "banked" is strongly encouraged as first option of consideration.*** These options, when available, do not result in the loss of military land use as would be the result of developing compensatory habitat or wetlands on the Station. DoD Inst. 4715.03 now encourages off-installation use of conservation and mitigation banks as a preferred alternative to on-installation mitigation. Any such proposals must be approved by the appropriate chain of command and applicable regulatory agency because this may warrant different mitigation ratios.

Concurrence from regulatory agencies is often required prior to finalizing mitigation plans. For initial planning of projects and actions, this guidance provides the best starting point for estimating mitigation requirements.

Table 6.2.2a. Mitigation Guidance for Projects with Temporary Impacts

Mitigation Trigger	T/E Species* Occupied	Required Impact Avoidance, Minimization, and Compensation**	T/E Species Consultation Required?	CWA Permits Required?
All Upland Vegetation Communities, Disturbed Areas, and Developed Areas	No	✓ Active restoration of any native habitat temporarily disturbed. ✓ Replace any damaged oak trees at a 5:1 ratio. ✓ Take action to minimize erosion and sediment laden stormwater runoff. ✓ Minimize temporary indirect impacts on adjacent habitat occupied by T/E species in accordance with the T/E species present. Compensatory mitigation may be required if impacts cannot be avoided to adjacent habitat occupied by T/E species.	No	No
	Yes	✓ All above actions, plus enhancement of the same habitat type as the occupied habitat at a 1:1 ratio if active restoration of project-disturbed vegetation is required. Impacts must be planned to occur outside of the breeding/active growing season.	Yes	No
Riparian Scrub, Riparian Woodland, Freshwater Marsh, and Drainages***	No	✓ Obtain and implement CWA Section 404/401 permits if area of impact is considered jurisdictional wetlands or waters of the U.S. Some restoration beyond the impact footprint may be required. ✓ Active restoration of any habitat temporarily disturbed. ✓ Replace any damaged oak trees at a 5:1 ratio. ✓ Take action to minimize erosion and sediment laden stormwater runoff. ✓ Minimize temporary indirect impacts on adjacent habitat occupied by T/E species in accordance with the T/E species present. Compensatory mitigation may be required if impacts cannot be avoided to adjacent habitat occupied by T/E species.	No	Yes (if CWA jurisdictional wetlands or Waters of U.S. involved)
	Yes	✓ All above actions, plus, enhancement of the same habitat type as the occupied habitat at a 1:1 ratio if active restoration of project-disturbed vegetation is required. Impacts must be planned to occur outside of the breeding/active growing season.	Yes	Yes (if CWA jurisdictional wetlands or Waters of U.S. involved)
Vernal Pool Watersheds and Basins^^	No	✓ Obtain and implement CWA Section 404/401 permits if area of impact is considered jurisdictional wetlands or waters of the U.S. Restoration beyond the impact footprint may be required. ✓ For true vernal pools, restore area of impact and enhance the surroundings to improve	No	Yes (if CWA jurisdictional Waters of U.S. involved)

Table 6.2.2a. Mitigation Guidance for Projects with Temporary Impacts				
Mitigation Trigger	**T/E Species* Occupied**	**Required Impact Avoidance, Minimization, and Compensation****	**T/E Species Consultation Required?**	**CWA Permits Required?**
		vernal pool function. ✓ Where possible, cover basin areas with metal plates or sheets of plywood to provide protection. ✓ Salvage vernal pool soil (plants, seeds, cysts, and soil) in the dry season prior to construction for restoration purposes. ✓ Take action to minimize decreases of water quantity, increases of sediment transport, and changes in water quality of the runoff to pool basins. ✓ No work in vernal pools during rainy season or when ground is wet (approximately 1 November to 1 June).		
	Yes	✓ If presence/absence of T/E species is not confirmed or T/E species are present, implement above required actions to include all basins supporting T/E species.	Yes	Yes (if CWA jurisdictional Waters of U.S. involved)
Breeding Season	Between 15 February and 31 August, minimize habitat-disturbing activities to nesting migratory birds. If disturbance of suitable nesting habitat cannot be avoided, conduct pre-activity surveys for nesting birds. If bird nests are located, maintain appropriate buffers as advised by the Natural Resources Division. Any additional requirements for threatened and endangered species must be implemented.			

*Federally listed species only.
**See text (Section 6.2.2, *Definition of Terms*). Mitigation ratios should be equitable with the quality of vegetation/habitat impacted. Project-specific update of vegetation and land cover mapping must be done prior to determining appropriate mitigation ratios.
***Contact MCAS Miramar Natural Resources Division for a determination whether CWA jurisdictional wetlands or waters of the U.S. are present.
^^Contact Natural Resources Division to assist with clearly documenting whether T/E species are in a vernal pool watershed and whether T/E species would be indirectly impacted by work in the watershed. Planners should also contact the Natural Resources Division regarding the identification of true vernal pools (vs. other seasonally ponded features) and whether they are CWA jurisdictional wetlands or waters of the U.S.

Table 6.2.2b. Mitigation Guidance for Projects with Permanent Impacts				
Mitigation Trigger	**T/E Species* Occupied**	**Required Impact Avoidance, Minimization, and Compensation****	**T/E Species Consultation Required?**	**CWA Permits Required?**
All Upland Vegetation Communities, Disturbed Areas, and Developed Areas	No	✓ Maintain a minimum width of 500 feet for wildlife movement corridors in Level I, II, and III areas. ✓ For impacts in Level I, II, III, and IV areas, implement habitat compensation for regionally rare native plant community types (e.g. sage and sagebrush scrub) at a 1:1 ratio targeting the same habitat elsewhere. ✓ Additional habitat compensation may be appropriate if significant impacts would occur to other sensitive species or plant community based on the NEPA analysis. ✓ Implement Temporary Impact Guidance, as applicable.	No	No
	Yes	✓ All above actions, plus compensation for occupied habitat lost at a 2:1 ratio.	Yes	No
Riparian Scrub, Riparian Woodland, Freshwater Marsh, and Drainages***	No	✓ Obtain and implement Section 404/401 permits if area of impact is considered jurisdictional wetlands or waters of the U.S. under the CWA. ✓ Implement compensation for the loss of wetlands or waters of the U.S. in accordance with ACOE SOP (12501-SPD) for determining CWA sec. 404 compensatory mitigation requirements. Expect a mitigation ratio of 2 to 5:1.	No	Yes (if CWA jurisdictional wetlands or Waters of U.S. involved)
	Yes	✓ All above actions, plus compensation for occupied habitat lost at a 2:1 ratio (habitat compensation may concurrently meet wetland mitigation requirement).	Yes	Yes (if CWA jurisdictional wetlands or Waters of U.S. involved)
Vernal Pool Watersheds and Basins^^	No	✓ Obtain and implement Section 404/401 permits if area of impact is considered jurisdictional wetlands or waters of the U.S. under the CWA (in accordance with ACOE SOP (12501-SPD) for determining CWA sec. 404 compensatory mitigation requirements. Expect a mitigation ratio of 2 to 5:1. ✓ For non-jurisdictional true vernal pools, implement compensation of the same habitat type at a 1:1 ratio. ✓ When watersheds are affected but basins remain, take action to minimize decreases of water quantity, increases of sediment transport, and changes in water quality of the runoff to pool basins. ✓ Salvage vernal pool soil (plants, seeds, cysts, and soil) in the dry season prior to	No	Yes (if CWA jurisdictional Waters of U.S. involved)

Table 6.2.2b. Mitigation Guidance for Projects with Permanent Impacts				
Mitigation Trigger	**T/E Species* Occupied**	**Required Impact Avoidance, Minimization, and Compensation****	**T/E Species Consultation Required?**	**CWA Permits Required?**
		construction for restoration purposes. ✓ No work in vernal pools during rainy season or when ground is wet (approximately 1 November to 1 June).		
	Yes	✓ If presence/absence of T/E species is not confirmed or T/E species are present, implement above required actions plus compensation for occupied habitat at a 3:1 ratio (consider quality equivalency). This may also concurrently contribute to any required CWA mitigation requirement.	Yes	Yes (if CWA jurisdictional Waters of U.S. involved)
Breeding Season	Between 15 February and 31 August, minimize habitat-disturbing activities to nesting migratory birds. If disturbance of suitable nesting habitat cannot be avoided, conduct pre-activity surveys for nesting birds. If bird nests are located, maintain appropriate buffers as advised by the Natural Resources Division. Any additional requirements for threatened and endangered species must be implemented.			

*Federally listed species only.
**See text (Section 6.2.2, *Definition of Terms*). Mitigation ratios should be equitable with the quality of vegetation/habitat impacted. Project-specific update of vegetation and land cover mapping must be done prior to determining appropriate mitigation ratios.
***Contact MCAS Miramar Natural Resources Division for a determination whether CWA jurisdictional wetlands or waters of the U.S. are present.
^^Contact Natural Resources Division to assist with clearly documenting whether T/E species are in a vernal pool watershed and whether T/E species would be indirectly impacted by work in the watershed. Planners should also contact the Natural Resources Division regarding the identification of true vernal pools (vs. seasonally ponded features) and whether they are CWA jurisdictional wetlands of the U.S.

General Mitigation Requirement for All Actions

Many components of mitigation actions are common to most situations. The following mitigation measures should be planned for all proposed actions unless a determination can be made, in consultation with Natural Resource Division staff, that they are not appropriate.

- The first step in mitigation planning should be ***avoidance of impacts***. Once avoidance has been implemented to its fullest extent, remaining impacts should be minimized prior to consideration of off-site compensation. This must be the first step in the mitigation planning process because numerous regulatory authorizations require demonstration of maximum impact avoidance and minimization before authorization may be given (Appendix A).
- ***Indirect effects*** of a proposed action must be addressed when planning mitigation. Indirect effects have an impact at some point later in time. This may be the case where use and maintenance of a new facility is likely to have an adverse effect beyond the building "footprint" following construction. For example, landscape maintenance and concentrated human foot traffic at a newly constructed facility may damage resources that were avoided by construction of a building. Often, maintenance and safety considerations associated with new or re-utilized facilities are overlooked by planners and are not realized until use is implemented (e.g. clear zones and firebreaks). Another example occurs when a new facility displaces field training from sites traditionally used for exercises. Such considerations must be treated as part of the initial project and mitigated accordingly.
- ***Less tangible direct and indirect effects*** must be evaluated and mitigated as a part of proposed actions. A common issue with wildlife is noise associated with construction and subsequent use

that extends beyond the project footprint, particularly during the breeding season. With least Bell's vireos and California gnatcatchers, separation of at least 500 feet from active nests is often required if the breeding season cannot be avoided. Other examples include outdoor lighting that may require shielding, visual harassment by human activities and equipment operation, changes to wetland hydrology, and sedimentation from construction sites to wetlands. Often temporary effects that may result from construction are avoided by performing work outside sensitive breeding and growing seasons, as presented in this planning guidance. Other effects that are likely to have a longer or permanent adverse effect must be mitigated.

- ***Threatened or endangered species presence or absence determinations*** must be made using survey guidelines developed by the USFWS or other means acceptable to them. Where no such guidelines or protocols exist, surveys must be conducted by qualified persons (as defined below for biological monitors) using methods recognized and accepted in the professional consulting field. When making presence/absence determinations relative to a project, areas where indirect effects may affect species must also be surveyed. If a site is used by a species for some important part of their life cycle, it is considered occupied regardless of the presence of the species at any one time. Survey protocols have been developed for the California Gnatcatcher, Least Bell's Vireo, Quino checkerspot butterfly, and fairy shrimp.
- A ***biological monitor*** should be retained to educate workers, oversee and implement impact avoidance, minimization, and document impacts for all proposed actions that require active avoidance or will actually affect threatened or endangered species or wetlands (including vernal pool habitat), require active revegetation, or require habitat compensation. At a minimum, this individual must have: (1) a bachelor's degree with an emphasis in ecology, natural resource management or related science; (2) demonstrated local experience with the resource(s) involved; and (3) a good understanding of the regulations regarding wetlands and endangered species. For contracted actions, the biological monitor will work with the contracting officer's representative to stop work.
- Proposed actions must include requirements for ***impact avoidance and minimization measures*** as part of implementation of any proposed action. Measures, which should be considered as applicable, are worker environmental protection briefings, signs, markers, protective fencing, biological monitoring, erosion and sedimentation prevention, noise baffling, and temporary impact restoration. These should be included as part of the environmental protection plan for all standard operating procedures, work requests, and contracts during planning.
- ***Migratory birds*** and their nests are protected by the Migratory Bird Treaty Act and implementing regulations and orders. Planners must review proposed actions with regard to conduct of actions during the active breeding season (may be January-September) and project-caused loss of traditionally used nesting/roosting sites. Habitat clearing activities should be timed to avoid the breeding season to maximum extent practicable to avoid damage to active bird nests. Compensation for the loss of traditionally used nesting/roosting sites may be an issue for raptors and colonial nesters, such as herons. All contracts and work orders prepared for MCAS Miramar must include provisions in the Environmental Protection section that prohibit harming, damage, or destruction of active bird nests while requiring "work arounds" without incurring additional cost. The Natural Resource Division can provide contractual language that has been used for construction contracts on MCAS Miramar.
- ***Compensating mitigation*** on the Station should be planned to occur in level I, II, or III MAs if at all possible, in that order. Consideration of off-station sites shall be a preferred method since using those locations would not limit on-station flexibility. Site evaluations and approvals for compensation and enhancement must be initiated concurrently with proposed action planning. Ideally, compensating work should start concurrent with or before the action causing an impact.

All actions that require active habitat restoration, enhancement, and/or compensating mitigation should have an appropriate mitigation plan developed prior to implementation. Such plans must discuss site conditions, methods to be implemented, monitoring and maintenance (usually 5 years or more), success criteria, remedial actions if expected success is not being achieved, and reporting requirements. The plans must ensure that all applicable requirements of regulatory approvals are incorporated. Often, regulatory agencies require that they have an opportunity to review and approve plans where their authorization for resource impacts is provided. Regardless, review and approval of plans must be finalized through the Natural Resources Division on MCAS Miramar.

6.2.3 Vernal Pool Advance Mitigation Program

In 2015, MCAS Miramar prepared an Environmental Assessment for a Vernal Pool Advance Mitigation Planning project, which described six potential "Mitigation Areas" that could be used as part of a future mitigation/conservation strategy that reduces mitigation cost and agency permitting processes. The program would develop compensatory mitigation in advance for unavoidable impacts to federally listed threatened and endangered vernal pool species and Clean Water Act jurisdictional Waters of the U.S to support MCAS Miramar ongoing activities (maintenance, repair, and renovation) and new actions (such as adding new land uses, facilities, or training areas). The six areas included about 699 acres on the Station at sites deemed compatible with currently known operational requirements. This planning included coordination with the U.S. Army Corps of Engineers and U.S. Fish and Wildlife Service with both agencies being supportive of the concept. Because of the substantial disturbance that site restoration would involve, Section 106 National Historic Preservation Act consultation for undertaking restoration on all sites was completed with a determination that no historic properties would be affected.

While all six potential mitigation areas were evaluated in the Environmental Assessment and a determination that all could be approved for vernal pool wetland habitat development, a decision was made to focus on one area, Area Delta (128 acres located between I-15 and Kearny Villa Rd.), as a first candidate for developing advance mitigation. This area already has some vernal pools supporting multiple endangered species, the MV-22 basing vernal pool mitigation project, and many acres suitable for development of additional new vernal pools. A site specific vernal pool wetland habitat development plan, environmental condition of property assessment, and full draft prospectus were developed in August 2016 to support agency approvals (Leidos 2016).

Further progress has been delayed because of staffing requirements for all (USFWS, ACoE, and Station) to support F-35 Basing facilities development planning, consultation, and execution. When the F-35 construction projects have finished, NRD staff expects to re-engage work on this effort with the appropriate agencies. Funding has been programmed as a COLS 2 project to start initial habitat development work in 2022.

6.2.4 Planning Alternatives for Future Mitigation

Off-Installation Mitigation

Given existing constraints to land use at MCAS Miramar, the use of existing and/or creation of mitigation/ conservation banks off-Station as an option for meeting natural resources mitigation requirements shall be given serious consideration as a preferred approach. Participation in approved off-installation conservation/mitigation banks or in-lieu fee programs is encouraged as a preferred alternative to meet ecosystem goals and future mission requirements (DoD Inst. 4715.03, Enclosure 3). The primary objective of conservation and mitigation banking is to develop credit for habitat/wetland improvement, development, and long-term conservation that can be used, sold, or purchased as compensation for impacts elsewhere. However, while use of off-Station banks is encouraged, another option is to create conservation banks on

DoD owned-lands. However, selling, trading, or transferring credits to non-DoD entries is not allowed for conservation banks on DoD lands (DoD Inst. 4715.03, Enclosure 3).

In recent years, many large-scale conservation and mitigation banks have been established in California. With many conservation banks in operation or being established, San Diego County has opportunities (https://www.wildlife.ca.gov/Conservation/Planning/Banking/Approved-Banks) to provide off-Station mitigation (*e.g.*, Daley Ranch, Crestridge, Cornerstone Lands, and Pilgrim Creek Banks). In 2010, credits for unoccupied coastal sage scrub mitigation were purchased from the Daley Ranch Conservation Bank in Escondido to compensate for the loss of similar habitat on the Station.

Purchase of conservation easements can also provide a means for securing compensatory mitigation. In late 2009, the Naval Facilities Engineering Command Southwest (NAVFAC SW) completed purchase of an off-Station, perpetual and irrevocable, conservation easement for 8.9 acres of California gnatcatcher occupied habitat owned by the San Dieguito River Park Joint Powers Authority in compensation for permanent impacts to habitat from the Navy Joint Regional Confinement Facility Southwest (Brig) Alteration and Expansion Project on MCAS Miramar.

Off-Station opportunities for compensating mitigation through purchase of mitigation credits, perpetual conservation easements, and similar arrangements consistent with regional conservation plans and installation buffering shall be considered favorably as a preferred method for providing natural resource mitigation. Although off-installation options many not be available or preferred in all situations, or for all resource types, such an approach maintains future land-use flexibility on the Station to support military readiness. When comparing cost, indirect costs of staff time needed to manage on-Station restoration efforts and loss of land-use must be considered in addition to direct costs. Federal regulatory agency approval for compensating mitigation will be required if ESA species or CWA permitting is required.

Encroachment Partnering

Under authority of the Readiness and Environmental Protection Initiative and Readiness and Environmental Protection Integration (REPI) Program authorized by Congress in 2003 (10 U.S.C. § 2684a), installations "*may enter into an agreement with a State or private entity to limit development or property use that is incompatible with the mission, to preserve habitat, or to relieve anticipated environmental restrictions that would restrict, impede, or interfere with military training, testing, or operations on the installation*" (U.S. Department of Defense and U.S. Fish and Wildlife Service 2004).

The primary objective of the environmental partnering program is to ensure that encroachment does not threaten the ability on an installation to achieve its mission objectives and support military readiness. Environmental partnering is a cost effective means to limit incompatible land use and support local conservation efforts. This program is not intended to expand DoD land holdings, however, it is intended to relieve encroachment pressures restricting use of military lands. The Marine Corps' vision and approach to creating land and conservation buffering partnerships on an installation has the following components:

- maintain integrity of military installation,
- conserve open space and natural resources, and
- enhance the community's quality of life.

Usually, a non-governmental organization, such as The Nature Conservancy or The Trust for Public Lands, acquires either the land or easements on the land from willing sellers on behalf of the partnership. If an easement is purchased, the landowner can usually remain on the land and conduct their preferred lifestyle, whether it is forest management, ranching, etc. These lands will be managed in perpetuity in a manner to conserve the ecosystem and limit urbanization along the military installation boundaries. Real property

interest will normally take the form of a restrictive or conservation easement. Lands acquired under this authority are not to be directly used (*e.g.*, maneuver or other training) for military purpose. Indirect use (*e.g.*, overflights, noise) is permitted.

Notable successes with this process are on many military installations, including Marine Corps installations Camp Pendleton, Camp Lejeune, and MCAS Miramar. A 2015 DoD report to Congress[11] on the status of the Readiness and Environmental Protection Initiative stated the program, "…is a key tool for ensuring the sustainability of our military's training, testing, and operational capabilities through cooperative land-use planning and integrated land protection around installations and ranges."

A 2007 RAND Corporation study[12] of the Readiness and Environmental Protection Initiative stated, "*The key to combating this issue is speed… A number of these bases don't have the immediate funding or partnerships to compete with development pressures and buffer additional land, which in the long-term would save them money due to increases in property values over time… In many cases, the clock is ticking…. Once the opportunity to purchase undeveloped land has passed, it will be very difficult and expensive to buffer these bases*."

Through coordination for Camp Pendleton's Buffer Lands Acquisition Program, the USFWS stated[13], "*we recommend that both MCB Camp Pendleton and MCAS Miramar consider conservation opportunities for listed species within western San Diego County (approximately west of the crest of the Peninsular Mountain Range), western Riverside County (west of Banning Pass and the crest of the San Jacinto Mountains), and Orange County, as these areas contain the great majority of occurrences of listed species on MCB Camp Pendleton and MCAS Miramar*." The USFWS continued by stating, "*The use of offsite conservation and restoration to offset impacts to listed species is a novel approach for MCB Camp Pendleton and MCAS Miramar, so we encourage continued close coordination with our office on the development of the crediting program and on the suitability of offsite conservation/restoration opportunities for addressing project-related impacts*."

MCAS Miramar is working alongside MCB Camp Pendleton and the USFWS in an effort to develop a crediting agreement for REPI acquisitions for the threatened coastal California gnatcatcher to relieve restrictions to on-installation military operational land-use. MCAS Miramar has a goal to relieve ESA-related restrictions on undeveloped lands on the Station to support field operations and wildland fire management. The first property acquired to accomplish this goal is the 409-acre Lakeside Downs property, which is 2.3 miles east of MCAS Miramar. The DoN holds a conservation easement on the property that requires habitat preservation in-perpetuity, and the Endangered Habitats Conservancy hold fee title on the property and will manage it as a preserve. The property has high quality and regionally rare coastal scrub habitat and is occupied by the federally threatened coastal California gnatcatcher and a federal candidate for listing, the Hermes copper butterfly. The Lakeside Downs property has supported up to 13 breeding territories of coastal California gnatcatcher. The USFWS estimated that 279 acres of historically occupied habitat will provide coastal California gnatcatcher recovery credits proportional to DoD contributions. Because field training is restricted in occupied habitat during coastal California gnatcatcher breeding season on-installation, this will help to alleviate restrictions of on-installation military land-use.

[11] *Readiness and Environmental Protection Integration Program*. March 2015. Ninth Annual Report to Congress. Deputy Under Secretary of Defense for Acquisition, Technology and Logistics, Washington, DC.
[12] *The Thin Green Line: An Assessment of DoD's Readiness and Environmental Protection Initiative to Buffer Installation Encroachment*. June 2007 Press Release, RAND Corporation, Office of Media Relations.
[13] Ecological Services, Carlsbad Fish and Wildlife Office, Carlsbad, CA. Dec. 9, 2009, letter to Commanding Officer, Marine Corps Base, Camp Pendleton, CA, *Buffer Lands Acquisition Program and Offsite Conservation for Marine Corps Base Camp Pendleton and Marine Corps Air Station Miramar, San Diego County, California*.

As needs and staffing permit, MCAS Miramar will continue to pursue REPI acquisition projects that can directly support military operations and readiness. Areas that are occupied by federally threatened and endangered species on MCAS Miramar will be the focus of acquisition due to the relief on operational restrictions that can be realized.

Conservation Agreements

A conservation agreement is a formal, written document agreed to by the USFWS and other cooperators that identifies specific actions and responsibilities for which each party agrees to be accountable. The objective of a conservation agreement is usually to reduce threats to a candidate or proposed species or its habitat, possibly lowering the listing priority or eliminating the need to list the species. Conservation agreements are usually less restrictive than mitigation banks and do not require transfer of ownership (Foreman 1997). A conservation agreement was effectively used at MCAS Yuma to assist the flat-tailed horned lizard. Through this conservation agreement (Flat-tailed Horned Lizard Interagency Coordinating Committee, 2003a) and a Rangewide Management Strategy (Flat-tailed Horned Lizard Interagency Coordinating Committee, 2003b), it was possible to preclude a formal listing of the species onto the Endangered Species List. When appropriate, MCAS Miramar will consider conservation agreement options.

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7.0 NATURAL RESOURCES MANAGEMENT GOALS AND OBJECTIVES

A Comprehensive Natural Resources Management Plan (Kellogg 1994) was developed for the U.S. Navy to provide guidance for natural resources management on NAS Miramar. A number of specific management plans were incorporated and appended into that 1994 Natural Resources Management Plan, including the Fish and Wildlife Management Plan (USFWS 1993a), Outdoor Recreation Management Plan (NAS Miramar 1991), and Vernal Pool Management Plan (Bauder and Wier 1991). MCAS Miramar incorporated information that remained relevant into the 2000 and 2005 INRMPs (MCAS Miramar 2000, 2006). All relevant information from these previous plans is updated and incorporated into this INRMP for implementation.

7.1 Natural Resources Management Goals

Marine Corps' natural resource management goals, as set forth in MCO 5090.2 in support of Station military readiness requirements, are as follows:

- preserve access to air, land, and sea spaces to meet military readiness requirements;
- comply with applicable natural resources protection requirements (*e.g.*, laws, executive orders, and regulations);
- provide public access to installation lands, where practicable, provided such access does not conflict with military readiness and does not harm sensitive installation natural resources;
- participate in regional ecosystem partnerships, provided such participation does not conflict with military readiness and does not harm installation natural resources; and
- participate in wetland mitigation banks and threatened and endangered species conservation banks.

Natural resource management goals specifically adopted by MCAS Miramar are as follows:

- support the MCAS Miramar military mission by ensuring compliance with applicable environmental laws and regulations;
- include natural resource management as a component of planning for execution of Marine Corps operational requirements;
- identify and select opportunities for maintaining biodiversity, including conservation of important plants and animals; and
- secure regulatory agency and public recognition of Marine Corps environmental stewardship efforts.

DoD policy directs that each INRMP must address resource management on all lands for which the installation has real property accountability, including lands occupied by tenants or lessees or being used by others pursuant to a permit, license, right of way, or any other form of permission. Additionally, DoD policy authorizes installation commanders to require tenants, lessees, permittees, and other parties to accept responsibility for performing appropriate natural resource management actions as a condition of their occupancy or use[14].

[14] Assistant Deputy Under Secretary of Defense (Environment, Safety, and Occupational Health) Memorandum for the Deputy Assistant Secretary of the Army (Environment, Safety, and Occupational Health), Deputy Assistant Secretary of the Navy (Environment), Deputy Assistant Secretary of the Air Force (Environment, Safety, and Occupational Health), and Director, Defense Logistics Agency of 17 May 2005 on the subject of Implementation of Sikes Act Improvement Amendments: Supplemental Guidance concerning Leased Lands.

As such, all MCAS Miramar actions will consider natural resource management policies and objectives of this INRMP for all lands of MCAS Miramar. As new real estate and permission documents are developed and as modifications to existing permissions are prepared, the clear applicability of this guidance in the context of the entire INRMP will be reinforced. DoDI 4715.03, Enclosure 3, states that prior to acquiring, disposing, or realigning DoD properties, (1) all significant natural resources should be identified and determined whether they may be affected by the action and (2) permitted, significant, or museum-housed natural resources-related objects and documents are identified and conserved.

Natural resource management actions outlined in this INRMP will be planned and executed on all applicable lands of MCAS Miramar by Station resource management actions, others using Station lands, or both. Where applicable, this will include lands occupied by tenants or lessees or being used by others pursuant to a permit, license, right of way, or any other form of permission following necessary coordination. Existing land use agreements already subject to environmental planning and resources agency authorizations are expected to be operating already in a way that complements the philosophies and objectives of this INRMP.

NAVFAC SW provides some project management support to the Natural Resources Division for contracting, natural resource cooperative agreements, and project oversight. Department of the Navy procedures strongly encourage that NAVFAC SW be used for all contracted actions and cooperative agreements. Costs of this support are in addition to anticipated contracting costs.

This chapter's purpose is to describe the integration of the management and conservation of natural resources to support military operational requirements of the Station. To that end, clear objectives are presented below to meet each natural resource management goal. Projects were then developed and prioritized to accomplish each objective, and are presented in Appendix E.

7.2 Natural Resources Management Objectives

The natural resources management goals of MCAS Miramar can be split into the following management categories based upon the natural resources and management issues present for the Station:

- General Vegetation Management and Soil Conservation
- Wildland Fire Management
- Grounds Maintenance and Landscaping
- Special Status Species Management
- Vernal Pool Habitat Management
- General Wetland Management
- General Wildlife Management
- Migratory Bird Management
- Wildlife Damage Management (including Bird and Animal Air Strike Hazards)
- Integrated Pest Management
- Natural Resources-Related Outdoor Recreation Management
- INRMP Planning & Implementation
- Agricultural Outlease Management

Specific objectives have been developed for each of these categories as discussed in more detail below.

7.2.1 General Vegetation Management and Soil Conservation

Monitoring and maintaining native vegetation, control of invasive species, watershed and floodplain

management, and soil conservation are components of this subsection. Meeting objectives of each of these components requires an integrated approach to vegetation management as well as other natural resources components identified in this chapter. Management of special status plant species are addressed in Section 7.2.4, *Special Status Species Management*.

Objective: Develop and Implement Natural Land and Habitat Restoration or Rehabilitation
Effective vegetation management and associated soil conservation are critical to maintaining, restoring, and rehabilitating native vegetation and its associated wildlife habitats. When vegetation management is focused on habitat improvement for wildlife, it should include maintenance of wildlife corridors and habitat linkages. An example of ongoing habitat maintenance on Station is the informal policy of discouraging the removal of snags (standing dead trees) and logs. Whether left standing or laying on the ground, these materials provide valuable wildlife habitat. The maintenance and restoration of training lands is an equally important aspect.

Quantitative descriptions of vegetative attributes (cover, biomass, or composition) are helpful for habitat condition or trend monitoring, a planned management objective. Monitoring allows for periodic review of ecosystem quality and management success. The Natural Resources Division updated its vegetation/landcover mapping and geospatial information system (GIS) database in 2014 (Tetra Tech 2014). Data updates will be determined by periodic analysis of landscape conditions.

Invasive Plant Management
MCO 5090.2 (para. 11104.1g(2)) states, "*Installations, organizations and military units shall not authorize, fund, or carry out actions likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere. They shall provide for invasive species control and minimize the economic, ecological, and human health impacts that invasive species cause*."

MCAS Miramar complies with Executive Order 13112, *Invasive Species*. An invasive species is defined as "*an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health*" (Executive Order 13112). Federal agencies are to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause. Invasive plants can be a serious threat to natural plant communities. These species can change the structure of a plant community and degrade its ecosystem value.

MCAS Miramar has been actively identifying and controlling invasive plant species since before 1999. The priority for species control changes due to variable threats associated with invasive species, effectiveness of ongoing control, cost/benefit factors, and available control resources. There are 22 invasive species under contract for control with additional species to be added as needed. Several additional vernal pool weed species are controlled in specific vernal pool restoration and enhancement projects. MCAS Miramar follows the California Invasive Plant Council (http://www.cal-ipc.org/) and the San Diego Weed Management Area working group (http://www.sandiegocounty.gov/content/sdc/awm/ipm_sdwma.html) guidance materials when appropriate during invasive plant treatment and monitoring efforts.

Objective: Continue Long-Term Ecosystem Monitoring (LTEM) of Vegetation and Soil Conditions
MCAS Miramar has implemented Long-Term Ecosystem Monitoring (LTEM) for vegetation and soil conditions. Results of the initial year (1999) field studies for flora were summarized (Varanus Biological Services, Inc., and San Diego Natural History Museum 2003[15]) and are available for baseline comparisons. The most recent floral portion of the long-term ecosystem monitoring effort (O'Leary 2009) was completed in 2009.

[15] J.L. O'Leary, San Diego State University, provided the vegetation evaluation.

O'Leary (2009) summarized results of the vegetation component of LTEM, which included the following:

- the development and implementation of a work plan for the spring 2008 and future vegetation sampling of 82 permanent plots located on the Station;
- the relocation and resampling of 75 vegetation plots last sampled in spring 1999;
- the establishment and sampling of seven additional plots;
- the production of detailed site descriptions, information on disturbance activities and erosion on 'Land Use Forms,' plot boundary directions, and maps recorded on standardized 'Plot Map Forms;'
- the collection, pressing, identification, and mounting onto herbarium sheets of any plants found within plots that were previously not known to occur on the Station;
- creation of individual summaries of the compositional, structural, and site characteristics of the 82 plots sampled in 2008;
- creation of composite summaries of the individual plots that comprise each major vegetation type;
- contrasts between summaries of each major vegetation type sampled in 1999 with those sampled in 2008;
- summary contrasts for average cover for growth forms for 1993-94, 1999, and 2008;
- discussion of vegetation management implications; and
- production of a detailed methods manual to assist in the future relocation and sampling of the 82 vegetation plots.

O'Leary (2009) evaluated changes in vegetation between 1993-94, 1999, and 2008 and concluded, "*With only one exception (plot 80-5), none of the changes detected on individual sample plots appear attributable to U.S. Marine Corps military readiness activities. A significant factor affecting the Station's vegetation was the Cedar Fire of October 2003 which burned 67 of the 82 vegetation plots. Generally, most vegetation types appear to be recovering fairly well, but exceptions occur*."

LTEM special purpose plots have been placed in specific sites to provide information on management issues. For example, the Natural Resources Division has established LTEM special purpose plots in areas for controlled burns or wildfire corridors to monitor long-term fire effects to vegetation and soil conservation.

Objective: Maintain Watershed Productivity, Quality, and Function

Non-point source pollution control (including soil erosion control and maintenance of vegetative cover) is critical to the management of watershed health. Maintaining riparian vegetation cover through invasive plant removal contributes to water quality by preventing siltation into streambeds (e.g., minimizing new surface drainage into canyons). Watershed management is performed to conserve soil and water productivity and function. Effective watershed management includes fire management to reduce the loss of native vegetation and the assessment of impacts of surface runoff into watersheds.

Soil Erosion Control

MCO 5090.2 (para. 11104.2d) states, "*The Marine Corps shall manage its lands and waters to control and prevent soil erosion, soil loss, and aquatic sedimentation and to preserve natural resources by conducting surveys and implementing soil conservation measures. Construction projects shall be designed to eliminate post construction soil erosion, and altered or degraded landscapes and associated habitats shall be restored and rehabilitated whenever practicable*."

Soil erosion can severely delay the re-establishment of vegetation and habitat conditions needed to sustain plant and wildlife species. This is of particular concern when Special Status Species' habitat is the focus of

habitat improvements. Soil erosion also affects the maintenance of training lands, which require vegetative cover for training realism.

All Marine Corps installations are required to manage their lands to prevent and control soil erosion and conserve natural resources using surveys and soil conservation measures. Erosion control is meant to conserve the integrity of soil productivity and function. It encompasses water quality concerns and protection of wetland functions.

Slope Restoration - Fish Pond Natural Resources Division

Erosion and sedimentation issues are important at MCAS Miramar due to highly erodible soils and above normal fire risk throughout most of the year. Excess sediment or altered flows can affect watershed hydrologic function, water quality, and wildlife habitat. Watershed malfunction that results in excessive runoff can degrade or even destroy whole ecosystems, individual plant communities, or specialized zones, such as riparian areas. Gullies can lower the water table, potentially affecting vegetative cover and the hydrology of an entire watershed. Roads can alter water flow and potentially divert water from natural streams.

A soil erosion inventory of the Station was completed in 1991 (Kellogg and Kellogg 1991). Of 287 erosion sites described, 51 were classified as active and 32 with minor activity. Almost three-quarters of the sites were natural landslides off eroded ridges in East Miramar. The greatest manmade erosion hazards on the Station were wide, unvegetated fuelbreaks without water diversion devices (Kellogg 1994).

In 2004-05, URS (2005) inventoried undeveloped portions of the Station on a landscape level to assess, document, and prioritize active erosion sites and provide recommendations for restoration of priority erosion sites. Erosion sites were classified into the following categories: sheet, rill, gully, channel, and mass wasting/landslide; sites were further categorized as natural or accelerated by human-induced processes. URS identified 98 sites with erosion problems; 68 contained gullies. Rills were identified at 19 sites; channel erosion at 8 sites; streambank erosion at 6 sites; slumps at 5 sites; and mass wasting was recorded at 12 sites.

Site prioritization was based on the following: 1) sites that potentially affect Station training needs, 2) sites that potentially affect Station facilities, 3) sites that potentially affect Station cultural/ biological resources, and 4) sites that affect Station maintenance projects. URS (2005) completed detailed erosion restoration recommendations for 18 priority erosion sites. These recommendations are adaptable to other erosion sites

with the same erosion classification. Current efforts involve establishing restoration project programming and implementation efforts for these recommendations.

Vegetation restoration is a second area of watershed and ecosystem protection achieved by MCAS Miramar, which provides soil stability in addition to reducing reflected sunlight. During 1999-2001, field work was conducted for a Public Works Division project to locate restoration sites for coastal scrub, grasslands, and wetlands. This study (Johnson *et al*. 2003) identified 102 restoration sites encompassing 598 acres.

MCAS Miramar has instituted several revegetation and restoration projects that have stabilized soils with vegetative cover.

- In 1993, revegetation (restoration) of 25 acres of land was conducted in the Eastgate Mall portions of the Station in order to obtain 20 acres of coastal sage scrub vegetation to compensate for the loss of 20 acres off-station in Lakeside, CA.
- In 1999, the restoration of 87.5 acres was begun to compensate for impacts from construction associated with BRAC realignment. Methods involved burning, irrigation, ripping and tilling, mulching, and local seed to grow seedlings for transplanting (Heffernan 2002).
- In 1999, the restoration of 3.16 acres was begun to repair on-site damage caused by fuelbreak maintenance operations. Methods involved straw flake erosion control dams and seedling plantings from local stocks, follow-up weed control, and irrigation (Johnson 2003a).
- In 1999, restoration of 0.6 acres was done to compensate for impacts associated with repair and improvements to the Ammunition Road leading to the Flightline. Methods involved seedling plantings from local stocks, follow-up weed control, and irrigation. This project also included a study of the effects of soil compaction on seedling survival (Johnson 2003b).
- Beginning in 2001, three eroded sites associated with the Fish Pond were restored to reduce sediment flow into the pond (Green *et al*. 2001). This project is complete (see above photo), and the pond is open for patron use.
- In 2002, MCAS Miramar stabilized and revegetated an eroded chaparral slope at Homestead Dam (Tierra Data 2003).
- In 2006, soil erosion was stabilized on 0.09 acres on slopes in east Miramar along the San Clemente riparian corridor and Training Area 4.
- In 2007, soil erosion stabilization was conducted on 1.19 acres of slope at the Ordnance Complex (Environmental Engineering Division lead).
- In 2008, restoration of 7.2 acres was conducted to compensate for habitat loss from development and enhancement of 2.5 acres of habitat in Rose Canyon associated with the construction of a new Jet Fuel Farm (P-125).
- In 2009, soil erosion stabilization was conducted on 1.8 acres at the Fish Pond outfall on Rose Canyon tributary slope (Environmental Engineering Division lead) (different from 2001 project above).
- In 2010, 7.19 acres of Training Area 4 was reseeded with a variety of native grass species to reduce slope erosion (see below photo).
- In 2016, restoration of severe rill and gully erosion began on more than an acre bordering the VA Cemetery along Nobel Drive in northwestern MCAS Miramar and this area was filled, re-contoured, and planted to native species.

Marines provide manpower to reseed a training area with native plant seed
Photo courtesy of GySgt Christopher Long, January 14, 2010, H & HS Marines

Watershed and Floodplain Management
MCAS Miramar avoids direct or indirect development of floodplains and restores and conserves natural and beneficial values served by floodplains as it implements land management, construction, and land-use actions, as required by Executive Order 11988, *Floodplain Management* and outlined by MCO 5090.2. This approach serves to prevent flood damage to facilities.

Watershed management conserves soil and water productivity and function. Erosion and water quality management employ BMPs approved by the State of California under the Non-Point Source Pollution Control Plan.

Smith and Lichvar (2001) conducted a Station-wide planning-level delineation of aquatic resources, mapping of floodplains, and a functional assessment of riparian ecosystems at MCAS Miramar. The study accomplished the following:

- identified waters of the United States (U.S.) to help address jurisdictional requirement(s) of the CWA, and identified aquatic resources;
- mapped the 100-year return period floodplain; and
- provided a baseline assessment of riparian integrity for the 116 riparian "reaches" on the Station.

The 2003 Cedar Fire demonstrated the potential for substantial damage to riparian systems. Damage occurred in riparian areas from (1) riparian vegetation loss, (2) siltation from the adjacent slopes during rainfall events, and (3) higher water volumes during post-fire rainfall events that eroded channels and banks more than normal. A project was initiated in 2004 by the Miramar Public Works Division to mitigate some watershed damage caused by the fire and to prevent or minimize downstream flooding and sedimentation. Sedimentation barriers and plantings of riparian vegetation were installed in West Sycamore and San Clemente canyons to compensate for potential permanent loss of native riparian vegetation and accelerate vegetation recovery.

Green Farm earthen dam was repaired in 2003 to reduce risk of dam failure, which could have impacted the new Rifle/Pistol Training Range Complex and federally endangered willowy monardella plants downstream. Similarly, Homestead earthen dam in Training Area 4 was repaired about the same time to

prevent failure and damage to downstream resources and facilities.

7.2.2 Wildland Fire Management

MCO 5090.2 (para. 11104.2h) states, "*Fire is an important component of fire-adapted ecosystems. These ecosystems may require some level of prescribed burning to mimic the temporal frequency and intensity of the natural fire regime. Burning outside the natural fire regime may impact or convert vegetation plant communities to a non-native type. Prescribed burning is an important tool to reduce fuel loading and maintain fire-dependent ecosystems*."

Objective: Implement a Wildland Fire Management Plan

MCO 5090.2 (para. 11204.2a) requires installations with burnable acreage, or bordered by burnable acreage, to develop and implement a Wildland Fire Management Plan, which will be incorporated into or consistent with the INRMP. An effective Plan will protect high value human and natural resource areas from catastrophic wildfire while also conserving resources and military operational flexibility.

The primary reason for fire management at the Station is the protection of human life, health, and property. Proper land and vegetation management aids in suppressing and reducing damage from wildland fires, which helps maintain watersheds and, thereby, water quality.

Potential ignition sources are both on- and off-Station. Management supports emergency response control efforts to reduce the likelihood of catastrophic wildfires, which can cause significant loss of resources. The MCAS Miramar Fire Department is responsible for fire management on the Station. Fire Department wildland fire managers work with the Public Works Division and Environment Management Department to maintain fuelbreaks and access roads.

The management of vegetation to meet fire control needs and soil/vegetation conservation will be evaluated jointly between wildland fire managers and the Station Natural Resource Division. Ideally, plans and actions should be directed to avoid grading or blading the soil beyond maintenance of an access road width with the remainder maintained by vegetation crushing, mowing, or prescribed burning. Where vegetation is cleared down to mineral soil on steep slopes, water bars or other diversion structures are placed at regular intervals to minimize soil erosion.

The *Wildland Fire Management Plan for Marine Corps Air Station Miramar, San Diego, California* (MCAS Miramar Fire Department 2009a) is referenced, but not incorporated into this INRMP. This Plan and its accompanying Environmental Assessment were prepared to guide wildland fire management and action decisions on MCAS Miramar. Fire prevention and suppression measures described in the Plan serve to reduce and/or control the frequency, size, distribution, and intensity of wildfires. Furthermore, these measures are intended to protect high-value areas (*e.g.*, military assets and sensitive natural or cultural resources) on- and off-Station (*e.g.*, residential and commercial areas that border MCAS Miramar). The plan is compatible with this INRMP. It emphasizes the protection of listed species from wildfire and identifies required conservation measures (termed MIST for Minimum Impact Suppression Tactics) associated with firefighting actions.

The *Fireroad/Fuelbreak Maintenance Plan and Standard Operating Procedures* (MCAS Miramar Fire Department 2009b) is also referenced, but not incorporated into this INRMP. Implementation of

this plan is included in the environmental assessment for the Wildlife Fire Management Plan. The Fireroad/Fuelbreak Plan is reviewed annually and includes details on the maintenance of fuelbreaks and fireroads on the Station. This plan emphasizes treating vegetation to maintain fuelbreaks, instead of using heavy equipment blades to expose bare ground. Most fireroads are normally 15 feet wide unless they are within a fuelbreak when they are 20 feet wide with a 50-foot fuelbreak on each side. The Station maintains a GIS database on prescribed burn and wildfire burn boundaries; these GIS data were used to help develop the Fireroad/Fuelbreak Maintenance Plan.

Objective: Track and Monitor the Effects of Fires and Fuel Modifications
The effects of fires and fuel modifications on MCAS Miramar are tracked and monitored to inform hazardous fuel reduction actions in strategic areas on the Station, and to enhance or maintain native plant diversity and improve wildlife habitat.

The Station evaluated the use of native grass seeding for erosion control on Fuelbreak NS-5 and effects of such grasses on fuel management (Section 7.2.1, *General Vegetation Management and Soil Conservation*). However, native grass did not establish due to drought. The study was not continued due to costs without demonstrated benefits. The Station implemented a 2010 soil erosion control project (Restore Eroded Areas) on the upper portion of Fireroad R-15. R-15 was a 15-foot wide road that has been restored to the adjacent plant community. It will not be maintained as a fireroad.

The Miramar Fire Department includes prescribed burning as one of several fuel management tools that will support both fire and resource management objectives identified in the Station Fire Management Plan and this INRMP. Prescribed burn plans contain measurable objectives, a predetermined prescription, a fire escape contingency plan, and receive environmental review. Fire Department wildland planning within the Air Station boundary includes an element that all fire management activities will support and enhance ecosystem sustainability and the interrelated ecological, economic, and social components on a landscape scale.

Hunsaker and Awbrey (1999) studied the effects of fire on the Station using 12 study sites. This study showed the effects of a moderate intensity fire. The study indicated that unburned vegetation within general burn areas was important for ecosystem recovery. Black *et al*. (2016) studied the effects of wildfire on Miramar vernal pool habitat vegetation and found that native vernal pool vegetation is enhanced for the first several years after fire events (see Section 7.2.5, *Vernal Pool Habitat Management*).

Fire can have a positive impact on native vegetation and wildlife habitat. Prescribed burns can improve ecological diversity by fostering a mosaic of successional stages and age classes of vegetation types, which create vegetation patterns that increase forage for wildlife. The primary benefit of patchy mosaics to fire control is to lower the age class of vegetation, thereby lessening fuel load and buildup of the duff layer. This helps reduce the intensity and spread of unintentional spot wildfire ignitions (*e.g*., roadside accidents, equipment sparks, powerline wire sparks). The resulting fire pattern is one of more frequent, smaller fires instead of providing seasoned, high fuel load vegetation that would contribute to larger-sized installation fires.

While wildfire typically occurs on MCAS Miramar each year, fire in any one area is typically much less frequent (*i.e*., approximately every 20 years or more). Climate change, however, may alter natural fire regimes in southern California by increasing dry fuel loads due to decreases in precipitation, increasing winds due to amplification of the thermal gradient across the California interior, and decreasing humidity (Cayan 2013). Dry fuels, low humidity, and winds create extreme fire danger, and this compilation of factors may increase in the future due to warming temperatures. Consideration of the effects of climate change will need to be included in fire management goals and actions in order to effectively manage the

Station's natural resources.

The Natural Resources Division has established LTEM special purpose plots (Section 7.2.1, *General Vegetation Management and Soil Conservation*) in representative wildfire areas to monitor long-term effects to vegetation and soil conservation. Long-term monitoring will provide information regarding the effects of fire on vegetation and wildlife habitat.

7.2.3 Grounds Maintenance and Landscaping

Grounds maintenance and landscaping includes water conservation landscape design, use of regionally native plants in developed areas, reduction of fertilizer and pesticide use, low-flow irrigation, recycling of green waste, and weed control.

Ensure that Grounds Maintenance and Landscaping Operations are Consistent with Marine Corps Conservation Goals and Objectives

It is Marine Corps policy that environmentally and economically beneficial landscaping practices be used, per Executive Order 13148 and as outlined in a Presidential Memorandum (26 April 1994). The Presidential Memorandum directs federal agencies to:

- use regionally native plants for landscaping;
- design, use, or promote construction practices to minimize adverse effects on the natural habitat;
- prevent pollution by reducing fertilizer and pesticide use, using integrated pest management, recycling green waste, minimizing runoff, and similar practices;
- implement water efficient practices; and
- create outdoor demonstrations incorporating native plants and other similar practices.

A "native plant" occurs naturally in a particular region, ecosystem, and/or habitat without direct or indirect human actions (60 FR 40840).

Relevant orders and plans that affect grounds maintenance and landscaping on MCAS Miramar include:

- ***Executive Order 13112***, *Invasive Species*, which requires preventing the introduction of and controlling invasive species;
- ***National Invasive Species Management Plan*** (2001), which include DoD goals to prevent and control invasive species as well as restore lands with native species;
- ***DoD Directives 4715.1 and 4715.3***, which require military services to protect, preserve, and restore the natural environment using regionally native plants for landscaping;
- ***Marine Corps Order P5090.2A, Chapter 11, specifically 11201.2*** (26 Aug 2013), which states that installations are to maximize the use of native plants for urban and open areas incorporating cost-effective, environmentally sound landscaping practices; and
- ***MCAS Miramar Base Exterior Architecture Plan*** (2008), which provides landscape architecture guidelines in Chapter 6 and the Master Plant List in Appendix B (MCAS Miramar Base Exterior Architecture Plan 2008). An updated native plant list was added to the Base Exterior Architecture Plan in 2011.

The Natural Resources Division has distributed copies of Presidential Memorandum and Executive Order 13148 to personnel in charge of Station landscaping plans. Lists of regionally native plants suitable for the landscaping and sources for procurement have been provided to Station personnel involved with landscaping and can be provided to others upon request. The current Station Base Exterior Architecture Plan (MCAS Miramar Base Exterior Architecture Plan 2008), including the updated native plant list (2011),

follows the most current landscape conservation guidance as the template for all landscape design and management in developed portions of the installation.

The Environmental Management Department reviews and recommends changes to Station landscaping plans for compliance with the above legal instrumentalities. MCAS Miramar uses invasive plant control programs to reduce spread of invasive landscaping plants into natural areas (also see Section 7.2.1, *General Vegetation Management and Soil Conservation*, *Invasive Plant Species*).

During the bird breeding season, personnel need to check for nests prior to pruning or tree removal (Section 7.2.8, *Migratory Bird Management*). Pesticide application must be coordinated with the Station pesticide management coordinator and is part of the Station integrated pest management approach (Section 7.2.10, *Integrated Pest Management*).

Persons responsible for mowing around the runways and parking aprons are aware that, in many locations, there are Special Status Species in the immediate vicinity of the runways. This is particularly true in the case of vernal pool basins and watersheds. Mowing taller grasses around runways tends to attract birds that can become a Bird/Animal Air Strike Hazard (BASH). This circumstance requires special planning be done to avoid or minimize damage to habitat or injury to Special Status Species, and that BASH hazards are kept at a minimum. The flight line mowing program has been coordinated with the USFWS[16] (Section 7.2.9, *Wildlife Damage Management*). MCAS Miramar has reviewed and revised the flight line mowing program standard operating procedures to maintain consistency with the BASH program and vernal pool management requirements (Section 7.2.5, *Vernal Pool Habitat Management*).

7.2.4 Special Status Species Management

Special Status Species include those that are federally listed as endangered or threatened, or proposed for such listing (refer to Table 4.6). Definitions for categories of Special Status Species are provided in Section 4.6, *Federal Special Status Species*.

Objective: Proactively Maintain Up-to-Date Data for Special Status Species

MCO 5090.2 (para. 11104.3a) states, "*Each installation shall survey and take other appropriate actions to document the presence of candidate species and endangered or threatened species on the installation, and identify their currently used and periodically-or indirectly-used habitats. Each installation shall assist FWS in determining whether any such habitats may be included or excluded from critical habitat designation. Each installation shall also survey and take other appropriate actions to document the presence of state or territory rare and endangered species*."

San Diego Mesa Mint Natural Resources Division

MCAS Miramar's approach to Special Status Species management proactively collects information on presence or absence, location, habitat availability and suitability, and life history requirements to support planning for military operational requirements and habitat conservation.

[16] Bird Air Strike Hazard Prevention Program Mowing Operations, NAS Miramar (1-6-94-I-33) dated 14 January 1994.

MCAS Miramar consults with the USFWS (as appropriate) to ensure that its actions are not likely to jeopardize the continued existence of any endangered or threatened species in compliance with sections 7 and 9 of the ESA. Pursuant to Section 7 of the ESA, federal agencies, such as the Marine Corps, must consult with USFWS if their action "may affect" a federally listed endangered or threatened species (50 CFR 402). Such consultations may be formal or informal (see Appendix A for more details).

The 2000 INRMP (MCAS Miramar 2000) addressed ESA requirements associated with the Biological Opinion for the Realignment of Naval Air Station Miramar to MCAS Miramar (USFWS 1996a). The 2005 INRMP (MCAS Miramar 2006) carried forward the applicable and ongoing management commitments made by this action, such as having a plan for multi-species conservation. This INRMP continues implementation of these commitments.

Table 4.6 summarizes information on federally listed species on MCAS Miramar. The six Special Status Species dependent on Station vernal pool habitat are described in Section 4.3, *Vernal Pool Habitat*. Surveys for fairy shrimp and vernal plants on MCAS Miramar are ongoing (*e.g.*, Black in progress [2016-2017]). All vernal pool habitat on Station has been intensively surveyed since 2000 to document species presence and precisely map the pools and their associated watersheds. Surveys were originally focused in operationally important areas of the Station, but recent surveys have extended the survey areas to all portions of the installation including areas occupied by leases and grants. Basin and watershed delineation, associated species inventories, invasive species assessment, and associated GIS data provide resource information for appropriate habitat management.

Quino Checkerspot Butterfly *G. Huffman*

Lepidoptera surveys were conducted on MCAS Miramar from 1995 to 1998 and in 2000 to search for Quino checkerspot butterfly. An estimated 625 Lepidoptera, including up to 10 previously undescribed species were found (San Diego Natural History Museum 2004b). Other project specific surveys failed to find this species in potentially suitable habitat. Due to recent sightings of this species adjacent to the Station in areas burned by the Cedar Fire, a new survey for this species on MCAS Miramar was conducted in 2011. The purpose was to identify suitable habitat and survey the best 1,400 acres in East Miramar. No individuals were found throughout the flight season by surveys completed using USFWS protocols. Recent surveys for San Diego Gas and Electric reported finding this species on a ridgeline fuelbreak in East Miramar and a road in Mission Trails Regional Park (April 2017). The species was found at three locations on MCAS Miramar and one location on the Station boundary, as shown on Figure 4-6. An additional location was found approximately 1 kilometer south of MCAS Miramar and is not shown in Figure 4-6. In 2018, two additional locations were found, which are also shown on Figure 4-6. As more information is received, it will be incorporated.

Hermes copper butterfly was found on many sites in East Miramar before the 2003 Cedar Fire (San Diego Natural History Museum 2004b), but has not been observed on MCAS Miramar since. This species was found at multiple sites from 1996 through 1998 during 1995-1998 surveys (Brown and Bash 1999; San Diego Natural History Museum 2004b). In 2000, the San Diego Natural History Museum conducted Hermes copper butterfly surveys for the Military Family Housing Project and found the species at multiple sites (EDAW, Inc. 2004). All sites where this species had previously been found were severely burned. In 2010, the Natural Resources Division undertook in-house staff surveys of all areas where the species was

previously reported, but none were found. Additional sites supporting spiny redberry in canyon bottoms of West Miramar that were not burned in the 2003 fire were also examined. No sightings were made in 2010. Additional staff biologist surveys were performed in May and June of 2015. Two to three visits of approximately two hours were made to each of four previously occupied sites. No sightings were made in 2015. An extreme drought continued in the spring of 2015, and very few Hermes Copper butterflies were observed in currently known occupied areas around the County. Likewise in 2016, no sightings on MCAS Miramar were made by Natural Resources Division staff, and very few Hermes Copper butterflies were observed at any sites in the County by a San Diego State University surveyor. To assist with the persistence of the Hermes copper butterfly, MCAS Miramar implemented the off-site Lakeside Downs REPI project in the community of Lakeside (2.3 miles east of the Station), which is permanently preserving 409 acres of rare coastal scrub habitat that contains a documented breeding population of this species.

Table 7.1 summarizes the results of coastal California gnatcatcher surveys performed at MCAS Miramar since 1994. Survey results in 2007 found that coastal California gnatcatchers inhabited 16 additional areas relative to 2004. Recolonization of 2003 burned areas seems to be occurring still.

Table 7.1. Summary of Coastal California Gnatcatcher Survey Results at MCAS Miramar

Year	Number of Breeding Pairs	Source Report
1994	55	Hunsaker et al. 2000
1995	45	Hunsaker et al. 2000
1996	51	Hunsaker et al. 2000
1997	41	Hunsaker et al. 2000
1998	53	HSWRI 2000
1999	51	HSWRI 2000
2000	19	HSWRI 2000
2001	36	HSWRI 2006
2004	21 pairs, 1 lone male	Bitterroot Restoration Inc. 2005
2007	34 pairs, 3 lone males	RECON Environmental, Inc. 2008
2009	65 pairs, 24 males/females	Haas 2010
2013	43 pairs, 9 single males	Tierra Data 2014
2016	70 pairs	San Diego Nat. History Museum 2016

Effects of helicopter operations at MCAS Miramar on the coastal California gnatcatcher were studied by Awbrey and Hunsaker (2000). They found that take-off and landing maneuvers may pose a physical threat (egg and/or chick displacement from nests) only to nests within 100 meters of touchdown points. Effects of overflights on nesting birds were variable, and overflights at 1,500 feet only partially masked calls. A more recent study (Hubbs-Sea World Research Institute 2006) concluded the following:

- The coastal California gnatcatcher will find and inhabit suitable nesting habitat, in spite of the noise environment at MCAS Miramar. Nest success is equally likely in quiet and noisy areas within MCAS Miramar.
- Coastal California gnatcatcher nesting success was negatively associated with tall stands of broom baccharis and black sage with an understory dominated by dead leaf litter.
- Habitat, topography and fall rainfall were positively associated with reproductive success.
- Nesting success was not associated with any noise metrics measured, suggesting that noise from helicopters was not detrimental to coastal California gnatcatcher reproductive success.
- Nesting success rates increased with distance from flight tracks; however, after adjusting for covariation with habitat, climate, and physical metrics, success rates for nests close to helicopter flight tracks were statistically similar to those more distant nests.

Hunsaker *et al*. (1994, 1995, 1997, 2000) evaluated coastal California gnatcatcher habitat and home range. They provided management information regarding habitat requirements, fire, invasive plants, and Station operations. Section 7.2.1, *General Vegetation Management and Soil Conservation* describes these efforts on the Station.

In 1998, a breeding least Bell's vireo was found on the Station (east of Interstate 15) for the first time. The range of the least Bell's vireo extends from California to Baja California, Mexico. The species winters only in Southern Baja. Table 7.2 summarizes the results of least Bell's vireo surveys performed at MCAS Miramar since 1998. Least Bell's vireos found on MCAS Miramar have been detected both west and east of Interstate-15. Identification of five breeding vireos in 2008, eight breeding pairs in 2014, and 12 breeding pairs in 2012 represents an increase from pre-Cedar Fire results, in spite of severe habitat damage from the 2003 Cedar Fire. This indicates recovery from the severe habitat damage of the 2003 Cedar Fire (AmDyne Corporation 2008, San Diego Natural History Museum 2014 and 2017).

Table 7.2. Summary of Least Bell's Vireo Survey Results at MCAS Miramar

Year	Number of Breeding Pairs	Source
1998	1 pair, 1 lone male	MCAS Miramar GIS
2002	1	MCAS Miramar GIS
2008	5	AmDyne Corporation 2008
2011	17 pairs, 6 lone males	Tierra Data 2011
2014	8 pairs, 2 lone males	San Diego Natural History Museum 2014
2017	12 pairs, 4 lone males	San Diego Natural History Museum 2017

Focused surveys for the southwestern willow flycatcher were conducted in 1998, 2002, 2008, 2011, 2014, and 2017. Migrating willow flycatchers were recorded early on MCAS Miramar, but none were confirmed to be the southwestern subspecies, and none bred on the Station. These individuals were likely a different subspecies of willow flycatcher (AmDyne Corporation 2008, Varanus Biological Services, Inc. 2003, San Diego Natural History Museum 2014). No southwestern willow flycatchers were detected during 2014 or 2017 surveys (San Diego Natural History Museum 2014 and 2017). Although there are no known nesting occurrences of the southwestern willow flycatcher on MCAS Miramar, it is likely that some of the transient willow flycatchers that have been observed on MCAS Miramar are the listed entity and are migrating through MCAS Miramar on their way to breeding locations in California.

MCAS Miramar supports a large proportion of the known population of the endangered plant, willowy monardella. Rebman and Dossey (2007) completed a Station-wide census for this plant and developed a long-term monitoring program for this plant on MCAS Miramar. The survey located 3,379 plants in 393 occurrences in six watersheds with active populations (a seventh watershed had three dead plants). Pre-Cedar Fire willowy monardella sites showed regrowth from the October 2003 Cedar Fire. However, after the high rainfall of 2004-2005, the willowy monardella population appeared to decrease significantly within the monitoring plots. As a result, two projects were undertaken to evaluate the Station population and habitat. In 2015, the population was re-mapped on MCAS Miramar with more detailed definitions (e.g., clumps verses individual plants).

Willowy Monardella Natural Resources Division

This station-wide data collection effort indicates the population is declining. There is no indication that the overall decline is related to military land uses. Data collection for both population and habitat evaluation will continue, enabling more accurate assessments of population trends, habitat management needs, and regional understanding of this species' life history.

Surveys have documented intermixed populations of Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*), Eastwood manzanita (*Arctostaphylos glandulosa* ssp. *glandulosa*), and hybrids between the two subspecies in East Miramar. In 2006, a complete census of Del Mar manzanita was conducted with a monitoring plan for population trends and habitat assessment (Licon Engineering Co., Inc. & Garcia and Associates 2006). The census identified 2,341 individual plants within 5,610 acres in east Miramar. Recent preliminary DNA analysis of the Station manzanita populations (Del Mar and Eastwood) indicate the previously morphologically identified manzanitas may not be *Arctostaphylos glandulosa* ssp. *crassifolia.* Further study will increase knowledge of this species' population, habitat definition, and regional ecosystem importance. The Station's manzanita population resprouted from the Cedar Fire with vigorous regrowth due to less competition from previous surrounding vegetation.

Objective: Proactively Manage Special Status Species' Habitat

The Endangered Species Act was revised (ESA Section 4(a)(3)(b)(i)) via the National Defense Authorization Act of 2004, which states that, "*The Secretary [of the Interior] shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an integrated natural resources management plan prepared under section 101 of the Sikes Act (16 U.S.C. 670a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation*. This again was reiterated in the Department of Interior and Department of Commerce's *Listing Endangered and Threatened Species and Designating Critical Habitat; Implementing Changes to the Regulations for Designating Critical Habitat; Final Rule* (50 CFR Part 424,81 Federal Register 7414, 11 February 2016). The Department of Interior and Department of Commerce have determined that, where applicable, federal critical habitat designation is not warranted if the USFWS and/or NOAA determine that an INRMP provides a conservation benefit to the species. The following four criteria will be evaluated to determine whether the INRMP provides a conservation benefit to the species (50 CFR Part 424).

1. **"The extent of the area and features present."** The management activities identified in the management plan, for the length of the plan, must maintain or provide for an increase in a species' population or the enhancement or restoration of its habitat within the area covered by the plan [*i.e.*, those areas deemed essential to the protection of the species].

2. **"The type and frequency of use of the area by the species."** Management activities within the plan may reduce fragmentation of habitat, maintain or increase populations, ensure against catastrophic events, enhance and restore habitats, buffer protected areas, or test and implement new strategies.

3. **"The relevant elements of the INRMP in terms of management objectives, activities covered, and best management practices, and the certainty that the relevant elements will be implemented".** Persons charged with plan implementation are capable of accomplishing objectives of the management plan and have adequate funding for the management plan. They have the authority to implement the plan and have obtained all necessary authorizations or approvals. An implementation schedule (including completion dates) for the management effort is provided in the plan.

4. **"The degree to which the relevant elements of the INRMP will protect the habitat from the types of effects that would be addressed through a destruction-or-adverse-modification analysis."** The following criteria will be considered when determining the effectiveness of the management effort. The

plan includes (1) biological goals (broad guiding principles for the program) and objectives (measurable targets for achieving the goals); (2) quantifiable, scientifically valid parameters that will demonstrate achievement of objectives and standards for these parameters by which progress will be measured are identified; (3) provisions for monitoring and, where appropriate, adaptive management; (4) provisions for reporting progress on implementation (based on compliance with the implementation schedule) and effectiveness (based on evaluation of quantifiable parameters) of the management effort are provided; and (5) a duration sufficient to implement the plan and achieve benefits of its goals and objectives.

Land-use planning strategies (*i.e*., the incorporation of essential habitat[17] into high priority management areas [Section 5.1, *Management Area Designations*]), flora and fauna inventory and monitoring, habitat management, wildlife management, Special Status Species management, and numerous other projects discussed in this INRMP will provide a cumulative benefit to federally listed species. Most essential habitat identified by the USFWS for species on MCAS Miramar is in areas identified in this INRMP as Level I or II MAs, which focus on proactive management of these resources (see Table 5.1).

The MCAS Miramar Commanding Officer has the authority to implement the plan, which will be accomplished by the Environmental Management Department staff, as scheduled and budgeted. Formal adoption of an INRMP by the installation commander constitutes a commitment to seek funding and execute, subject to the availability of funding, all projects and activities in accordance with specific timeframes and priorities identified in the INRMP (see Appendix E for Projects to be implemented under this INRMP). Under the Sikes Act, any natural resources management activity that is specifically addressed in the plan must be implemented (subject to availability of funds). Failure to implement the INRMP is a violation of the Sikes Act and may be a source of litigation (USMC 2007). Annual review of INRMP implementation to both the USFWS and CDFW documents the commitment of MCAS Miramar to acquire funding and implement the INRMP.

Goals, objectives, and long-term ecosystem needs, based on land-use sustainability for the MCAS Miramar military mission, have been analyzed and considered in collaboration with regulatory agencies. Marine Corps and MCAS Miramar goals and objectives are defined for the plan as a whole (Section 1.3, *Management Approach*), and specific projects established within the plan (see Appendix E). Each INRMP project has standards by which success will be monitored. Monitoring will occur within the Environmental Management Department on a regular basis, as described in Section 1.1.4, *Reviews, Approvals, and Revisions*.

Acquisition and conservation of lands that support habitat areas for rare and endangered species in the vicinity of MCAS Miramar contribute to species conservation and can buffer the Station from incompatible development. Buffers can be used for off-site mitigation and habitat conservation that promotes successful environmental stewardship while simultaneously reducing the potential for encroachment on the Station's mission. Section 6.2.4, *Encroachment Partnering*, describes the potential to implement land and conservation buffering partnerships on MCAS Miramar.

Critical habitat has been designated for five threatened or endangered species that occur on MCAS Miramar: the Riverside fairy shrimp (USFWS 2005, 2012a), willowy monardella (USFWS 2006, 2012b), coastal California gnatcatcher (USFWS 2003, 2007a), spreading navarretia (USFWS 2010), and San Diego

[17] The final determination of critical habitat for the endangered plant spreading navarretia included a definition of "essential habitat" (FR 70, No 200, p. 60662; 18 Oct 2005). The text states, "*The Service in this and other notices has been using the term "essential habitat" as shorthand for "areas eligible for designation as critical habitat.*"" It further states, "*The use of the term "essential habitat" in this and past notices is not a determination by the Service or the Secretary that this habitat is, within the terms of the Act, essential to the conservation of the species, unless the use of the term is accompanied by an expressed statement that the Secretary has made such a determination*."

fairy shrimp (USFWS 2007b). Essential habitat not designated as critical habitat on MCAS Miramar has been identified for the endangered Quino checkerspot butterfly (USFWS 2009); this species was recently reported on a ridgeline in the eastern part of the Station (April 2017). While essential habitat was identified on MCAS Miramar, lands on the Station, in all cases, were excluded from critical habitat designation rules for these species based on the Station having a legally operative INRMP (MCAS Miramar 2000, 2006, 2011a) that benefits each of these species.

This INRMP update continues the protection and benefits afforded to all threatened and endangered species present on MCAS Miramar, as outlined below.

- Development and use of Management Areas focused on differing resource types and sensitivities that will guide management and planning and afford protection to high concentrations of listed species and essential habitats. Associated guidance attempts to limit activities, minimize development, and mitigate actions in areas supporting high densities of vernal pools, listed species, and other wetlands and manage activities and development in areas with low densities, or no special status species and sensitive habitat. For example, 75.5 percent of essential habitat identified for the California gnatcatcher and 84.8 percent of essential habitat identified for willowy monardella occur within Level I and II MAs, which are focused on the management of vernal pools and non-vernal pool threatened and endangered species (see Table 5.1). These same MA Levels I and II include a high proportion of the vernal pool habitat, including 85.4 percent of essential habitat for the San Diego fairy shrimp, 83.7 percent identified for Riverside fairy shrimp, and 92.2 percent for spreading navarretia.

- General management actions include restoring degraded sites, restricting access to sensitive areas through fencing/signage, training military personnel to recognize and avoid sensitive areas via incorporated natural resources instructions in the Station training order, distributing sensitive resources maps and brochures to Station personnel, invasive/exotic species removal, removal of unlawfully dumped trash, surveys to identify areas suitable for habitat restoration/enhancement, habitat compensation for unavoidable impacts from Station projects to ensure no net loss of habitat value, plant and animal surveys for listed and rare species, and long-term ecosystem monitoring of both plant communities and selected wildlife.

- Specifically regarding vernal pool species (***San Diego fairy shrimp, Riverside fairy shrimp***, ***spreading navarretia***, and ***California Orcutt grass***), measures completed, being conducted, and planned for MCAS Miramar, as described in Appendix E, have and will continue to appreciably benefit the species. These actions have and will also continue to appreciably benefit other federally listed species found in vernal pool habitats (*i.e*., endangered San Diego button-celery and San Diego mesa mint). Past, ongoing, and planned actions include protective fencing along susceptible vernal pool group boundaries; trash removal (more than 250 tons); a Vernal Pool Burn Study (Black *et al*. 2016); Long-Term Vernal Pool monitoring (2010); identification of areas suitable for habitat restoration and re-establishment; posting signage to delineate vernal pool areas adjacent to Station activities; exotic plant removal; a study of *Agrostis avenacae* occurance in vernal pools and options for control; Vernal Pool Surveys (~1989-2007, 2009, 2010, 2015); successful completion of all field work meeting BRAC 1995 vernal pool mitigation commitments with an additional surplus to bank; restoration of impacted

Fairy Shrimp Natural Resources Division

pool habitat; and seed banking for San Diego button-celery, spreading navarretia, California Orcutt grass, and San Diego mesa mint (Fraga and Wall 2012).

- Specifically regarding the ***coastal California gnatcatcher***, measures completed, being conducted, and planned have and will continue to appreciably benefit the species. Past, ongoing, and planned actions include Habitat Evaluation, Home Range Determination and Dispersal Study (1993-1996); coastal sage scrub restoration site survey; study for effects of helicopter noise on the coastal California gnatcatcher (Hubbs-Sea World Research Institute 2006); Station-wide population surveys (conducted 1998-2001, 2004, 2007, 2009, and 2013) to include mapping of "use areas" (2004, 2007,2009, 2013); numerous habitat compensation projects on Station (see Chapter 6). MCAS Miramar also implemented the off-site 409-acre Lakeside Downs REPI project (2.3 miles east of the Station), which is preserving coastal scrub habitat occupied by multiple breeding pairs of coastal California gnatcatchers. In 2016, the Lakeside Downs property supported 6 breeding territories of coastal California gnatcatcher.

- Specifically regarding ***willowy monardella***, measures completed, being conducted, and planned have and will continue to appreciably benefit the species. Past, ongoing, and planned actions include partial surveys prior to listing, Station-wide baseline surveys (2002, 2009, and 2015), establishment of monitoring plots (2003) and re-surveying of plots (2004 and 2005), willowy monardella habitat enhancement project (2006-2010) and participation in a county-wide study, distribution map and propose long-term management with San Diego Natural History Museum and San Diego Association of Governments. Miramar's long-term monitoring is planned to continue with data from plots collected about every three years and a resurvey of the Station about every six years.

- Study and surveys for ***Miramar's manzanita*** population continue. As better data and population understanding develop, the Station knowledge and management will be coordinated with regulatory agencies and county organizations to improve region-wide understanding and management.

- Recent sightings of endangered ***Quino checkerspot butterfly*** were observed in 2017 and 2018 on East Miramar along a ridgeline fuelbreak. In 2018-2019, MCAS Miramar is having more comprehensive surveys of East Miramar to better understand the distribution of this species and its habitat. Upon completion of field surveys, the management area designations will be updated accordingly. A rare/endangered butterfly monitoring project is programmed for 2022. It is anticipated that rare/endangered butterfly monitoring will be performed every 3 years.

- Although ***Hermes copper butterfly*** has not been observed on MCAS Miramar since the Cedar fire, MCAS Miramar is currently undertaking comprehensive surveys to better understand the distribution of this species and its habitat because the USFWS determined that a proposed listing for the species will occur during 2018. Upon completion of field surveys, the management area designations will be updated accordingly. All sites identified as supporting the Hermes copper butterfly prior to the 2003 Cedar Fire remain undeveloped, and most sites are within areas already identified for special attention to conserve other non-vernal pool threatened and endangered species (Level II MA). Additional areas with unburned patches of its host plant that were never documented to support the butterfly also occur within Level II Management Areas. MCAS Miramar implemented the Lakeside Downs REPI project (2.3 miles east of the Station) that is preserving 409 acres of coastal scrub habitat occupied by this species. A rare/endangered butterfly monitoring project is programmed for 2022. It is anticipated that rare/endangered butterfly monitoring will be performed every 3 years.

Objective: Monitor to Ensure ESA Section 7 Compliance with Biological Opinions
As described in more detail in Appendix A, a biological opinion is the USFWS opinion resulting from the formal Section 7 ESA consultation process. It is a written statement from the USFWS regarding its opinion on effects of a proposed action on listed species and the potential to jeopardize the continued existence of the species. It provides nondiscretionary Terms and Conditions with Reasonable and Prudent Measures that must be implemented in conjunction with a proposed action to avoid or minimize impacts. The USFWS also provides nonbinding Conservation Recommendations as part of the biological opinion.

All MCAS Miramar approvals will be conditioned upon the action proponent's commitment to fund and/or implement Reasonable and Prudent measures with associated Terms and Conditions which result from this consultation/conference procedure. Terms and conditions can involve additional costs relative to mitigation requirements, which may include compensation for lost resources, minimization of, and avoidance of impacts on threatened or endangered species and critical habitat. Such potential costs must be considered as part of project planning and construction.

Objective: Protect Other Species of Special Regional Concern (i.e., Species at Risk [SAR])
DoDI 4715.03, Enclosure 3, states "*To the extent practicable, all DoD Components shall establish policy and procedures for the management of species at risk (SAR) to prioritize proactive management of those species that, if listed, could adversely impact military readiness. Program objectives shall focus on efforts that have the greatest potential to prevent listing of SAR (e.g., habitat conservation, planning level surveys, monitoring). Protecting these species is critical; therefore, the installation INRMP should consider funding for SAR protection a high priority*," where SAR is defined in DoDI 4715.03 as "*Includes species on lists maintained by USFWS, NOAA Fisheries Service, and state agencies as threatened or endangered or candidates for such lists. SAR also includes species whose designation as threatened or endangered may require conservation efforts significantly impacting a military mission*."

MCO 5090.2 also states that installations should inventory and monitor state-listed species because NEPA analyses may require an installation to consider a proposed action's impacts on state-listed species and state laws and regulations may govern their possession, propagation, sale, or taking on the installation.

Other Species of Special Regional Concern at MCAS Miramar, discussed in Chapter 4, have been defined to include former candidates for federal listing as threatened or endangered, species of concern to the state of California, and species that are regionally rare or of limited distribution (refer to Table 4.7). These species and their habitats are considered as part of MCAS Miramar's general vegetation and wildlife management program.

The Natural Resources Division uses station-wide e-mails, brochures, and quarterly training classes to create and promote awareness of natural resources to Station personnel of the sensitivity, values, and obligations regarding the conservation of Special Status Species and their habitat. Protection of habitat for federally listed species often serves to protect all SAR as well. Finally, conservation of land due to Encroachment Partnering (Section 6.2.4), also helps to protect SAR. A few examples of MCAS Miramar's actions to protect SAR are discussed below.

MCAS Miramar had the Station surveyed for 17 rare and endangered plant species. This 4-phase project (Rebman and Dossey 2002, Tierra Data Inc. 2004, Saucedo-Oritz and Scheid 2005, and Dossey and Associates 2007) was completed in March 2007. Other site-specific surveys are also used to update MCAS Miramar Special Status Species, such as the "G" (Teacup) parcel survey in 2001 (Ecological Restoration Service) and surveys conducted in support of planning for the Military Family Housing Environmental Impact Statement. As a result, the entire Station has been surveyed for *Acanthomintha ilicifolia, Arctostaphylos glandulosa* ssp. *crassifolia*, *Baccharis vanessae*, *Chorizanthe orcuttiana*, *Fremontodendron*

mexicanum, *Ambrosia pumilla*, *Adolphia california*, *Artemisia palmeri*, *Ceanothus verrucosus*, *Chorizanthe polygonoides* ssp. *longispina*, *Comarostaphylis diversifolia* ssp. *diversifolia*, *Dudleya variegata*, *Ferocactus viridescens*, *Githopsis diffusa* ssp. *filicaulus*, *Harpagonella palmeri* var. *palmeri*, *Muilla clevelandii*, and *Quercus dumosa*. During the final survey phase, one new California Native Plant Society regionally rare species was found, *Ceanothus otayensis* (Otay lilac).

The USFWS has initiated a status review of the following species to determine whether listing is warranted: monarch butterfly (*Danaus plexippus*), western spadefoot toad (*Spea hammondii*), and tricolored blackbird (*Agelaius tricolor*).

The monarch butterfly is known to occur only as a transient on MCAS Miramar. No overwinter roosts have been identified on the Station. Small amounts of narrow-leaved milkweed (*Asclepias fascicularis*) have been noted on MCAS Miramar from time to time, but no established patches have developed. This may be due to high temperatures and drought over the past several years that affect seed viability. Sites identified as having its milkweed host plant are located in canyon bottoms and floodplains which mostly occur within Level II Management Areas already identified for special conservation attention.

The western spadefoot toad is known to be widely scattered throughout MCAS Miramar in low densities in a variety of habitats. Western spadefoot toads breed in vernal pools and other seasonally ponded areas which are already protected on MCAS Miramar. The tricolored blackbird is a colonial nester and not known to breed on MCAS Miramar. Although it is not known to breed on MCAS Miramar, individuals have been documented using wetland habitats during the non-breeding season. These wetland habitats are also protected on MCAS Miramar. Both the western spadefoot toad and tricolored blackbird are found in habitat primarily identified in management areas I, II, and III, as shown in Table 5.2 in Chapter 5. Conservation of vernal pools and wetlands afforded by the INRMP benefit spadefoot toads and tricolored blackbirds.

The Natural Resources Division is tracking the status of a number of other SAR that occur at MCAS Miramar, presented in Table 4.7. For example, MCAS Miramar supports habitat for burrowing owl, which is a California Species of Special Concern. There has been a dramatic reduction in numbers of resident breeding burrowing owls, as well as wintering, in coastal southern California. The species is under imminent threat of extirpation from San Diego County. In 2012, CDFW prepared a staff report on burrowing owl mitigation, which replaced the 1995 staff report. This report would be considered by MCAS Miramar during NEPA analysis. Focused surveys for burrowing owls during breeding and non-breeding seasons were performed in 2012 (Arnold 2013), and observations are noted by the Natural Resources Division staff and biological contractors. No potentially breeding pairs of burrowing owl have been recorded on the Station since 1994 (Table 4.7), however, isolated individuals have been observed as short term residents on MCAS Miramar.

7.2.5 Vernal Pool Habitat Management

This section addresses vernal pool habitat and other wetlands on MCAS Miramar that are described in greater detail in Chapter 4. Special Status Species dependent on vernal pool habitat at MCAS Miramar are described in Section 4.3, *Vernal Pool Habitat*. The San Diego button-celery, California Orcutt grass, San Diego mesa mint, Riverside fairy shrimp, and San Diego fairy shrimp are listed as endangered, and spreading navarretia is listed as threatened.

Other wetlands include vernal marshes, fresh water marshes, portions of some riparian vegetation types, and edges of open water ponds and are discussed further in Section 7.2.6, *General Wetland Management*. Management and use of these areas requires careful consideration of the CWA, ESA, and the national policy (Executive Order 11990, *Protection of Wetlands*) to permit no overall net loss of wetlands.

MCAS Miramar maintains up-to-date GIS for vernal pool habitat on the installation that supports proactive planning and impact avoidance.

Previous Plans

Previously prepared and relevant documents for the management of vernal pool habitat at MCAS Miramar include the 2000 and 2005 INRMPs (MCAS Miramar 2000, 2006), NAS Miramar Vernal Pool Management Plan (Bauder and Wier 1991) and *The Ecology of Southern California Vernal Pools* by Zedler (1987). Relevant content of these management plans have been incorporated into this INRMP.

The NAS Miramar Vernal Pool Management Plan (Bauder and Wier 1991) was prepared for a Naval Air Station with a different mission than that of MCAS Miramar. Since that time boundaries have changed, more accurate inventories have been conducted, technology has advanced, and the science of vernal pool management has progressed. The current INRMP contains portions of the NAS Miramar Vernal Pool Management Plan that remain applicable for continuing management of vernal pool habitat on the Station.

Early Surveys

Two vernal pool habitat surveys were conducted in the region during 1979 that include parts of MCAS Miramar: one for CDFW (Beauchamp and Cass 1979) and the other for Pardee Construction Company (Villasenor and Riggan 1979). Both surveys included many vernal pool areas not on the then NAS Miramar, and neither survey included the entire Station. Beauchamp and Cass (1979) mapped and counted vernal pools and estimated the surface area of pools and their watershed area. They also indicated the presence or absence of nine sensitive vernal pool taxa in each pool group, the type of associated vegetation, the degree of disturbance, and the land owner. Villasenor and Riggan (1979) mapped and numbered individual pools and noted the presence or absence of 12 vernal pool taxa in each pool. In some pools, only the presence of *Pogogyne abramsii* and *Eryngium aristulatum* var. *parishii* was noted. Pool dimensions were estimated.

Beauchamp (1982) conducted a vernal pool habitat survey limited to NAS Miramar with the purpose of mapping pool areas around runways on the Main Station and on Miramar Mounds National Natural Landmark. Maps were created for all of the Station, but detailed information on plant species and pool size was provided for only six pool series (AA - a portion, EE, GA, GG, HH, and U). He noted the presence or absence of 16 vernal pool habitat taxa and estimated pool size for these pools.

The Bauder (1986) report, compiled for CDFW, was intended to update the Beauchamp and Cass (1979) report. It surveyed all previously mapped pools and made an assessment of their condition, noted the presence/absence of sensitive taxa, and calculated the number of pools or pool areas that had been lost to development. This survey and those in 1991 by Bauder and Weir are the only surveys to assess pool habitat condition in detail. Bauder made no attempt to remap pools or map newly discovered pools. In addition to these comprehensive studies, a number of more focused surveys has been conducted over the period, including Woodward-Clyde Consultants (1980), City of San Diego (1981), Patterson (1987), Steele (1988), and Michael Brandman Associates, Inc. (1988).

Differences from survey to survey in the level of detail used in mapping pools in the field and the tendency to either merge pools that are interconnected or count them separately have contributed to different numbers of pools being recorded for each pool group during 1979, 1982, 1986, and 1990 surveys. In addition, the prolonged drought from 1986 through spring of 1990 may have reduced the numbers of plants of vernal pool habitat species in a given area and, thus, made locating vernal pool habitat more difficult.

Management Units

All vernal pool habitats identified on MCAS Miramar were assigned a group designation in 1991 (Bauder and Weir) following the system of vernal pool groups developed by Beauchamp and Cass (1979) for San

Diego County, as supplemented by Bauder (1986). Individual clusters/groups of pools were identified by a code employing letters and numbers. Letters refer to regions or series of pools, and numbers refer to clusters/groups within regions or series. Pool groups newly mapped or renamed in 1990 were assigned codes that were followed by a "+" (Bauder and Wier 1991). Data regarding the number of pools, plant species present, characteristics of pools, and other qualities were presented in descriptive paragraphs and summarized in Table 2 and Appendix 1 of the 1991 plan (Bauder and Wier). Exhibit 4 in that plan illustrated the distribution of pool groups, sensitive species, and Management Units. This exhibit was a synthesis of all previous mapping efforts. The abundance and distribution of vernal pools and other seasonally ponded features supporting vernal pool adapted species has been updated in recent years with additional and more intensive surveys (see Section 4.3.4, *Vernal Pool Habitat at MCAS Miramar*). Figure 4.3.4 of this INRMP shows current vernal pool habitat distribution and management units on MCAS Miramar and this data is maintained in the Stations GIS data layer.

Objective: Take Proactive Action to Prevent Damage to Vernal Pool Habitat

Vernal Pool Habitat Damage and Other Risks

Bauder and Wier (1991) summarized the relative likelihood of damage to vernal pool habitats via different mechanisms on a qualitative basis. The type and extent of damage visible (in 1991) at each site was used to predict future conditions unless a significant change in land use or management had recently taken place. Probability or likelihood of occurrence was coupled with an estimate of habitat restorability given the particular type of damage. For example, some events had a low probability of occurrence (*e.g.*, air crashes, toxic spills) but a high potential for inflicting serious, perhaps, irreversible damage. Conversely, dumping or mowing had a high probability of occurrence, but resulted in little irreversible damage.

Bauder and Wier (1991) summarized the following types of damage, either potential or realized for vernal pool habitat.

Aviation Mishaps - Although air crashes may occur infrequently, when they do happen, pools and surrounding habitat could sustain substantial damage from the impact of the plane, fuel spillage, fire, fire suppression, and the activities of emergency crews and vehicles.

Altered Hydrology - The construction of roads, runways, and buildings that interrupts the normal surface and subsurface flow of water creates an altered hydrology of pool areas. For example, vehicles usually cause longer periods of water retention (Bauder 1989a, 1989b), probably due to a combination of soil compaction and removal of soil that puts the hardpan closer to the surface.

Dumping/Trash - Dumping of trash refers to the accumulation of inert materials, such as wood, metal, bricks, and household goods, but not toxic materials.

Fire/Fire Suppression - Wildfires and associated activities can affect vernal pool habitat in three ways: fire suppression (vehicles, grading, chemical fire retardants), fire risk reduction (discing, grading, brushing), and the actual burning of vegetation (prescribed burns, wildland fires). Because vernal pool flora and fauna evolved in a landscape subject to periodic wildfires, they ought to be able to withstand fires so long as their frequency and intensity do not differ markedly from the historical norm.

Future Projects – Potential future projects[18] or altered land uses (resulting from both military and non-military sources) occurring in vernal pool habitat could have a very high probability of damaging vernal pool habitat. Projects that will affect nearby land may impact pools via altered hydrology, toxic spills, increased disturbance, or some other effect associated with the juxtaposition of incompatible land uses. Also, changes to land higher in the drainage increase the probability of impacts to pools.

Grading - The threat of damage due to grading, defined as soil disturbance well below the surface, includes that of approved land uses as well as grading incidental to other activities. If grading or ripping pierce the hardpan or fill pool basins with soil, pool hydrology may be permanently altered.

[18] This discussion refers to a concept and is NOT referring to a specific list of projects being planned.

Mowing and Discing - Mowing is known to alter the competitive relationships of species, but its effect on vernal pool species is unknown. Mowing generally occurs around the runways. If mowing is done when soils are dry and annuals have set seed, damage should be minimal.
Pedestrians and Horses - Although effects of foot paths and bridle trails are not as detrimental as motorized vehicles, both humans and horses can have negative impacts on vernal pool habitat.
Toxics - Toxics can directly kill vernal pool flora and fauna and may persist in soil and water for long periods of time.
Vehicles - Other than destruction of habitat by conversion to buildings, parking lots, and roadways, vehicles pose the greatest threat to vernal pool habitat. Information evident in aerial photos and field surveys (in 1991) on the ground suggested that vernal pool habitat on NAS Miramar was steadily being degraded and destroyed. This observation from 1991 failed to acknowledge the long history of military land use of the Station dating back to World War I. No comparison was made to conditions following World War II land use when Camp Elliott was the primary training base for the Fleet Marine Force.
Climate Change – Changes in precipitation and warming will likely affect vernal pools and the species that inhabit them. Decreases in annual precipitation may affect vernal pool hydrology, which in turn may affect the species of plants and animals that rely on the seasonal wetlands.

Objective: Implement Vernal Pool Habitat Restoration and Re-Establishment to Maintain No Net Loss of Vernal Pool Habitat Basin Resources

Compatibility of uses within Level I MAs is discussed in Chapter 5. The vast majority of vernal pool habitat basins and watersheds are encompassed within Level I MAs on MCAS Miramar to highlight them for management and conservation. Protection of vernal pool habitat has been given the highest management priority on MCAS Miramar. Management recommendations have been, and continue to be, developed to prevent the degradation or destruction of vernal pool habitat.

Vernal Pool Habitat Restoration Natural Resources Division

The 1991 Vernal Pool Management Plan (Bauder and Wier 1991, Appendix 6) included prioritized lists of management recommendations for each management unit. Many of these have been accomplished; some are outdated; and some remain to be done.

The 1991 Vernal Pool Management Plan (Bauder and Wier 1991, Appendix 7) includes vernal pool habitat restoration techniques (*i.e.*, decompaction, sculpting/recontouring, reseeding pools, re-establishment, invasive species removal), which have been used, and when necessary modified, to restore pools on NAS Miramar and MCAS Miramar during the past 14 years, as indicated by the following examples.

- In 1988-1996, 23 vernal pool basins (0.36 ac; 15,681 sq. ft.) were created in the northwestern portion of the Station (X1-3 Group) to compensate for vernal pools lost from construction of the West Coast Navy Consolidated Brig. This project included excavation of basins and inoculation with soil and seed collected from surrounding basins at the restoration site. Maintenance and success monitoring continued for seven years, and at the end of seven years all basins continued to meet success criteria (Black *et al*. 1996). A review of created vernal pool basins completed by Black and Zedler (1998) found that these basins suggested a gradual convergence of the function

and characteristics toward those of natural pools and that artificial basins can support populations of native species for considerable periods. Recent sampling for a few of these pools showed that the basins continue to provide vernal pool habitat in 2010 (C. Black, unpublished data).

- In 1992, restoration of 0.4-acre of vernal pool habitat south of the Navy-Marine Corps Reserve Center that was damaged by tank training was completed.
- In 1992-94, 30 pool basins were restored. This project included reconstructed mounds reseeded with appropriate upland native species and basins inoculated with appropriate species from pools that were to be developed; it also included removal of invasive plants in the surrounding watershed (Bauder *et al.* 2001).
- In 1997, 2.30 acres (79 pools) were restored within AA4-7, F (north), F16, U15, and U19 pool groups (Black 2000a, 2003a).
- In 1997, 2.3 acres (75 pools) were restored within Management Unit 2, X1-4, Z1-3, EE1, and HH3+ pool groups (Black 2000b, 2003b).
- In 1998-1999, 0.85 acres (69 pools) were restored within A4, AA8, AA9, and AA10 pool groups (KEA Environmental, Inc. 1999; EDAW, Inc. 2005).
- In 1999-2000, MCAS Miramar re-established/restored about 170,000 square feet of vernal pool surface in the Miramar Mounds National Natural Landmark Vernal Pool Group U (north) (Tomsovic and Macaller 2003, 2004a, and 2004b; Saucedo-Oritz and Macaller 2005).
- In 2004, 0.50 acres of vernal pool habitat were restored in compensation for San Diego fairy shrimp habitat lost in association with improvements and paving of roads and lots of the Flightline Perimeter Road and Camp Elliott Warehouse Area (Tierra Data, Inc. 2008).
- In 2008, restoration of 0.443 acre and enhancement of 0.067 acre of vernal pool habitat at the Miramar National Cemetery for the Miramar National Cemetery vernal pool restoration project was completed. A total of 37 basins were created (33 restored, 4 enhanced). Additional upland watershed restoration was also conducted at the vernal pool restoration site.
- In 2009, a total of 17 vernal pools were created with a combined surface area of approximately 0.41 acre in compensation for the loss of 0.11 acre of vernal pool habitat for the West Coast Basing of MV-22 Osprey at MCAS Miramar and MCAS Camp Pendleton (2009 Department of the Navy).
- In 2016, the Year 4 Annual Management and Monitoring Report for compensatory vernal pool installation for the West Coast Basing of MV-22 Osprey at MCAS Miramar was published. All 17 of the created pools met Year 4 hydrology, species richness, and invasive species success criteria. Additionally, mature fairy shrimp were observed in 13 pools during the wet season and fairy shrimp cysts were found in all 17 pools; all created pools are considered to be occupied by the San Diego fairy shrimp (Naval Facilities Engineering Command Southwest [NAVFAC SW] 2016).

Cobb (2003) developed a restoration plan for the vernal pool habitat at the Miramar Mounds National Natural Landmark on the Station. This plan identified 124 vernal pool habitats (3.2 acres) within the Landmark that are suitable for vernal pool habitat restoration. The plan includes performance criteria and annual reporting requirements. This restoration planning methodology has value for Other Seasonally Ponded Features restoration projects in the future.

Black (2007) identified 293 acres in seven areas of the Station that appear suitable for re-establishing vernal pools. During 2005-2008, Black (2009b) identified basins suitable for restoration and enhancement in all suitable areas of the Station. In all, 1,716 basins (22.814 acres) were suitable for some type of restoration or enhancement treatment. The most common recommended treatments were deepening and enlarging marginal basins or combining and enlarging small adjacent basins. A total of 284.171 acres was suitable for new basin and associated new basin watershed construction. A net increase of 48.302 acres was determined to potentially be achieved through existing basin restoration and enhancement plus new basin construction.

The Branchiopod Research Group (2003) concluded monitoring water quality in vernal pool habitat restored in 1998-99 (KEA Environmental, Inc. 1999; EDAW, Inc. 2005). No significant coliform bacteria or hydrocarbon contamination was found. Soil disturbance associated with pool re-establishment/restoration did not appear to increase the availability or solubility of heavy metals. Soluble levels of heavy metals were generally low, but cadmium, lead, and iron were above Environmental Protection Agency potable levels in some areas. However, no comparison was made to naturally occurring background levels.

Black *et al.* (2016) studied effects of wildfire on vernal pools in the F (north) vernal pool group. In 2000, a wildfire started along a freeway (SR 163); 15 vernal pools burned by the fire were studied along with 30 unburned pools as controls. Subsequently, the October 2003 Cedar Fire burned the entire study site. Another smaller fire later burned a portion of the study site. The study continued to collect data on all pools through spring of 2009. It found that there was a generally positive effect of fire on native vernal pool plant vegetation and a negative effect on invasive annual plant populations for the first several years after burning.

Vernal pool ecosystem functionality is threatened by invasive plant species. *Agrostis avenacea* has invaded San Diego vernal pools since the 1980s and has become firmly established (Zedler and Black 2004). This species adversely affects at least three Special Status Species. The Station funded a study of the effects of *Agrostis avenacea* in vernal pool habitat on MCAS Miramar. Labor-intensive, hand weeding was suggested to be the best option for minimizing effects of this species (Bauder *et al*. 2002). Since the species is widespread on MCAS Miramar and easily windblown and spread, the best opportunity to manage this species is to reduce colonizing efforts by removing the species by hand during restoration/enhancement projects.

The Natural Resources Division has developed a general approach to respond to and repair accidental damage to vernal pool habitat and associated threatened and endangered species and maintains a budget line item to respond to damage repair and vernal pool habitat management. The Natural Resources Division has been using field markers, signs, or fencing around vernal pool habitat groups with a higher susceptibility for damage to prevent accidental and/or unintentional damage. The perimeter of the Sander Parcel, south of State Route 52, was fenced in 2005 to reduce trespass damage.

The Natural Resources Division continues delineating isolated ephemeral wetlands and other depressions ponding water (including vernal pool habitat) during winter/spring. This effort was started in 1999 and has included virtually all of the Station with more than 7,500 basins surveyed. Virtually all vernal pool basins have been or are being surveyed for fairy shrimp and listed plant presence and abundance. This was accomplished both as specific survey projects and using other projects that require vernal pool habitat mapping, such as the survey of Parcel G for possible transfer to the USFWS (Ecological Restoration Service 2001). Re-mapping of pools previously mapped with old technology using sub-meter accurate GPS equipment resulted in a more accurate, but lower, estimate of total acreage of vernal pool habitat on the Station in 2010 versus earlier years (147.1 acres in 2010 vs 157.3 acres reported in 2006). The apparent loss of vernal pool habitat acreage was only the result of more accurate mapping. Nevertheless, the total number of basins mapped increased by a few hundred in 2010. The most recent survey for vernal pool resources was completed in 2015. With virtually all of the Station now surveyed for vernal pool resources, the current focus is performing survey updates for operationally important areas.

Vernal Pool Mitigation Planning

A Finding of No Significant Impact was signed in August 2015 to identify suitable areas to establish and manage vernal pool wetland habitat at MCAS Miramar and to compensate for impacts to federally listed vernal pool species and/or jurisdictional areas. Areas identified and approved for potential future use have suitable site conditions (geology, topography, soil) and were deemed to be compatible with operations at

the time. A site-specific plan and crediting agreement with the USFWS and ACOE is under development for one identified area that would be used for advance mitigation credit development, possibly as a formal joint ESA and CWA conservation/mitigation bank, in-lieu fee mitigation program, or advance permittee-responsible mitigation. A second area identified is planned for use to meet compensatory mitigation needs that is not done in advance, beginning with that needed for new F-35 facility construction in 2018.

7.2.6 General Wetland Management

Objective: Maintain No Net Loss of Wetland Values

MCO 5090.2 (para. 11104.2a) states, "*The Marine Corps will comply with the national goal of no net loss of wetlands and will avoid loss of size, function, and value of wetlands. In addition, the Marine Corps will preserve and enhance the natural and beneficial values of wetlands while conducting its activities*."

MCAS Miramar supports wetlands other than the vernal pool habitat addressed above, including vernal marshes, fresh water marshes, and portions of some riparian vegetation types and edges of open water ponds. As is the case with vernal pool habitat, management and use of these areas requires careful consideration of the CWA, ESA, and the national policy (Executive Order 11990, *Protection of Wetlands*) to permit no overall net loss of wetlands. Table 7.3 provides estimates of acreages of various wetland types found on MCAS Miramar. These data, in no way, are intended to identify which wetlands are subject to regulatory requirements of the CWA.

Table 7.3. Wetlands on MCAS Miramar

Types of Wetlands	Acreage
Vernal Pool	96
Other Seasonally Ponded Features	52
Freshwater Marsh	26.4
Riparian Woodland	252.8
Total Wetlands	427.2

Lichvar (2000) delineated non-vernal pool wetlands and Waters of the U.S. at Main Station, including portions of the Rose Canyon area, on MCAS Miramar. He delineated 14.9 acres of non-vernal pool wetlands and 0.26 acres of drainage ditches and intermittent stream channels in the cantonment area.

Smith and Lichvar (2001) conducted a Station-wide planning level delineation of aquatic resources, mapping of floodplains, and a functional assessment of riparian ecosystems at MCAS Miramar, as discussed in Section 7.2.1, *General Vegetation Management and Soil Conservation*.

Lichvar and Dixon (2008) delineated non-vernal pool wetlands and other waters of the United States, updating the 2000 delineation done for the Main Station and adding all areas within the Flightline security fence. This work used the recently published Corps of Engineers Wetland Delineation Manual: Arid Wet Supplement of 2006. Additionally, the project made "nexus" determinations (of hydrologic connection) for all waters of the U.S., including vernal pool basins, within this same area, consistent with clarifications to the Clean Water Act that resulted from recent U.S. Supreme Court decisions.

Tetra Tech (2014) updated the Station-wide vegetation map. The 2014 vegetation map provides a more up-to-date and accurate representation of riparian plant communities as shown in Figure 4-2 and detailed in Appendix C.

Non-Vernal Pool Wetland Mitigation Planning

In anticipation of a need for non-vernal pool wetland mitigation for BRAC construction impacts, Burkhart (1999) analyzed two potential restoration sites (totaling 3.1 acres). To compensate for impacts of BRAC

projects, the Murphy Canyon site analyzed by Burkhart (1999) was used. The second site in San Clemente Canyon, east of I-15, was also identified as a potential location for future wetland mitigation efforts.

During 1999-2001 a contracted study was conducted for the Public Works Division to identify suitable restoration sites for coastal scrub, grasslands, and wetlands. This study (Johnson *et al*. 2003) identified 88.1 acres suitable for wetland restoration or enhancement.

Surveys conducted for suitable streambed and associated riparian wetland mitigation sites identified a number of man-made berms and other excavations in San Clemente Canyon, west of Kearny Villa Road and I-15, which were suitable for CWA mitigation. Removal of the man-made berms and restoration of riparian habitat were identified to have the potential to provide beneficial repair to the hydrology of the San Clemente watershed on Station. As a result of this survey, restoration of 0.28 acre of stream and 0.20 acres of wetland habitat was sited in San Clemente Canyon as compensatory mitigation for West Coast Basing of MV-22 Osprey facilities at MCAS Miramar. The project is currently in the fifth year of maintenance and monitoring.

In 2011 and 2012, surveys of the Base were performed again to identify potential mitigation sites for impacts to waters of the United States (HDR 2014). Non-wetland streambeds and non-vernal pool wetlands were identified for potential restoration (re-establishment and rehabilitation), establishment, or enhancement. Twenty-four Potential Mitigation Areas (POAs) were identified within four drainages on MCAS Miramar, including within Rose Canyon, San Clemente Canyon, Murphy Canyon, and Elanus Canyon. Of the 24 PMAs studied in 2012, Natural Resources Division staff selected seven for individual California Rapid Assessment Method (CRAM) analysis and development of individual conceptual mitigation plans (HDR 2014).

Owl Box *Natural Resources Division*

7.2.7 General Wildlife Management

Objective: Maintain Healthy Wildlife Populations

Fish and wildlife management is defined by the Marine Corps as, "*A coordinated program of actions for conserving, enhancing, and regulating indigenous wildlife and its habitats, including conserving protected species and non-game species, managing and harvesting game species, reducing bird aircraft strike hazards, and controlling animal damage*." (MCO 5090.2, para, 11105.17). At MCAS Miramar, BASH is considered in applicable management actions and is discussed further in Section 7.2.9, *Wildlife Damage Management*.

Conservation of undeveloped areas and the habitat in those areas will protect the viability of all wildlife populations on MCAS Miramar. All species of wildlife will benefit from MCAS Miramar's basic strategy to limit activities, avoid development, and perform mitigation actions in areas supporting high densities of predominantly vernal pool habitat, threatened or endangered species, and other wetlands.

Furthermore, the basis of good management is an understanding of the diversity, abundance, distribution, population dynamics, and habitat requirements of species. This approach is reflected in the Station's past and ongoing biological studies. These studies have included monitoring of neotropical migrant birds and surveys of Lepidoptera, bats, reptiles, amphibians, small mammals, coyotes, and mule deer, in addition to focused surveys for threatened and endangered wildlife species.

Hunsaker and Cox (1997, 2001) conducted a vertebrate survey on MCAS Miramar that identified 190 bird species, 36 mammal species, 25 reptile species, and 7 amphibian species. Hunsaker (1997, 2001) studied the habitat use and relative density of bats at the Station. Habitat use and relative density of reptile and amphibian populations at the Station are summarized by Varanus Biological Services, Inc., and San Diego Natural History Museum (2001). Updated surveys were performed in 2009.

Game fish species recorded as having been stocked on Miramar include largemouth bass, rainbow trout, channel catfish, bluegill, and red-eared sunfish (USFWS 1992b). The Fish Pond, after being closed to fishing since about 1990, was restored and reopened to fishing in May 2003 (Section 7.2.11, *Natural Resources-related Outdoor Recreation Management*).

As discussed in Section 7.2.11, *Natural Resources-related Outdoor Recreation Management*, MCAS Miramar has determined that it is not currently feasible to develop and implement a recreational hunting program. However, wildlife game species at MCAS Miramar include California quail (*Callipepla californic*a), mourning dove *(Zenaida macrour*a), desert cottontail *(Sylvilagus audubon*ii), black-tailed jackrabbit *(Lepus californicu*s), brush rabbit *(Sylvilagus bachman*i), coyote (*Canis latrans*), bobcat (*Lynx rufus*), waterfowl, and southern mule deer.

The deer population on East Miramar in 1986 was estimated at 100 to 150 animals (Hannan 1987). Spotlight surveys conducted through 1999 by the Station, show a similar deer population. Quail surveys, conducted in 1986, estimated the quail population at 900 to 2,500 on East Miramar (Hannan 1987). Subsequent 1989 quail surveys indicated they were still abundant. The mourning dove population on East Miramar in 1986 was estimated at about 500 (Hannan 1987). Coyote surveys conducted in fall 1995 estimated densities of 4.1 coyotes per square kilometer for East Miramar and 2.3 in West Miramar, noting that densities were equal to the highest published densities in North America (Mason 1998).

The Natural Resource Division has worked with Station planners and security personnel to minimize barriers to movement of large wildlife that may be created by necessary security fencing. In areas of lower security concern, devices to allow larger wildlife passage have been included in new fencing plans. However, in some areas, such as the Flightline Area, Ordnance Magazine Area, and those containing munitions of explosive concern, heightened security or safety requirements preclude provision of any openings that would allow human access.

MCAS Miramar contracted for the removal of non-native fish and amphibians from aquatic ecosystems, in accordance with the Non-Indigenous Aquatic Nuisance Prevention and Control Act of 1990 and Executive Order 13112, *Invasive Species* (Varanus Monitoring Services 2002); results were not effective on a long-term basis. Issues of complete removal, reintroduction, or immigration after removal of these species are very difficult to resolve.

Long-Term Ecosystem Monitoring

MCAS Miramar and the Naval Facilities Engineering Command, Southwest have developed a faunal component of LTEM that coincides with a subset of the vegetation LTEM plots. Results of the initial year (1999) field studies for both flora and fauna were summarized (Varanus Biological Services, Inc., and San Diego Natural History Museum 2003) and provide a baseline for future comparisons. The fauna component includes small mammals, bats, reptiles, amphibians, and results of spotlight surveys. A repeat monitoring effort was more recently completed in 2009.

7.2.8 Migratory Bird Management

Objective: Manage Migratory Bird Conservation to Minimize Operational Conflicts

MCO 5090.2 (para. 11104.3c) states, "*The Marine Corps shall consult with FWS during INRMP preparation to ensure that actions not directly associated with military readiness activities (e.g., training) are conducted in a manner that minimizes the taking of birds protected by* [Migratory Bird Treaty Act] *and listed in [*Title 50, Code of Federal Regulations, Part 10, Section 13, "*List of Migratory Birds*," annual edition]. *While incidental take of migratory birds is authorized during the conduct of military readiness activities, the Marine Corps will discuss with FWS the impacts of such activities to migratory birds. Installations shall consult with local or regional FWS offices on proposed actions intended to take (e.g., banding or marking, scientific collecting) migratory birds, their young, or eggs.*"

The primary consideration with regard to migratory birds is compliance with the Migratory Bird Treaty Act. Except as permitted, actions may not result in pursuit, hunting, taking, capture, killing, possession, or transportation of any migratory bird, bird part, or nest of any species listed in 50 CFR 10.13. Marine Corps installations must apply for depredation permits for those actions with the primary intent to capture, move, or kill migratory birds, their young, or eggs. All persons, organizations, and agencies, are liable for prosecution for violations and must follow permitting requirements for taking migratory birds. Special purpose permits may be requested and issued that allow for the relocation or transport of migratory birds for management purposes. However, the long timeframe required to apply for and obtain special purpose permits makes it inappropriate for most one-time, individual cases. MCAS Miramar maintains a depredation-airport permit that allows authorized Station personnel to take, temporarily possess, and transport migratory birds to relieve or prevent injurious situations impacting public safety. Such depredation control activities must be within MCAS Miramar-specific and standard permit conditions. No hunting is allowed on MCAS Miramar. Appendix A discusses requirements of the Migratory Bird Treaty Act and the applicable military readiness rule in more detail.

The bird component of LTEM (Project - Long-term Ecosystem Monitoring, Faunal Component (MI95556), Section 7.2.7, *General Wildlife Management*) is used to monitor migratory birds on the Station in accordance with Executive Order 13186, DoD policy; and the Memorandum of Understanding between DoD and the USFWS for Migratory Bird Conservation (see Appendix A). Appendix A outlines organizations and their respective lists of Bird Species of Concern that warrant particular consideration and monitoring in accordance with these laws.

The following considerations are pertinent to migratory bird management.

- ***Nuisance bird problem prevention***: Exclusion of nuisance birds is the preferred method; Natural Resources Division can provide technical support to those needing assistance. Installation and materials for such exclusion must be accomplished in coordination with the Public Works Division. Unfortunately, exclusion is not always possible or completely effective. Natural Resources Division biologists will assist in developing exclusion devices where bird access or nesting cause problems.
- ***Injured and nuisance birds:***
    - *Final Rule –Removal of Migratory Birds From Buildings* (as discussed in Appendix A) allows removal of migratory birds (other than federally listed threatened or endangered species, bald eagles, and golden eagles) from inside buildings in which the birds may pose a threat to themselves, to public health and safety, or to commercial interests. This regulatory addition facilitates removal of birds from buildings, which would otherwise require a migratory bird permit. Birds removed under this rule must be captured using a humane method and, in most cases, immediately released to the wild. "*This regulation does not allow removal of birds or nests from the outside of buildings without a permit. Removal*

of active nests from inside buildings must be conducted by a federally permitted migratory bird rehabilitator." The permit cannot be used for situations where birds "*are merely causing a nuisance*."

- MCAS Miramar annually renews a depredation-airport permit. In the past, removal actions to alleviate excrement falling onto workspaces and aircraft have been deemed impacting public safety. The Natural Resources Division and Public Works Division have developed procedures for responding to injured or nuisance birds including active bird nests (with or without eggs or chicks). The Public Works Division maintenance trouble call system is to be used for assistance. A standard form has been developed to record data for each removal action in order to support annual permit reporting requirements.

- ***Construction and Maintenance***: The approach will be to coordinate with those scheduling and performing construction and/or maintenance to avoid the breeding season, where possible. Wording in contracts and work orders will explain the law, and that it applies to all persons (not just federal agencies). A contract or work order does not authorize, encourage, or condone violation of the law, and workers are expected to comply. The Natural Resources Division has developed contractual and work order language for construction, reconstruction, and maintenance projects on the Station to minimize loss of bird nests and costly delays due to Migratory Bird Treaty Act prohibitions. This information is available for use in contracts and work orders and has been incorporated into many project specifications.

MCAS Miramar supports the DoD policy for integrating neotropical migratory bird management into existing natural resource and land management programs, consistent with the military mission. MCAS Miramar established and maintained Monitoring Avian Productivity and Survivorship stations to help determine nationwide bird demographics from 1996 through 2002 (Jones & Stokes 2003). Birds captured included 94 species; both total numbers and adult breeders showed declines during poor rainfall years.

7.2.9 Wildlife Damage Management (Including Bird and Animal Air Strike Hazard)

Objective: Reduce the Potential for Wildlife Damage

MCAS Miramar's boundaries interface with both urban and natural environments. Conflicts can arise with nuisance animals (*e.g*., coyotes, ground squirrels, rattlesnakes, rats), which occasionally pose a health hazard. Furthermore, Special Status Species and other native wildlife are prey for some domestic animals. MCAS Miramar pest control is conducted through the Public Works Division, and if necessary, other local vector/animal control agencies. Wildlife problems previously identified at MCAS Miramar include coyotes around the former horse stables and housing areas, gulls and ravens from the landfill, and interference from birds, coyotes, and deer on the runway.

Assistance with nuisance animal problems can be acquired from U.S. Department of Agriculture, Wildlife Services on a reimbursable basis. In general, special permits are usually required to remove nuisance animals and can delay the response to the problem. Although leg hold traps are often the most effective technique for catching some animals, the use of body gripping traps by Wildlife Services personnel is restricted to addressing a demonstrated human health or safety problem with the concurrence of the CDFW. Additionally, State law has further restricted control of mountain lions with a protected species status.

The BASH program is an important consideration at MCAS Miramar. Bird collisions with aircraft are a serious threat to flight safety. At MCAS Miramar, incidents in recent years have involved common ravens, small song birds, a red-tailed hawk, and a herring gull. Distribution and abundance of bird species that pose a potential hazard can change seasonally and also vary by altitude, temperature, rainfall patterns, and surrounding land use. The U.S. Department of Agriculture, Wildlife Services (2002) completed a Bird Air Strike Hazard Assessment for the Station. A review of the assessment and current conditions was completed in 2014 by the Station Wildlife Biologist; however, a new assessment by USDA Wildlife Services should

be done about the time F-35 facility construction is completed and basing begins. Flight line mowing is planned to minimize the attractiveness to birds and avoid adverse effects to Special Status Species with guidance provided by the USFWS[19].

Miramar Station Order 3750.2a, *Bird/Animal Aircraft Strike Hazard (BASH) Reduction Plan* (28 August 2014), is implemented to minimize aircraft exposure to potentially hazardous bird/animal strikes at and around the Air Station and reduce bird/animal strike potential through awareness, avoidance, monitoring, and actively controlling bird and animal populations and movements. The plan implements a red, yellow, and green Bird Warning Condition system to adjust awareness and flying activities to various risk levels. It also establishes a Bird Working Group with assigned responsibilities. The Airfield Operations Officer is the Chairman, and is supported by Airfield Operations staff, the Natural Resources Division, and Facilities Maintenance Division for implementation of the program. Airfield operations staff are key personnel for monitoring bird and wildlife activity that could be BASH hazards. They use hazing and employ banger and screamer noise devices to deter birds. A propane cannon has been recently purchased to supplement non-lethal noise deterrents.

City of San Diego landfill operations with regard to bird abatement have been improved in recent years, as required by the lease. As a result, bird concentrations at the landfill are generally low. However, common raven concentrations have recently become a concern on the airfield. Preliminary indication is that raven concentrations may be a result of colonial roosting in San Clemente Canyon, rather than attraction to landfill operations. Potential beneficial effects of owls inhabiting aircraft hangers have been evaluated at other air stations. Since owls are nocturnal, they are much less of a BASH concern than other species. They may also prevent or reduce the presence of other birds and rodents from inhabiting hangars. Unfortunately, the mess created by owls living in some of the aircraft hangers on Station has created conflicts with aircraft maintenance. A variety of methods are used to resolve problems, including exclusion, harassment, and relocation. Most other birds, since they are active during daylight hours, are a greater BASH concern.

The Natural Resources Division maintains a list of wildlife rehabilitation centers for placement of injured or abandoned wildlife. The Division also has prepared standard operating procedures for handling road-killed/injured deer and other larger animals. The feeding of wild animals is discouraged. The CDFW web site "*What to do about Nuisance, Dangerous or Injured Wildlife*" (https://www.wildlife.ca.gov/Living-with-Wildlife) discusses injured or orphaned wildlife and provides advice for common human-wildlife interactions. The CDFW Keep Me Wild program (https://www.wildlife.ca.gov/Keep-Me-Wild) is designed to avoid issues created by providing food to wildlife, either inadvertently or on purpose. Wild animals naturally fear humans and keep their distance—so long as they remain fully wild. If wild animals have access to human food and garbage, they lose their natural fear of humans and can become aggressive; they might be killed. The CDFW Living with Wildlife website (https://www.wildlife.ca.gov/Living-with-Wildlife/Rodenticides) discusses guidance for protecting wildlife and pets from rodenticide baits.

7.2.10 Integrated Pest Management

Objective: Comply with the Federal Insecticide, Fungicide, and Rodenticide Act and Minimize the Use of Pesticides

Pest control includes insect, rodent, and disease management, particularly pesticide application management. Most pest management activities on Station are performed in coordination with or under the supervision of the Public Works Division. A 2012 Integrated Pest Management Plan (MCAS Miramar 2012) for the Station complies with applicable requirements, particularly those of the federal Insecticide, Fungicide, and Rodenticide Act and DoD and Department of the Navy policies. More information on

[19] Bird Air Strike Hazard Prevention Program Mowing Operations, NAS Miramar (1-6-94-I-33) dated 14 January 1994.

guidance for protecting wildlife and pets from rodenticide baits can be found on the CDFW website at https://www.wildlife.ca.gov/Living-with-Wildlife/Rodenticides.

MCO 5090.2, para. 11104.1b) states, "*Each installation shall use the principles of Integrated Pest Management to avoid and minimize the use of pesticides when non-chemical alternatives are available and cost effective*." Pesticide use in support of Station natural resources management activities involves invasive plant/weed control (Section 7.2.1, *General Vegetation Management and Soil Conservation*). Sections 7.2.8, *Migratory Bird Management* and 7.2.9, *Wildlife Damage Management* of this INRMP discuss nuisance bird, wildlife, and BASH topics associated with integrated pest management.

A 2010 mosquito/West Nile virus risk assessment[20] indicated that naturally ponding areas have sufficient populations of natural predators to effectively suppress mosquito breeding. Treating vernal pools and other naturally ponding areas for mosquito control (larvacide) was not recommended, but continued monitoring was recommended. Ponding at unnatural sites should be addressed by making alterations to operations to prevent water from ponding. No historic information was found to confirm the absence or presence of West Nile virus in mosquito populations on Station.

Africanized honey bees are expanding their range, including in the direction of MCAS Miramar; however, these bees have not been found on the Station to date. The Miramar Fire Department is the designated first responder to incidents suspected of involving Africanized honey bees. The Natural Resources Division assisted the Fire Department and Safety Division with the development of an Africanized honey bee response plan.

Finally, it is DoD's policy to use current BMPs to protect pollinators (e.g., bees, birds, bats, butterflies, moths) and their habitats, when possible and to the extent practicable, by using native landscaping and minimizing the use of pesticides, including herbicides, in sensitive habitats (Memorandum dated 04 September 2014, *Department of Defense [DoD] Policy to Use Pollinator-Friendly Management Prescriptions*) in accordance with the *National Strategy to Promote the Health of Honey Bees and Other Pollinators* (House Memorandum dated 19 May 2015). MCAS Miramar does not actively create pollinator habitat.

7.2.11 Natural Resources-Related Outdoor Recreation Management

Objective: Provide Outdoor Recreation Opportunities When Feasible

MCO 5090.2 (para. 11104.1c) states, "*Marine Corps lands will be available to the public for enjoyment and use of natural resources, except when a specific determination has been made by the installation Commanding General/Commanding Officer (CG/CO) that a military requirement prevents such use for safety or security reasons, or when such use would cause substantial environmental degradation. A nonaccess or limited access determination will be explained in the installation's INRMP*."

A draft NAS Miramar Outdoor Recreation Tripartite Agreement (precursor to INRMPs) was prepared in 1992. This INRMP incorporates relevant aspects of the draft agreement that remain applicable, as related to natural resource management, and supersedes any benefits of such an agreement.

A further goal of Marine Corps natural resources management is to provide outdoor recreational opportunities, as appropriate. However, recreational opportunities at MCAS Miramar are limited by

[20] Memo from Officer in Charge, Navy Environmental and Preventive Medicine Unit Five, Naval Base San Diego, CA to Commanding Officer, Preventive Medicine, Naval Medical Center San Diego, CA. 15 June 2010. Subject: *Findings and Recommendations for the West Nile Virus Surveillance Program at Marine Corps Air Station (MCAS) Miramar*.

military operational and security needs, safety concerns, limited management staff to administer programs, and the relatively small land area with a finite resource base. Recreational activities dependent on developed facilities, such as the Miramar golf course, are managed and operated by Marine Corps Community Services (MCCS) under their specific guidelines. Management of the Miramar Fish Pond is accomplished jointly with the Miramar MCCS managing recreational aspects, Public Works providing facility management support, and the Environmental Management Department providing technical support regarding fishery and water quality issues.

Fish Pond *Natural Resources Division*

Management Issues

MCO 5090.2 (para. 11104.5a) states, "*Installations shall provide the public access to natural resources, provided such access is consistent with natural resources and military readiness preservation*."

Management issues at MCAS Miramar include determining the appropriate level of public access to allow for natural resource-dependent outdoor recreation on MCAS Miramar; implementing a program for such access; and integrating outdoor recreation with the operations and military mission of MCAS Miramar without compromising either. Proper management and supervision of outdoor recreation programs is needed to ensure that military safety and security requirements are met and natural resource damage is prevented. Current staffing does not allow for any increase in outdoor recreation opportunities or access. Without an increase in staffing, future development of natural resources-based outdoor recreation is not possible. Further, recreational access to undeveloped areas at MCAS Miramar is limited to a few activities that have been approved by the Committee for Land and Airspace Management Policy and/or the Commanding Officer.

Marine Corps policy is to permit off-road vehicle use only in areas and on trails designated by installation commanders. Unimproved roads must be monitored to prevent movement into sensitive areas (MCO P5090.2). MCAS Miramar does not have the staffing to implement such a program for recreational off-road vehicle use that would include monitoring to ensure natural resources are not damaged.

Stowe Trail is a recently designated non-motorized, multi-use trail for authorized permit-holding users on East Miramar. Stowe Trail provides connections to trails of Mission Trails Regional Park to the north and

south of the Station. Since the trail is on relatively flat terrain, minimal maintenance is expected. Maintenance needs will be evaluated by MCAS Miramar personnel in coordination with representatives from user groups, such as the San Diego Mountain Bike Association. Any maintenance deemed necessary would be accomplished as a cooperative effort of Station personnel and user group volunteers using only hand tools, following authorization by the Commanding Officer. Trail maintenance is best done when moisture is present in the soil so that good compaction and cohesion is obtained. As such, any maintenance would likely be done between late fall and early spring.

As surrounding areas have become urbanized, there has been increasing interest from the public to access MCAS Miramar for natural resource-related field tours and other outdoor recreation. Requests for field tours are typically limited to granting about one per month due to staffing constraints. Requests for field trips need to be submitted to the Public Affairs Office at least 60 days in advance along with proof of liability insurance.

Compatibility of other outdoor recreational activities must meet:

1. military operational and security needs;
2. safety hazards, such as explosive safety distances, firing range surface danger zones, and aircraft operation compatible use/clear zones;
3. staffing limitations; and
4. requirements for resources conservation, which must be carefully evaluated and will continue to limit recreational access.

Implementation of any new outdoor recreational program would involve initial trial phases and will be limited to MCAS Miramar, Marine Corps Recruiting Depot, and local Marine Corps Recruiting personnel (active duty and DoD employees), their dependents, and guests. Initial trial phases are expected to last for two to three years. Following initial trial phases and a determination of surplus resource availability, access by the general public would be accommodated through lottery drawing.

Hunting and Fishing

Executive Order 12962, *Recreational Fisheries* directs federal departments, including DoD, to improve the quantity, function, and sustainable productivity of recreational fisheries for increased opportunities, when practical to do so. A main focus of the recreational fisheries is the operation of a continuously maintained 7-acre pond in West Miramar (the Fish Pond). Due to its limited size and management by MCCS, access has been limited to authorized MCCS patrons (Active Duty, Reservists, retirees, DoD civilian employees of MCAS Miramar, and family members). Limited guests of these categories are also authorized.

Happy Anglers
Natural Resources Division

The pond was stocked repeatedly with rainbow trout and warm water fishes over its early years. The pond was closed to fishing about 1990. The USFWS (1992b) concluded that, with management, the Fish Pond could support a viable recreational sport fishery for Station personnel. In 1998, the Station Installation Restoration Program concluded that no clean up action was required and recreational fishing would not be a human health risk. During the 1990s, conditions at the Fish Pond deteriorated due to strong eutrophication and dissolved oxygen problems. A shoreline, fishery, recreation facilities restoration project was conducted (Green *et al*. 2001) through a combined restoration effort of the Marine Support Squadron 373, Public Works Center San Diego, MCCS, Environmental Management Department, and the Public Works Division. In 2004, the Fish Pond was re-opened. Naval Consolidated Brig and other working parties have removed a considerable amount of vegetation and debris to help maintain the site since re-opening of the pond.

MCAS Miramar maintains a CDFW aquaculture permit, which allows fish stocking and removal (including fishing) without the requirement for individuals to possess a State fishing license. The MCCS Outdoor Recreation Center issues free fishing permits to authorized patrons, which have the aquaculture permit number to allow fishing in the Fish Pond and support annual reporting requirements. The Fish Pond is generally managed as a catch and release operation, except for special events; removal of fish is not allowed.

Executive Order 13443, *Facilitation of Hunting Heritage and Wildlife Conservation*, directs Federal agencies with programs and activities that have a measurable effect on public land management, outdoor recreation, and wildlife management to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.

No formal hunting program has operated on the Station. Beginning in the mid-1980s, Navy natural resource staff initiated work toward development of a formal recreational hunting program involving upland game and archery deer hunting. This work showed that sufficient populations of deer, coyotes, and upland game (rabbits, quail, and doves) were present on the Station to support a limited hunting program (Hannan 1987). Changing priorities related to BRAC ceased any further work on this effort due to the transfer of the Station from the Navy to Marine Corps.

Since then, MCAS Miramar has determined that it is not currently feasible to develop and implement a recreational hunting program. Opportunities for such hunting would be extremely limited, and the Station does not have the personnel to operate such a program, which would require close monitoring of hunting.

Special Natural Areas

DoDI 4715.03, Enclosure 3, states "*Areas on DOD installations that contain natural resources (e.g., 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.*" These special native areas should be reassessed if mission requirements change, according to DoDI 4715.03, Enclosure 3. The Miramar Mounds National Natural Landmark is one such area that is frequently visited by tours. Development of an interpretive trail around vernal pools would better support managed public access and viewing.

7.2.12 INRMP Planning & Implementation

Objective: Review and Update this INRMP at Least Every Five Years

This INRMP must be reviewed at least every five years, as stipulated by the Sikes Act and Marine Corps policy, and coordinated with the USFWS and CDFW. The INRMP must also be updated when major changes are made to the natural resources program. The list of planned projects in Appendix E can be used to guide the review and adjust applicable programs per the adaptive management process.

Objective: Provide Staffing and Supplies/Equipment to the Natural Resources Program

MCO 5090.2 (para.11104.1i) states, "*Personnel with natural resources responsibilities must, as a condition of employment, possess the appropriate knowledge, skills, and professional training/education to perform their duties. Installation commanders will provide natural resources personnel timely and necessary supplemental training to ensure proper and efficient natural resources management. Installation commanders will also maintain adequate natural resources staffing levels to provide and sustain installation natural resources*."

MCO 5090.2 (para. 11200.1d) also states, "*Managing (including planning, implementation, and enforcement functions) and conserving Marine Corps natural resources are inherently Governmental functions that shall not be outsourced by the Marine Corps under the DOD Commercial Activities Program or an installation operating services contracts*."

The following staffing (full-time permanent USMC civilian positions) is required within the Natural Resources Division to implement this INRMP at MCAS Miramar:

Director, Natural Resources Division	1
Botanist	1
Wildlife Biologist	1

Above personnel do not include other personnel within the Environmental Management Department, other personnel within Public Works Division, or other organizations on MCAS Miramar (*e.g*., Provost Marshal's Office, Ground Training Office) who have roles in implementation of this INRMP. It also does not include other agency personnel, such as personnel with the Naval Facilities Engineering Command, Southwest or within the USFWS or CDFW.

The MCAS Miramar Natural Resources Division strives to continuously improve the success of natural resources management activities through professional development, information exchange, use of modern equipment and technology, and regular procurement of supplies needed to support day-to-day operations and several smaller scale projects. Professional training ensures that staff knowledge of management strategies is state of the art.

In general, staff members obtain USFWS training in ESA Section 7 consultation, wetland delineation, CWA Section 404 Nationwide Permitting, Western Area Counsel Office Annual Environmental Law Conference, and similar compliance-related training. Other training obtained in recent years by one or more staff members include the *Endangered Species Act and Habitat Management Course*, Ecological Risk Assessment, California Invasive Plant Council Conference, fairy shrimp identification, annual National Military Fish and Wildlife Association meeting, and the DoD Conservation Conference. Wildland fire management training is needed for Natural Resources Division staff responsible for supporting wildland fire management on the Station.

Objective: Implement in a Manner Consistent with the Protection of Cultural Resources at MCAS Miramar

Cultural resources management at MCAS Miramar is provided in accordance with Section 106 and Section 110 of the National Historic Preservation Act (16 USC Section 470, as amended), the Archeological Resources Protection Act (16 USC Section 470aa-47011), the American Indian Religious Freedom Act (42 USC Section 1996), the Native American Graves Protection and Repatriation Act (25 USC Section 3001 *et seq*.), Executive Order 11593 (*Protection and Enhancement of Cultural Environment*), DoD Directive 4710.1 (*Archeological and Historic Resources Management*, 1984), and U.S. Marine Corps policies. Means to achieve compliance with these laws and policies are outlined in the MCAS Integrated Cultural Resources Management Plan (MCAS Miramar ICRMP 2011b), currently under revision.

Cultural resource management efforts at MCAS Miramar have accomplished or documented the completion of basic archaeological surveys for virtually all undeveloped lands on Station and have evaluated all of the previously recorded archaeological sites for eligibility for the National Register of Historic Places, as required by the National Historic Preservation Act. Nearly all of MCAS Miramar has been adequately surveyed for cultural resources. As such, adequate survey information exists to support most natural resources, and other installation, management activities and operations.

Cultural Resources Implications for Natural Resources Management

Few natural resources projects would have the potential to adversely affect significant archaeological sites because most activities associated with substantial soil disturbance would only occur on sites already degraded by historical activities. The environmental assessment associated with the development of this INRMP provides an assessment of the potential for cultural resources effects (undertakings) during INRMP implementation.

It is important to ensure that provisions of this INRMP are consistent with the protection of cultural resources. Prior to any ground-disturbing, natural resources activity, the Cultural Resources Program Manager will evaluate proposed activities for compliance with all appropriate cultural resources laws and regulations. The National Historic Preservation Act, Section 106, requires consultation with the State Historic Preservation Office, affected Indian Tribes, and other interested parties regarding "undertakings" that may affect historic properties. The Cultural Resources Program Manager will assist with Section 106 consultation, as necessary. If cultural resources may be impacted, steps must be taken to avoid or mitigate damage.

Vegetation and soils management. Of all practices associated with natural resources management on MCAS Miramar, vegetation restoration and erosion control projects have perhaps the greatest potential to disturb archeological sites. Natural resources projects that involve excavation, earth moving, and/or fill deposition can damage or bury archeological sites.

Wetland restoration and development. The construction of compensatory wetlands, including vernal pool habitat, can involve moderate ground disturbance that can damage archeological sites.

Where restoration or mitigation work is a planned component of a construction project, necessary National Historic Preservation Act consultation is now being integrated into the project planning process. For example, approximately 699 acres of areas identified in advance as suitable for vernal pool mitigation underwent Section 106 consultation during the environmental assessment (2015).

Objective: Maintain an Up-to-Date Station Natural Resources GIS

MCO 5090.2, Chapter 1 defines a Geospatial Information System (GIS) as a "*computerized tool used to input, edit, store, retrieve, manage, analyze, and present geographic or geospatial information*."

MCO 11000.25 (para. 1) states, "*Geospatial information is critical to provide effective installation management, improve our stewardship of natural resources, protect the environment, and support the training of Operating Forces*."

The USMC Geospatial Information System, also referred to as GEOFidelis, is the Marine Corps geospatial data program used in support of USMC installation management. GEOFidelis includes guidance for the creation and documentation of all existing and newly created spatial and geospatial data. MCO 11000.25 (para. 3a(1)) states, "*All activities with installation management responsibilities shall include IGI&S* [Installation Geospatial Information and Services] *in their management, review, analysis, and decision-making process in order to effectively and efficiently meet their installation management mission*."

MCAS Miramar GIS information is maintained by the Public Works Division who also has the Installation Geospatial Information and Services billet for overall GIS database management on the Station. The MCAS Miramar Environmental Management Department serves as the subject matter experts for Station environmental data that is a part of the official Station GIS database.

The Natural Resources Division has completed in recent years or is completing a number of projects to improve its geospatial data program, including the following:

- developed and maintains natural resources GIS data layers according to GEOFidelis requirements,
- developed specific language that is included in all contracts to ensure that all spatial data produced are fully compatible with Natural Resources Division GIS requirements,
- continually updates database information for existing environmental GIS coverages, and
- cleared the backlog of the creation of GIS data layers for natural and cultural resources from various reports and NEPA documents written for the Station.

The Natural Resources Division requires that Station natural and cultural resources be mapped with global positioning (GPS) technology whenever possible. The GPS data are then required to be converted to GIS data in a format compatible with the current Natural Resource GIS database format. Most Station natural and cultural resource mapping is done by contractors as a contract deliverable using their own GPS units. It is the goal of the Natural Resources Division to continue providing current, up-to-date information on natural resources locations to managers and decision-makers.

7.2.13 Agricultural Outlease Management

Objective: Manage the Agriculture Outlease

As part of the integrated management of natural resources, installation commanders shall review the suitability of their lands for agricultural leasing, under the Military Construction Authorization Act, when such leasing is advantageous to the United States. Installation commanders should also review the suitability of existing leases to ensure they promote the national defense or are in the public interest and do not conflict with existing or planned military land-use requirements. In addition, any agricultural leases must be compatible with goals and objectives of the installation's INRMP. (MCO 5090.2, para. 11104.2c).

Agricultural funds are primarily intended to offset costs of maintaining agricultural leases, but they are also available for preparing and implementing INRMPs as well as other natural resource projects. Agricultural outlease income at MCAS Miramar provides significant support for implementation of this INRMP; therefore, renewal of the agricultural outlease on MCAS Miramar during this effective INRMP period is critical. Most of the rental revenue from the Miramar nursery agricultural outlease is returned to the Station by Headquarters USMC for INRMP implementation (i.e., "agricultural funded" projects). NAVFAC SW acts as the USMC agent for outleasing.

In recent years, the Miramar nursery agricultural outlease has provided a significant funding mechanism for projects such as updating soil erosion repair/control, vernal pool habitat surveys and studies, a plant genetics study, LTEM, vegetation mapping, rare plant surveys, interpretive/educational activities, and minor restoration project plant materials. Natural resources project management support and agricultural outlease management support from the Naval Facilities Engineering Command, Southwest are also funded by receipts from agriculture outlease.

DoD policy[21], as subsequently adopted by the Department of the Navy and Marine Corps, requires that INRMPs address resource management on all of its real property, including lands occupied by tenants or lessees or being used by others pursuant to any other form of permission. Installation commanders may require tenants, lessees, permittees, and other parties that request permission to occupy or use installation property to accept responsibility, as a condition of their occupancy or use, for performing appropriate natural resource management actions.

The Miramar nursery agricultural outlease contains a Soil and Water Conservation Plan with provisions for the lessee to undertake, including control soil erosion and noxious/undesirable weeds within the lease area. There are also annual audits for compliance to environmental laws (both federal and state) and monthly pesticide-use reporting. The outlease also allows for conservation and maintenance work directed by the government on a cost reimbursement basis through rent credit. The Station's natural resource management includes lease areas as part of its overall management, without distinction based on boundaries.

[21] *Supplemental Guidance for Implementation of the Sikes Act Improvement Act, Additional Guidance Concerning INRMP Preparation*, May 17, 2005, Assistant Deputy Under Secretary of Defense (Environment, Safety and Occupational Health).

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8.0 COMPLIANCE AND LAW ENFORCEMENT

8.1 Compliance Awareness

Educational and training programs will continue at MCAS Miramar as proactive measures to prevent violations of natural resource-related laws and regulations. Natural resource compliance and conservation awareness efforts include educating Station personnel about natural resources (briefings, presentations, all-hands e-mail messages, information on the Natural Resources Division website regarding sensitive biological resources on the Station, and the MCAS Miramar Environmental Management System [EMS] "Welcome Aboard" Environmental Awareness video from the EMS website) and use of this INRMP. To support all of these efforts, an informational brochure providing "*Natural and Cultural Resources Protection Guidelines*" has been produced and printed in large quantities for distribution.

Within the Flightline Area, fencing and signs are not always feasible due to clear zone requirements and concerns about creating Foreign Object Debris (FOD) hazards near operating aircraft. Vehicle operator awareness is emphasized, such as inclusion of specially designated warning instruction slides in the Airfield Drivers Course, which is required of all persons authorized to drive within the Flightline Area. The importance of remaining on paved roads is regularly mentioned by Environmental Management staff at Environmental Coordinator Update meetings given during the rainy season.

Information on the Natural Resources Program is available to MCAS personnel and the public on the natural resources page of the MCAS Miramar Environmental Management System portion of the MCAS Miramar website (see "Natural Resources Division" tab under "Programs") at www.MiramarEMS.com. This page also provides a natural resources awareness slide show/brief, a vernal pool seasonal change slide show, plant and animal species lists, Sensitive Resources Map, and other information related to natural resource conservation and protection. A current copy of the MCAS Miramar Sensitive Resources map is also available on this site.

MCAS Miramar has developed Marine Station Order 5090.4, *Environmental Compliance Program Standard Operating Procedures (ECPSOP)*, to provide a clear and concise document, in the form of environmental compliance and protection standard operating procedures, to assist Station activities and tenant commands/units in complying with pertinent environmental programs so that they may perform their missions in an environmentally sound manner and in accordance with installation-unique requirements. Chapter 10 addresses natural resources management.

MCAS Miramar Station Order 5090.4 states that persons operating aboard MCAS Miramar have a responsibility to protect and conserve natural resources by observing the following restrictions and reporting violations to the Director, Natural Resources Division or higher level in the Station chain of command:

a. Reference the Environmental Management Department Sensitive Resources Map prior to conducting activities outside of developed areas of the Station.
b. Units conducting military training shall comply with the MCAS Miramar Training Regulations.
c. Do not dig, alter, fill or contaminate wetlands or stream channels without Environmental Management Department approval and applicable CWA permits.
d. Restrict vehicular traffic to maintained roadways (dirt or paved) and fuel breaks as much as possible in East Miramar. Avoid driving off of improved road surfaces, particularly during periods when the ground is wet or saturated.
e. Submit plans for any facility or grounds alterations to the Environmental Management Department

for review and approval.

f. Ensure proper planning so that all necessary ESA consultations and CWA permits are completed prior to undertaking an action that may affect threatened and/or endangered species, wetlands, or other waterways (including ephemeral and intermittent stream channels).
g. Ensure that any commitments made by the Section 7, ESA consultations and/or CWA permits are included and funded as a part of any applicable proposed actions (projects, maintenance, real estate agreement, etc).
h. Incorporate locally adapted, native plants or other climatically adapted species into landscaping plans to reduce maintenance and watering requirements and prohibit use of invasive plant species. Incorporate removal of invasive species with project plans, where feasible.
i. Do not harm or damage native species of plants or wildlife. Harassment of threatened, endangered, or other wildlife is prohibited except when presenting an imminent danger to the safety of personnel.
j. Contact the Public Works Trouble Desk for assistance with removal of rattlesnakes, pests, and injured wildlife.
k. Coordinate with the Station Wildlife Biologist regarding bird nesting problems and methods to discourage or exclude nesting in problematic areas. Focused harassment and or relocation of birds in problem areas may be authorized by the Station Wildlife Biologist.
l. An SOP for Dead and Injured Large Wildlife is posted on the Natural Resources Program page of the MCAS Miramar EMS website.
m. Do not dispose of green waste or surplus soil in undeveloped lands of the Station.
n. Report vandalism or habitat destruction to the Director, Natural Resources Division.

8.2 Environmental Compliance and Natural Resources-related Enforcement

Violations documented by the Station organization responsible for compliance are referred to the Station Commanding Officer for determination regarding reporting, investigation, adjudication, and corrective and/or punitive actions. Law enforcement associated with individual actions beyond official federal duties, including poaching, will be the responsibility of the Provost Marshal's Office, or other entity as directed by the Commanding Officer, with technical assistance from the Environmental Management Department, Natural Resources Division.

Fishing at the MCAS Miramar Fish Pond is operated under a CDFW Aquaculture permit, which allows the Station to permit fishing by authorized personnel without any requirement for a state fishing license. Regulations applicable to the Fish Pond were jointly developed by the Marine Corps Community Services Department, which manages all recreational aspects, and the Environmental Management Department to conserve the fishery for the enjoyment of authorized MCCS patrons. MCCS, working with the military police, oversee enforcement of the Fish Pond regulations. The Environmental Management Department maintains the CDFW Aquaculture Permit for the Fish Pond.

Occasionally, the services of state and federal fish and wildlife agency enforcement personnel may be used where their technical expertise or extra manpower is needed. Marine Corps policy is to permit access to installation lands by federal and state conservation personnel for official purposes after proper safety and security measures are taken (MCO 5090.2, para. 11104.1d). A Memorandum of Agreement also exists between the U.S. Fish and Wildlife Service and the U.S. Marine Corps allowing U.S. Fish and Wildlife Service enforcement personnel to utilize Marine Corps enforcement personnel to assist in enforcement of Federal conservation laws (MC 5090.4A, *Conservation Law Enforcement Program*, Appendix A). Finally, MC 5090.4A also encourages installations to utilize dedicated Conservation Law Enforcement Officers from other installations where necessary, such as from MCB Camp Pendleton.

The Ground Training Office enforces the training instructions relative to military operational activity.

Station Order P3500.2, *Training Area Regulations*, has been prepared to govern military ground training on MCAS Miramar. Chapter 2 of this order outlines environmental requirements that are designed to conserve and protect natural resources on MCAS Miramar.

The Environmental Management Department provides technical support to plan for and address environmental compliance for all Station activities. Compliance for project implementation and maintenance activities is achieved through the Public Works Division site approval process, including compliance with NEPA, ESA, Migratory Bird Treaty Act, National Historic Preservation Act, and the Archaeological Resources Protection Act. Compliance with natural and cultural resources laws and regulations needed for accidental or unintentional impacts will be achieved through the Environmental Management Department, in coordination with the responsible parties, legal counsel, and the Provost Marshal's Office, as appropriate.

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9.0 INRMP IMPLEMENTATION AND EVALUATION

9.1 INRMP Implementation

MCAS Miramar's natural resource management program will seek appropriate funding and set priorities based on actual funding received. Implementation of planned actions and projects is a requirement of the Sikes Act, which directs the development and implementation of INRMPs.

This INRMP will be considered implemented when MCAS Miramar:

- actively requests, receives, and uses funds for USMC Common Output Levels of Service (COLS) Level 3 Projects and activities;
- ensures that sufficient numbers of professionally trained natural resources management personnel are available to perform the tasks required by the INRMP;
- coordinates annually with all cooperating offices; and
- documents specific INRMP action accomplishments undertaken each year (USMC 2007).

9.1.1 Implementation Metrics

According to Marine Corps INRMP Manual (USMC 2007), "*Conservation metrics are a DoN* [Department of Navy] *requirement developed to better demonstrate how well installation conservation programs support the military mission. The metrics builder provides Marine Corps natural resource managers a consistent method to accomplish and document annual INRMP reviews and provide the Marine Corps the additional metrics they desire to better monitor the health of the conservation program, its impacts on the installation mission, and the successful partnerships with the USFWS and state Fish and Wildlife agencies with whom the Marine Corps develops and implements INRMPs*."

Key focus areas are INRMP implementation, partnership effectiveness, INRMP team adequacy, impact on the mission, status of federally listed species and habitat, ecosystem integrity, and fish and wildlife management and public use. Objectives of key focus areas are as follows (USMC 2007):

1. Assessment of INRMP Implementation. Determine if INRMP projects are properly developed and entered into the system for resourcing. Document funding received, projects accomplished, and whether they meet expectations.
2. Assessment of Listed Species and Critical Habitat. Determine if conservation efforts are effective, ensure that SAR are successfully identified and steps are taken to preclude listing, and determine if the INRMP provides conservation benefits necessary to preclude designation of critical habitat.
3. Assessment of Partnership Effectiveness. Determine if the partnership among the INRMP team is cooperative and resulting in the effective INRMP implementation.
4. Assessment of Fish and Wildlife Management and Public Use. Rate availability of public recreational opportunities, such as fishing and hunting, given installation security requirements.
5. Assessment of Team Adequacy for Natural Resources Management. Determine if the Natural Resources Team is adequately supported and appropriately trained to implement INRMPs.
6. Assessment of Ecosystem Integrity. Determine the integrity of various installation habitats through the development of a simple protocol, using "indicator species" or possibly by reviewing the team's subjective reasoning and consensus.
7. Assessment of INRMP Impact on the Installation Mission. Measure the level to which existing natural resources compliance requirements and associated actions support the installations' ability to sustain the current operational mission.

9.1.2 INRMP Implementation Responsibility

The Environmental Management Department, Natural Resources Division for MCAS Miramar is responsible for implementing this INRMP. The Natural Resources Division provides program oversight for natural and cultural resource compliance and management on the Station. Division activities include:

- planning for and accomplishing established goals, objectives, and planned actions to support the ongoing military mission of the Station;
- providing technical guidance regarding vegetation management, soil conservation, management of Special Status Species, wetland conservation, fish and wildlife management, outdoor recreation, cultural resource protection, and environmentally-related GIS data management;
- providing technical advice on military and non-military NEPA documents, facility planning, construction plans, maintenance activities, military operations, and other proposed actions that may affect natural and cultural resources;
- using in-house staff, Natural Resources Division-managed contracts, and cooperative agreements to conduct fieldwork, surveys, and inventories to provide specific information about the flora and fauna on MCAS Miramar and proactively maintain up-to-date resource data for activity and project planning;
- serving as the planning lead and addressing natural resource compliance issues such as wetland and endangered species regulatory requirements;
- providing natural and cultural resources management support to Station action proponents regarding compliance requirements and BMPs; and
- providing conservation education to military and civilian personnel to raise awareness and improve community relations, with the goal of preventing resource damage.

9.1.3 Command Support

MCO 5090.2 (para.11200.1a) states, "*Natural resources stewardship is an important and identifiable responsibility of command to maintain use of Marine Corps lands for mission requirements. Each installation shall establish procedures to ensure commanders on the installation are aware of:*

(1) The condition of natural resources available to them;
(2) Any installation INRMP objectives and requirements applicable to them; and
(3) Any foreseeable or actual conflicts between their proposed actions and any installation INRMP objectives and requirements."

Command support is essential to implementation of this INRMP. Many natural resources management projects within the next five years require command support. The Commanding Officer is liable for noncompliance with environmental laws, and thus has a personal interest in ensuring that this INRMP is properly implemented.

This INRMP has the support and dedication of the Commanding Officer and other command personnel who are needed to implement this INRMP, as required by the Sikes Act and other federal laws. Command is also dedicated to maintaining and improving the military mission at MCAS Miramar; implementation of this INRMP will help achieve that goal.

9.1.4 Funding Priorities for INRMP Implementation

DoD Instruction 4715.03, Enclosure 4, defines programming and budgeting priorities for DoD's natural resources management programs. Projects are entered into the USMC Status Tool for Environmental Programs (STEP) budget system and are described in a standard format as a means of monitoring overall INRMP implementation. Projects are either classified as COLS Level 3 (*core requirements*), COLS Level

2 (*core but not critical*), or COLS Level 1 (*enhancements*). Definitions of each COLS level are provided below.

COLS Level 3. Core requirements of the natural resources program are necessary to maintain compliance with required conservation laws, regulations, Executive Orders, Final Governing Standards, and policies. COLS Level 3 projects are critically important to support Station operations and must be implemented as programmed to consider the INRMP implemented successfully. COLS Level 3 projects could involve actions necessary to rehabilitate or prevent resources degradation that may affect military readiness, including maintaining administrative, personnel, and other costs associated with managing DoD Natural Resources Conservation programs. COLS Level 3 projects could also implement management actions for federally listed threatened or endangered species, proposed federally listed threatened or endangered species, candidate species, proposed critical habitat on the installation, or court-ordered requirements to prevent the listing of species or habitat that would affect military readiness. COLS Level 3 projects are needed because an installation is currently out of compliance, or will be out of compliance in the current program year.

COLS Level 2. Additional core program projects that have lower risks associated with non-completion and are not critical to direct support of the military mission. COLS Level 2 projects could include best management practices or be related to addressing future compliance and policy requirements. Projects are designated as COLS Level 2 if the installation is not currently out of compliance, but will be out of compliance at an established deadline beyond the current program year.

COLS Level 1. Additional projects that enhance the program, promote sustainability opportunities, and conservation of environmental assets. Similar and more so than COLS Level 2, COLS Level 1 projects are not critical to direct support of the military mission. COLS Level 1 projects enhance conservation resources or the integrity of the installation mission, or are needed to address overall environmental goals and objectives, but are not immediate nor specifically required under regulation or executive order (*e.g.*, community outreach, educational and public awareness projects, management or surveys for candidate species for listing, natural resources restoration when no compliance requirement, volunteer program management).

COLS Level 3 projects include those required to:

- meet USFWS special management criteria for threatened and endangered species management;
- provide for qualified natural resources personnel; and,
- prevent resource loss or degradation (*e.g.*, soil loss, other maintenance activities) that may affect military readiness (USMC 2007).

Formal adoption of an INRMP by the installation commander constitutes a commitment to seek funding and execute, subject to the availability of funding, all COLS Level 3 projects in accordance with specific timeframes identified in the INRMP. Under the Sikes Act, any natural resources management activity that is specifically addressed in the plan must be implemented (subject to availability of funds). Failure to implement the INRMP is a violation of the Sikes Act and may be a source of litigation (USMC 2007).

COLS Level 2 and COLS Level 1 projects are identified for implementation as funding permits, and may be delayed for a year or more before such delay could cause a management problem.

9.1.5 Project Details and Summary

Individual projects have been developed to meet the objectives of the INRMP as discussed in Chapter 7. Projects addressed in this INRMP are presented in Appendix E and can be used to monitor the effectiveness of natural resources management at MCAS Miramar.

Appendix E contains a list of planned COLS Level 3 projects. A major aspect of INRMP implementation is whether or not MCAS Miramar actively requests, receives, and uses funds for COLS Level 3 projects. The year identified for any given planned project is the year for which funding is programmed.

Appendix E also contains a list of COLS Level 2 and COLS Level 1 projects. These projects and actions are not required to be implemented to achieve INRMP implementation status, but they are an important component of this INRMP. While Appendix E includes an implementation schedule, implementation of these projects are subject to available funding.

9.1.6 INRMP Implementation Funding Sources

MCO 5090.2 (para. 11200.8a) states, "*Installation commanders shall ensure natural resources management funding is included within their installation Program Objective Memorandum submittals. Funds from other sources (e.g., agricultural outleasing, forestry, and hunting and fishing user fees) may also be available to supplement natural resources management program funding. Installations should not rely on other funding sources, however, because their availability fluctuates and is beyond DOD control*."

The USMC STEP budget system provides the primary means for identifying current and projected budget requirements needed to execute the MCAS Miramar natural resources program and achieve implementation of this INRMP. Below are the primary sources of funds (Operations and Maintenance, Centrally Managed Environmental Program, and Agricultural Outlease Income) available to MCAS Miramar.

The USMC budgetary process requires requests for funding as far as seven years in the future. Thus, MCAS Miramar budgets for natural resources management from 2018 through 2022 are already in the system. However, these budgets are periodically updated, so they are sufficiently flexible to meet emergent requirements and needs.

The following statement is required in all Marine Corps INRMPs (USMC 2004). "*All actions contemplated in this INRMP are subject to the availability of funds properly authorized and appropriated under federal law. Nothing in this INRMP is intended to be nor shall be construed to be in violation of the Anti-Deficiency Act, 31 USC §1341*."

Operations and Maintenance Funds

Certain projects within this INRMP are either partially or fully funded with Operations and Maintenance funds, termed Operations Budget (OPBUD). OPBUD projects are typically recurring requirements to maintain services and high priority monitoring programs (*e.g.*, labor costs); however, each project may not be required every year (*e.g.*, the INRMP must only be reviewed/revised every five years). These locally controlled funds have more flexibility than centrally managed environmental funding, but compete with other installation needs for priority. OPBUD funds provide means for achieving projects at all COLS Levels.

Appendix E, Table E.1 lists projects for which OPBUD funding is programmed for INRMP implementation.

Centrally Managed Environmental Program Funds
The Centrally Managed Environmental Program (CMP) funds are a special subcategory of Operations and Maintenance funds. They are set aside by the USMC for new, emerging requirements, immediate environmental compliance needs, or funding requirements with no other available funding source.

Appendix E, Table E.1 lists projects for which CMP funding is programmed for INRMP implementation.

Agricultural Outlease Income Funds
Administrative expenses of agricultural outleasing may be funded with income from the outlease. These expenses are limited to direct supervisory, technical, clerical, legal, and accounting costs wholly attributable to agriculture leasing. This process includes initiating new leases and administering existing leases. Authorized items that may be reimbursed by outleasing funds, in priority order, are as follows (MCO 5090.2, para. 11201.7):

a. costs, including personnel-related expenses, that are directly attributable to agricultural and grazing program management;
b. costs of developing and implementing the INRMP, and supporting natural resources management programs;
c. costs of improving or rehabilitating agricultural outlease land and natural resources to enhance agricultural productivity;
d. costs of improving or rehabilitating land and water resources for soil and water conservation;
e. costs of improving land and water resources for enhancing fish and wildlife habitat;
f. costs of improving land and water for outdoor natural resources recreational use;
g. costs of travel and training to support integrated natural resources management programs; and
h. procurement, maintenance, and repair costs for equipment and materials to support integrated natural resources management programs and projects.

Agricultural outleasing income funds to support natural resources management operations are managed by Marine Corps Installations Command (MCICOM; Natural Resources Section). Direct obligation authority provided for the agricultural outleasing fund may not be transferred to other accounts or used for purposes not identified by integrated natural resources management. Modification of the plan may be made based only on prior approval by the MCICOM. Natural resources program requirements that may be funded with agricultural outlease income do not include (MCO 5090.2, para. 11201.8):

a. mitigation or compensation for damages to natural resources caused by construction projects or military activities;
b. costs of the production of forest products (*e.g.*, lumber);
c. costs of recurring grounds maintenance on improved and semi-improved grounds (*e.g.*, mowing, fertilizing, irrigating, seeding, pruning, ornamental planting, and pest control);
d. archaeological/cultural resources survey costs and other cultural resources management costs unrelated to natural resources management;
e. costs of animal damage control unrelated to natural resources management (costs of controlling or reducing bird/animal aircraft strike hazards are not excluded); and
f. general environmental and facilities organizational support costs that are unrelated to natural resources management.

Appendix E, Table E.1 lists projects for which agricultural outlease income funding is programmed for INRMP implementation.

Other Funding
Certain projects within this INRMP are not directly funded through the Natural Resources Division. These include natural resource-based mitigations that are associated with facility projects, and projects that have secondary or indirect benefits for natural resource conservation. Costs for these projects are not included within this INRMP.

In the future, MCAS Miramar may seek special funding under DoD special programs:

- The DoD Legacy Program provides funding for regional ecosystem management initiatives, habitat preservation efforts, invasive species control, and/or monitoring and predicting migratory patterns of birds and animals (www.dodlegacy.org).
- The DoD Strategic Environmental Research and Development Program (SERDP) provides funding to pursue high-risk/high-payoff solutions to DoD's most intractable environmental problems. SERDP promotes the development and application of innovative environmental technologies to support the long-term sustainability of military installations as well as significantly reducing current and future environmental liabilities (www.serdp.org).
- The DoD Encroachment Partnering/Buffering (REPI) Program provides funding for acquisition or long-term conservation easements on adjoining third-party lands, to ensure that encroachment does not threaten the ability of an installation to perform its military mission (see Section 6.2.4, *Encroachment Partnering*).

Each of these programs has specific goals, objectives, requirements, and priorities, which require the submission of proposals that must compete for relatively limited funding.

9.2 INRMP Implementation Costs

Appendix E, Table E.2 contains a summary of funding avenues and dollars required by COLS Levels (project priorities) for implementation of this INRMP. Table E.2 also includes the grand total implementation cost for all projects and actions during this INRMP period, subject to inflation.

9.3 INRMP Evaluation

DoD, USFWS, and the Association of Fish and Wildlife Agencies for a Cooperative Integrated Natural Resource Management Program on Military Installations have a Memorandum of Understanding (MOU) (dated July 2013) regarding the process for review and concurrence on updates to existing INRMPs. It is DoD policy to review INRMPs annually, and a statutory requirement to have INRMPs reviewed by the USFWS and appropriate state fish and wildlife agency or agencies (hereafter "states") for operation and effect at least every five years.

In addition, DoD published *Guidelines for Streamlined INRMP Review* (July 20, 2015), and the USFWS published its own internal guidelines for coordination on INRMP reviews (June 15, 2015). To more effectively and rapidly adapt to ongoing natural resource activities, and to respond to revisions that are administrative or process-oriented, the three partners (DoD, USFWS, and states as represented by the Association of Fish and Wildlife Agencies) included a provision in the MOU that streamlines the review process for incorporating minor changes or "updates" to existing and approved INRMPs. INRMP updates are minor changes to an INRMP that do not result in new biophysical effects, do not change the management prescriptions set forth in the INRMP, and do not require public review or analysis under NEPA. The use of updates is intended to reduce the workload for all agencies involved, while maintaining both INRMP currency and mission flexibility. The specific document format, step-by-step coordination process, and administrative responsibilities under the streamlined process are described in the *Guidelines for Streamlined INRMP Review*.

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AGENCY AND PUBLIC REVIEW AND COMMENTS

MCAS Miramar has coordinated the development of this INRMP with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW), as required by the Sikes Act. Appendix F includes copies of correspondence regarding this coordination.

MCAS Miramar provided the USFWS, CDFW, California State Historic Preservation Office, interested Indian tribes, potentially interested parties, MCAS Miramar lessees/easement holders, and the general public with opportunities to review and comment on drafts of the INRMP. The Draft INRMP was posted on the MCAS Miramar web site http://www.miramar-ems.marines.mil/.

MCAS Miramar and Other Agency Reviewers

MCAS Miramar*
Wildlife Biologist, Natural Resources Division, Environmental Management
Division Director, Natural Resources Division, Environmental Management
Botanist, Natural Resources Division, Environmental Management
GIS Specialist, Natural Resources Division, Environmental Management
* Other MCAS Departments reviewed the INRMP and provided comments for INRMP preparation.

U.S. Marine Corps Installations Command
Natural Resource Specialist, Headquarters, U.S. Marine Corps reviewed the INRMP and provided comments to improve the document.

Marine Corps Installations – West
Regional Conservation Program Manager, was involved in the development of the INRMP and this EA.

U.S. Fish and Wildlife Service
Fish and Wildlife Biologist, Carlsbad Fish and Wildlife Office
Supervisory Fish and Wildlife Biologist, Carlsbad Fish and Wildlife Office

California Department of Fish and Wildlife
Senior Environmental Scientist (Specialist), Habitat Conservation, South Coast Region (5)

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INRMP PREPARERS

Tetra Tech, Inc. has prepared multiple INRMP updates for a variety of military bases across the country. Michelle Bates, Principal Biologist, has a Bachelor of Science and Master of Environmental Science and Management. She has over 19 years of experience and has been a Natural Resources Project Manager for over 15 years. Amy Noddings, Senior Biologist, also has a Bachelor of Science and Master of Environmental Science. She has over 9 years of experience in natural resources management in the consulting field and has participated in multiple INRMP updates. Daniel Berg, Biologist, has a Bachelor of Science and over 4 years of experience working on natural resources projects. Brad Agius, GIS Manager/Senior Ecologist, and Nicc Johnson, GIS Analyst/Biologist, have extensive experience updating report figures, preparing GIS databases, and running GIS data queries.

Natural Resources Division, MCAS Miramar personnel are listed in the reviewers of the Station INRMP in the *Agency and Public Review and Comments* section of the INRMP. However, much of the original work was accomplished by the Division Director and staff. Division staff was particularly involved in the creation of appendices B (Plants) and C (Animals), photographs, and most INRMP tables and provided GIS databases for most maps. Natural Resources Division detailed reviews of various drafts of the INRMP were the basis for most improvements over the preliminary draft.

Gene Stout and Associates has prepared various National Environmental Policy Act and natural/cultural resources planning documents for over 180 military installations in the United States.

Gene Stout - Owner and principle author of INRMP - Mr. Stout has a Bachelor of Science and Master of Science degrees in Zoology with an emphasis on wildlife biology. Mr. Stout has 36 years of experience with Department of Defense environmental programs and was responsible for natural resources management and NEPA compliance at Fort Sill, Oklahoma for 18 years.

Geomorph Information Systems, LLC provided geographic information system support for preparation of the MCAS Miramar INRMP. The company has worked primarily with Navy and Marine Corps clients in Southern California, providing GIS support from the single-user to the enterprise level.

Eileen Goff - Manager - Ms. Goff has a Masters degree in Geography and has concentrated on the application of GIS tools in support of natural and cultural resources planning, analysis, and compliance. Since 1991 she has worked with all aspects of GIS planning, support, and implementation, with an emphasis on environmental planning and management applications. Ms. Goff was previously employed as the GIS Specialist in Environmental Management at MCAS Miramar.

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APPENDIX A. LEGISLATION AND REGULATIONS

Below is a list of the most significant federal and state laws and regulations and other regulatory instruments that may govern implementation of this Integrated Natural Resources Management Plan.

Federal Laws

American Indian Religious Freedom Act (42 United States Code (USC))
Americans with Disabilities Act of 1990 (PL 101-336; 42 USC 12101)
Archaeological and Historic Preservation Act of 1974 (PL 93-291; 16 USC 469 *et seq*.)
Archaeological Resources Protection Act of 1979 (PL 96-95:16 USC 470aa-11)
Bald Eagle Protection Act (PL 95-616; 16 USC 688 *et seq*.)
Clean Air Act (as amended through 1990)
Clean Water Act (PL 95-217; 33 USC 1251 *et seq*.)
Coastal Zone Management Act (16 USC 145 *et seq*.)
Conservation Programs on Military Reservations (see Sikes Act below)
Defense Appropriations Act of 1991 – Legacy Program
Emergency Wetlands Resources Act of 1986 (16 USC 3901-3932)
Endangered Species Act of 1973 (PL 95-632, 16 USC 1531 *et seq*.)
Estuarine Areas Act (16 USC 1221-1226)
Farmland Protection Policy Act (7 USC 4201-4209)
Federal Facilities Compliance Act of 1992 (PL 102-386; amending 42 USC 6961)
Federal Insecticide, Fungicide and Rodenticide Act (7 USC 136 *et seq*.)
Fish and Wildlife Conservation Act (FWCA) of 1980 (16 USC 2901 *et seq*.)
Fish and Wildlife Conservation and Natural Resource Management Programs on Military Reservation (Amends Public Law 86-797 (Sikes Act) (PL 96-561)
Hunting, Fishing and Trapping on Military Lands (an update to the Military Construction Authorization Act 10 USC 2665)
Leases: Non-Excess Property of Military Departments (10 USC 2667)
Marine Mammal Protection Act (MMPA) of 1972, as amended (16 USC 1361 *et seq*.)
Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972, as amended (33 USC 1401 *et seq*. and 16 USC 1431 *et seq*.)
Migratory Bird Conservation Act (Chapter 257; 45 Stat 1222; 16 USC 715 *et seq*.)
Migratory Bird Treaty Act (PL 65-186; 16 USC 703 *et seq*.)
Military Reservation and Facilities: Hunting, Fishing and Trapping Act of 1958 (Public Law 85-337, 10 USC 2671)
National Environmental Policy Act of 1969 (as amended, PL 91-190; 42 USC 4321 *et seq*.)
National Historic Preservation Act of 1966 (as amended, PL 89-665; 16 USC 470 *et seq*.)
Native American Graves Protection and Repatriation Act (25 USC, Section 3001 *et seq*.)
Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990
North American Wetlands Conservation Act (16 USC 4401 *et seq*.)
Noxious Plant Control Act (PL 90-583)
Outdoor Recreation on Federal Lands (16 USC 4601{1} *et seq*.)
Plant Protection Act of 2000(7 USC 7701 *et seq*.) (replaces Federal Noxious Weed Act of 1973 (PL 93-629))
Plant Quarantine Act (7 USC 151-167)
Readiness and Environmental Protection Initiative (within Section 2811, FY 2003 National Defense Authorization Act) (10 USC 2684a)
Rivers and Harbors Act (33 USC 401)
Sale of Certain Interests In Lands; Logs (10 USC 2665)

Sikes Act (PL 105-85, as amended through 2004 including PL 108-136; 16 USC 670 *et seq*.)
Soil Conservation Act of 1938 (16 USC 5901 *et seq*.)
Soil Conservation and Domestic Allotment Act (7 USC 128)
Watershed Protection and Flood Prevention Act (PL 84-566; 16 USC 1001-1009)

Executive Orders and Presidential Memoranda
Executive Order 11593, Protection and Enhancement of the Cultural Environment
Executive Order 11644, Use of Off-Road Vehicles on the Public Lands
Executive Order 11987, Exotic Organisms
Executive Order 11988, Floodplain Management
Executive Order 11989, Off-Road Vehicles on Public Lands
Executive Order 11990, Protection of Wetlands
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 12898, Environmental Justice
Executive Order 13007, Indian Sacred Sites
Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks
Executive Order 13112, Invasive Species
Executive Order 13175, Consultation and Coordination with Indian Tribal Governments
Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds
Executive Order 13443, Facilitation of Hunting Heritage and Wildlife Conservation
Presidential Memorandum, Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds (April 26, 1994)
Presidential Memorandum, Government-to-Government Relations with Native American Tribal Governments

Department of Defense (DoD) Directives/Instructions
DoD Directive 4150.7, DoD Pest Management Program
DoD Directive 4700.4, Natural Resources Management Program
DoD Directive 4710.1, Archaeological and Historic Resources Management
DoD Instruction 4715.1, Environmental Security
DoD Directive 4715.1E, Environment, Safety, and Occupational Health
DoD Instruction 4715.9, Environmental Planning and Analysis
DoD Instruction 5000.13, Natural Resources
DoD Directive 6050.1, Environmental Effects in the United States of DOD Actions
DoD Directive 6050.2, Use of Off-Road Vehicles on DOD Lands
Department of Defense, American Indian and Alaska Native Policy

Marine Corps Orders (MCO)
MCO 5090.2, Marine Corps Environmental Compliance Protection Manual

California (CA) Regulations
California Coastal Act
California Constitution Article 10, Water
California Department of Fish and Game Code
California Endangered Species Act
California Environmental Quality Act
Porter-Cologne Water Quality Control Act

Additional information on the National Environmental Policy Act (NEPA) and other natural resource laws is discussed below.

National Environmental Policy Act

NEPA requires a detailed statement of significant environmental impacts of major federal actions. For example, an action may be considered significant if it has a long-term impact or potential risk because of its effect on a species protected under the Endangered Species Act (ESA). The process identifies reasonable alternatives to proposed actions that might have less or no environmental effect. Individual and cumulative impacts must be considered. The following three-tiered approach is used to evaluate impacts.

- Certain categories of actions may be excluded from the need to prepare a detailed environmental analysis for NEPA purposes. ***Categorical Exclusions*** are categories of actions that have been previously determined to not have a significant effect on the human environment, either individually or cumulatively. Marine Corps Order P5090.2A (para. 12201.3a) provides a list of Categorical Exclusions and associated extraordinary circumstances that preclude the use of the Categorical Exclusions.
- An ***Environmental Assessment*** (EA) is the analysis to be completed when the government is uncertain as to whether an action will significantly affect the environment or whether the action is controversial; the result of an EA is either a Finding of No Significant Impact or a requirement to complete an EIS.
- An ***Environmental Impact Statement*** (EIS) is a full-disclosure document that presents a full and complete discussion of significant impacts, informing the public and decision makers of reasonable alternatives to the proposed action.

Significance Determination

The issue of "significance" in terms of environmental effects is important to NEPA compliance. An issue is not necessarily significant just because a regulatory consultation or permit requirement is encountered (*e.g.*, Section 7 ESA consultation with the USFWS, obtaining a Section 404 Clean Water Act [CWA] permit). For example, the Nationwide Section 404 CWA permits have already been subjected to NEPA review, programmatically, with a conclusion that their use would not have significant impacts, either individually or cumulatively. Significant effects of proposed actions are determined by adverse effects on important resources that are not mitigated.

Definitions of adverse effects vary by law. Thus, it is important to use specific definitions within specific laws (*e.g.*, CWA, ESA) for determining adverse effects.

For biological resources in general, primary criteria for determining significance are the ***unmitigated*** loss of a resource identified as threatened or endangered by the USFWS, the local and regional rarity of affected resources, and the degree to which affected resources may be impacted. To a large degree, significance thresholds are based on the regulatory status of resources, which reflect their rarity and/or special significance. The following types of effects to biological resources are generally considered significant:

- unmitigated permanent or long-term temporary impact to federally listed species, including significant loss of occupied habitats (Section 7 ESA consultation with the USFWS will assist with this determination);
- unmitigated loss or impact to large quantities of wetlands in waters of the United States (U.S.), as defined by CWA regulations;
- unmitigated effects to important quantities of regionally- and locally-declining populations (*i.e.*, federal species of special concern and species considered rare and threatened or endangered by the State of California);

- unmitigated loss of important quantities of declining vegetation communities that are considered rare, both locally and regionally (with impacts evaluated in terms of such factors as setting [*e.g*., population size, habitat quality] and the magnitude and nature of effects (*e.g*., temporary versus permanent);
- alteration of regionally- and locally-important wildlife corridors that would severely and permanently limit their use by wildlife species; and/or
- substantial, unmitigated erosion resulting in loss of site integrity to support vegetation and degradation of downstream water quality by sediment loading.

Guidance for Addressing Natural Resources in NEPA Documents

The Natural Resources Division should be consulted regarding topics for analysis for each individual NEPA document to be prepared. Details for addressing natural resources in NEPA documents for MCAS Miramar can be obtained from the Station Environmental Department.

Endangered Species Act

MCO 5090.2 states, "*The Marine Corps will consult … on any Marine Corps action that may affect any endangered or threatened species or critical habitat to ensure that such action is not likely to jeopardize the continued existence of the species or result in the destruction or adverse modification of critical habitat… In addition, the Marine Corps will further programs for the conservation of endangered and threatened species. Each installation supporting endangered or threatened species must address their management in its INRMP detailing protective measures that assure the continued health and viability of these species on the installation*."

When evaluating actions potentially affecting threatened or endangered species identified in Chapter 4, planners (*e.g*., Public Works Division, military trainers, Real Estate Division, Environmental Management) must take into account requirements of the Endangered Species Act (ESA) and timelines needed for compliance. Formal consultations with the USFWS pursuant to ***Section 7*** of the ESA (50 CFR 402) are required prior to federal agencies authorizing, funding, or implementing proposed actions which may affect a federally threatened or endangered species or its critical habitat[22].

Once formal consultations are initiated, consultations can be lengthy. Formal consultations involve up to a 90-day consultation period and an additional 45-day period for the USFWS to prepare a biological opinion (135-day total). Either the lead agency or the USFWS may request an extension of the formal consultation period, but such extensions require mutual agreement. Conditions that may require an extension include complex issues or circumstances for which additional data (*e.g*., surveys) may be needed to avoid a jeopardy biological opinion.

Preparation of **biological assessment** information is required to initiate formal consultation. A biological assessment is required for major federal construction activities; however, a biological assessment may be prepared to support consultation for any action that may affect a federally listed threatened or endangered species. A listing of the basic information required to initiate formal consultation required by Section 7 of the ESA is found at 50 CFR 402.14(c).As part of a joint partnering effort between local Navy, Marine Corps, and USFWS staff, a working group developed an informal document, *Guidelines for Preparing Biological Assessments for Section 7 Endangered Species Act Consultation*, in 2000. Preparation of

[22] Critical habitat is a legal term defined by the ESA for species listed by the USFWS. No critical habitat has been designated on MCAS Miramar; thus, the term should not normally be used with regard to projects proposed for MCAS Miramar. Section 7.4, *Special Status Species Management* describes how implementation of this INRMP meets criteria to preclude critical habitat designation, as provided for by ESA Section 4(a)(3)(b)(i).

biological assessments for proposed actions on MCAS Miramar should follow the guidelines of this document unless otherwise directed (obtain a copy from Miramar Natural Resources Division staff).

The time required to prepare a biological assessment is quite variable depending on the complexity of the proposed action and the magnitude of potential effects on the species of concern. Potential requirements for additional information (*e.g*., surveys) can further extend the timeline for completion of the biological assessment. Anywhere from a few weeks to more than a year may be required to finalize a biological assessment before it can be submitted to the USFWS as part of the request to initiate formal consultations.

A ***biological opinion*** is the USFWS opinion resulting from the formal Section 7 ESA consultation process. It is a written statement from the USFWS regarding its opinion on effects of a proposed action on listed species and the potential to jeopardize the continued existence of the species. It also includes a summary of the information on which the opinion is based, detailing how the agency action affects the species or its critical habitat. It provides nondiscretionary Terms and Conditions with Reasonable and Prudent Measures that must be implemented in conjunction with a proposed action to avoid or minimize impacts. The USFWS also provides nonbinding Conservation Recommendations as part of the biological opinion.

A biological opinion is required for actions that may adversely affect a threatened or endangered species so as to avoid jeopardizing the continued existence of any such species and violations under ***Section 9*** of the ESA. Section 9 of the Act prohibits the "take" of a threatened or endangered species. *The term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct* (16 USC 1532). The term "harass" in this definition has been further defined to mean *…an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering* (50 CFR 17.3). *Harm, in the definition of "take" in the Act* [ESA] *means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral pattern, including breeding, feeding, or sheltering* (50 CFR 17.3).

Part of a biological opinion is the issuance of an incidental take authorization, which authorizes take of listed species that is "incidental" to the conduct of an otherwise legal activity, provided terms and conditions established in the biological opinion are followed and implemented. Terms and conditions can involve additional costs relative to mitigation requirements, which may include compensation for lost resources, minimization of, and avoidance of impacts on threatened or endangered species or critical habitat. Such potential costs must be considered as part of project planning and construction.

Consultation under the ESA shall be considered complete for NEPA planning purposes when, at a minimum, a draft biological opinion is issued by the USFWS (Commandant of the Marine Corps, *Supplemental Policy Guidance to SECNAVINST 5090.6A for Consultations and Regulatory Coordination*, July 27, 2009).

The informal consultation process to fulfill Section 7 requirements generally will require less time than formal consultations. This is an option only when the incidental take of a threatened or endangered species and other adverse effects can be avoided. This process can also be used to initiate a dialog with the USFWS regarding the necessity for formal consultation. The outcome of an informal consultation is often a letter from the USFWS stating that the proposed action is not likely to adversely affect the listed species, although sometimes the conclusion of informal consultation can be reached solely through discussion.

When a proposed action affects a species proposed for listing as threatened or endangered, a ***formal conference*** (as opposed to a consultation for a listed species) with the USFWS may be required. The

standard for requiring a conference is that the proposed action may jeopardize the continued existence of the species, as opposed to affecting it, as is the standard for listed species. The USFWS encourages ***informal conferencing*** when proposed species are involved. Unlike biological opinions, recommendations made in conference opinions are advisory and therefore non-binding.

The primary purpose of conferencing is to avoid delay of a proposed action should a species proposed for listing become listed, and to ensure that the proposed action does not jeopardize a species' recovery potential. Should a species become formally listed prior to implementation of the proposed action, federal agencies are required to consult with the USFWS to confirm that the conference opinion still serves as the formal biological opinion. This is typically a simple procedure if there are no significant changes in the action as planned or in the information used during the conference.

ESA consultations are accomplished for the Station through the Environmental Management Department. The action proponent shall bear the responsibility for preparation of a biological assessment along with the documentation necessary for execution of consultation/conferencing requirements. Often this work and documentation is accomplished by contract with a qualified consulting firm. Species and habitat information possessed by the Station can be made available to action proponents; however, any needed supplementation or field verification shall be accomplished (or funded) by the proponent.

For non-federal proposed actions requiring the approval of MCAS Miramar, the Station, as a federal agency, is required to complete a Section 7 consultation/conference with the USFWS prior to authorizing a proposed action which may affect a proposed or listed threatened or endangered species. This is the Station's requirement regardless of any requirement the action proponent may or may not have regarding such species. All MCAS Miramar approvals will be conditioned upon the action proponent's commitment to fund and/or implement Reasonable and Prudent measures with associated Terms and Conditions which result from this consultation/conference procedure.

Some non-federal actions associated with previously issued rights-of-way and easements may not require authorization from the Station. In such cases, where no federal action is involved, the Section 7 ESA consultation requirement for federal agencies may not be applicable, and the non-federal action proponent may need to resolve ESA compliance directly with the USFWS under the provisions of Section 10 of the ESA.

Clean Water Act (CWA)

CWA permitting for Marine Corps actions on MCAS Miramar will be processed through the Environmental Management Department. Preparation of permit application and associated information, wetland delineation, and other applicable information are the responsibility of the action proponent. Permitting necessary for non-Marine Corps proposed actions shall be accomplished and funded by the action proponent in coordination with MCAS Miramar staff. Completion of the regulatory permitting process is required for all federal and non-federal actions as part of receiving final Station approval to implement the requested action.

NEPA documentation can be completed prior to obtaining CWA permits, provided the decision maker is made aware of permit requirements and, to the maximum extent possible, made aware of potential mitigation requirements. The proponent must provide appropriate documentation indicating coordination with the Army Corps of Engineers, proposed mitigation, if any, and that the Corps of Engineers is likely to concur with the impacts determination (Commandant of the Marine Corps, *Supplemental Policy Guidance to SECNAVINST 5090.6A for Consultations and Regulatory Coordination*, July 27, 2009).

Executive Order 11990, *Protection of Wetlands* directs all federal agencies to provide leadership and take action to minimize the destruction, loss, or degradation of wetlands as well as to preserve and enhance the beneficial values of wetlands. Marine Corps Order P5090.2A (Chapter 12) requires that all activities adversely affecting the quality or quantity of tidelands or fresh water wetlands that are not covered by nationwide or regional permits have, at a minimum, an EA prepared. In a similar manner to Executive Order 11990, Executive Order 11988, *Floodplain Management* directs federal agencies to provide leadership in avoiding direct or indirect development of floodplains, as well as to restore and preserve the natural and beneficial values of floodplains.

Section 404 of the CWA addresses the discharge of dredge or fill material into waters of the United States, including wetlands (definitions at 40CFR 230.3 (s) and (t)). The term "waters of the United States" is broadly defined to include navigable waters (including intermittent streams), impoundments, tributary streams, and wetlands associated with navigable waters. This includes ephemeral streams on MCAS Miramar. In general, wetlands are areas inundated or saturated by surface or ground water to the extent that they support vegetation adapted for saturated soil conditions (*e.g.*, vernal marshes, vernal pool habitat). A discharge is any material that results in a change in the bottom elevation of a water body or wetland, including grading, road fills, stream crossings, building pads, and flood and erosion control on streambanks. Regulatory authority has been delegated by the Environmental Protection Agency to the U.S. Army Corps of Engineers for Section 404. Nationwide and individual permits are options for meeting the requirements of Section 404.

The Army Corps of Engineers has developed a series of nationwide permits that pre-authorize certain minor discharges (*e.g.*, construction of outfall structures, backfill or bedding for utility lines, fill for bank stabilization, minor road crossings), provided they meet certain conditions. Use of most nationwide permits requires review by the Army Corps of Engineers and possibly other federal agencies. Notification of the Army Corps of Engineers is usually required, and applicants must meet general and regional conditions outlined in the regulations and ensure the proposed project does not conflict with other federal laws (*e.g.*, ESA, NEPA).

Section 404 regulations apply to vernal pools when they are adjacent or connected to waters of the U.S. The Los Angeles District Engineer of the Army Corps of Engineers has established ***Regional General Conditions*** (U.S. Army Corps of Engineers 2012) to the nationwide permits. One condition requires that any action that affects jurisdictional vernal pools must have, at a minimum, an individual Section 404 permit. DON and USMC policy direct that an action requiring an individual Section 404 CWA permit requires a minimum of an EA for NEPA documentation. Not all vernal pool habitat on MCAS Miramar is subject to the permitting jurisdiction of the CWA[23]. The jurisdictional status of individual vernal pools will be determined in consultation with the Station Natural Resources Division. However, regardless of the jurisdictional status of vernal pool habitats, any projects that may affect them must consider the presence/absence of endangered species and the federal "no net loss" of wetlands policy (Executive Order 11990) in project planning and NEPA documentation.

The individual permit process is much more complex and time consuming than the Nationwide Permit program. Typically, the application process involves a pre-application meeting (if requested), permit application process, the posting of a public notice to allow for public comment, and a final decision by the Army Corps of Engineers in which the Corps indicates its readiness to prepare an EA (or cause one to be prepared) , Public Interest Review, and 404(b)(1) Evaluation. If the conclusion is that the action will cause significant impacts, then the Army Corps of Engineers must prepare an EIS (or cause one to be prepared,

[23] Solid Waste Agencies of Northern Cook County (SWANCC) vs. the U.S. Army Corps of Engineers.

often by the federal agency that is required to have the permit). Further, all ESA requirements must be fulfilled before a permit can be issued.

Before an applicant can receive an individual Army Corps of Engineers permit to discharge dredge or fill material into waters of the United States, including jurisdictional wetlands, the applicant may be required to demonstrate that the proposed discharge is unavoidable and the least damaging alternative. These considerations are required under the Environmental Protection Agency's 404(b)(1) Guidelines (40 CFR 230). An alternative analysis should be considered early during project planning process to reduce costs, avoid delays, and increase certainty in permit approval (Yocum *et al*. 1989). These requirements for alternative analysis, in general, exceed those required by NEPA.

For proposed actions involving wetlands, requirements of the CWA need to be considered. The CWA contains specific provisions for the regulation of the disposal of dredge soil within navigable waters, and placement of materials into wetlands. Permits are required under sections 401, 402, and 404 of the CWA for proposed actions that involve wastewater discharges and/or dredging/placement of fill in wetlands or navigable waters. These permits are required prior to the initiation of proposed actions. However, such permitting may be accomplished for emergency situations, as defined by the regulatory agency.

Section 401 addresses water quality issues and requires issuance of a Water Quality Certification by the Regional Water Quality Control Board before a Section 404 Permit can be issued. Completing the Section 401 process may be as challenging as issues associated with Section 404. The state charges a fee for Section 401 water quality certification application processing.

Section 402 of the CWA addresses requirements for storm water discharges into natural drainages and is administered by the U.S. Environmental Protection Agency. The CWA also requires federal agency consistency with state nonpoint source pollution management plans. Nonpoint source pollution results from ground disturbing actions, such as construction, military training, and fuelbreak construction. Marine Corps' policy is to support the development and implementation of nonpoint source pollution management programs that ensure water quality protection. This is typically accomplished through the use of Best Management Practices (BMPs). As defined by MCO 5090.2, BMPs are "*methods, measures, or practices selected by an agency to meet its nonpoint source control needs, including, but not limited to, structural and nonstructural controls and operation and maintenance procedures (40 CFR 130).*"

Migratory Bird Treaty Act

The Migratory Bird Treaty Act is an international agreement among the United States, Canada, and Mexico that protects designated species of birds. Virtually all birds are protected under the Migratory Bird Treaty Act, with only a few exceptions, such as the California quail. Birds classified as migratory also include species that occupy MCAS Miramar throughout the year. A complete list of all species of all migratory birds protected by the Migratory Bird Treaty Act is in 50 CFR 10.13.

The Migratory Bird Treaty Act controls the taking of these birds, their nests, eggs, parts, or products. The Act states that it is unlawful "at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, attempt to capture, or attempt to kill, purchase, offer to purchase, deliver for shipment, ship, export, import, cause to be shipped, deliver for transport, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, possess, offer for sale, sell, offer to sell, barter, offer to barter, any migratory bird, any part, nest, or egg of any such bird, or any part, nest, or egg thereof;" unless and except as permitted by regulations in the Migratory Bird Treaty Act.

All persons, organizations, and agencies, are liable for prosecution for violations and must follow permitting requirements for taking migratory birds. Special purpose permits may be requested and issued that allow

for the relocation or transport of migratory birds for management purposes.

Executive Order 13186

Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds* required that DoD and the USFWS establish a Memorandum of Understanding that will promote the conservation of migratory bird populations. A Memorandum of Understanding (MOU) has been developed between the agencies to promote the conservation of migratory birds and address non-military readiness activities[24] (*i.e.*, natural resources management, installation support functions, industrial activities, facility construction/demolition, hazardous waste cleanup) (September 5, 2014). Specifically the MOU requires that DoD shall:

- follow all migratory bird permitting requirements for activities subject to 50 CFR (*e.g.*, banding and marking, scientific collecting, special Canada goose permit, special purposes, depredation);
- encourage incorporation of comprehensive migratory bird management objectives into DoD planning documents, including INRMPs;
- consistent with current and emerging mission requirements, manage military lands and non-military readiness activities in such a way that supports migratory bird conservation, habitat protection, restoration, and enhancement;
- inventory and monitor bird populations on DoD land to the extent feasible to facilitate decision about the need for, and effectiveness of, conservation efforts;
- work cooperatively with USFWS and state fish and wildlife agencies to promote timely development, effective review, and revisions of the INRMPs, including any potential revisions to promote the conservation of migratory birds;
- incorporate conservation measures addressed in Regional or State Bird Conservation Plans into INRMPs;
- consistent with imperatives of safety and security, allow the USFWS and other partners reasonable access to military lands for conducting sampling or survey programs;
- consistent with imperatives of safety and security and bird conservation responsibilities, support the economic and recreational benefits of bird-related activities by allowing public access to military lands for recreational uses;
- develop policies and procedures for facilities design that will promote the conservation of migratory bird populations, including:
    - mitigating the negative impacts of reflective glass in buildings;
    - maximizing the use of native landscaping to promote migratory bird habitat, except in areas subject to BASH hazards; and
    - turning off interior building lighting at night, especially building surfaces that may be visible to migratory or resident birds.
- prior to starting any activity that is likely to affect populations of migratory birds, take the following specific steps:
    - identify potentially affected species and determine if any species of concern could be affected;
    - use NEPA to assess and document expected impacts on species of concern; and
    - engage in early planning and scoping with the USFWS relative to potential impacts of a proposed action to proactively address migratory bird conservation and initiate appropriate actions to avoid or minimize the take of migratory birds.
- Continue to promote the conservation of migratory birds on military lands by:
    - fire and fuel management practices;
    - invasive species and aquatic nuisance species management practices; and

[24] Military readiness activities are addressed in a rulemaking in accordance with section 315, National Defense Authorization Act for Fiscal Year 2003 (Public Law 107-314, 116 Stat. 2458).

- communication towers, utilities and energy development.

This MOU does not address incidental take resulting from military readiness activities or active DoD airfield operations, as covered by 50 CFR 21.15 (Authorization of take incidental to military readiness). Installation commanders responsible for military airfields will not implement wildlife conservation prescriptions set forth in this MOU if they conclude that such actions will negatively impact military mission or combat capability. Bird-related management activities with a potential to affect airfield operations or safety will be managed according to DoDI 4165.57 and the airfield's Bird/Wildlife Aircraft Strike Hazards (BASH) Program.

Final Rule – Migratory Bird Permits; Take of Migratory Birds by the Armed Forces
Section 315 of the 2003 National Defense Authorization Act provides that, not later than one year after its enactment, the Secretary of the Interior (Secretary) shall exercise his/her authority under Section 704(a) of the Migratory Bird Treaty Act to prescribe regulations to authorize the Armed Forces to incidentally take migratory birds during military readiness activities authorized by the Secretary of Defense or the Secretary of the military department concerned. The Authorization Act further requires the Secretary to promulgate such regulations with the concurrence of the Secretary of Defense.

The USFWS published a final rule (Federal Register Volume 72, Number 39, February 28, 2007) that authorizes the Armed Forces for the incidental taking of migratory birds during military readiness activities. This final rule "… *authorizes such take, with limitations, that result from military readiness activities of the Armed Forces. If any of the Armed Forces determine that a proposed or an ongoing military readiness activity may result in a significant adverse effect on a population of a migratory bird species, then they must confer and cooperate with the Service to develop appropriate and reasonable conservation measures to minimize or mitigate identified significant adverse effects. The Secretary of the Interior, or his/her designee, will retain the power to withdraw or suspend the authorization for particular activities in appropriate circumstances.*"

This rule only includes military readiness activities. It specifically does not include routine operation of installation operating support functions (*e.g.*, administrative offices; military exchanges; commissaries; water treatment facilities; storage facilities; schools; housing; motor pools; laundries; morale, welfare, and recreation activities; shops; mess halls), operation of industrial activities, or construction or demolition of facilities relating to these routine operations.

The rule anticipates that installations will use the NEPA process to determine whether an ongoing or proposed military readiness activity is "*likely to result in a significant adverse effect on the population of a migratory bird species.*" If such significant adverse effects are likely, an installation is required to confer with the USFWS to develop and implement appropriate conservations measures to minimize or mitigate any such significant adverse effects. The Armed Forces will continue to be responsible for ensuring that military readiness activities are implemented in accordance with all applicable statutes including NEPA and ESA.

Withdrawal of authorization may be proposed if the Secretary [*of Interior*] determines that failure to do so is likely to result in a significant adverse effect on a population of a migratory bird species and one or more of the following circumstances apply:

(A) The Armed Forces have not implemented conservation measures that (i) are directly related to protecting the migratory bird species affected by the proposed military readiness activity; (ii) would significantly reduce take of migratory birds species affected by the military readiness activity, (iii) are economically feasible, and (iv) do not limit the effectiveness of military readiness activities.

(B) The Armed Forces fail to conduct mutually agreed upon monitoring to determine the effects of a military readiness activity on migratory bird species and/or the efficacy of the conservation measures implemented by the Armed Forces.
(C) The Armed Forces have not provided reasonably available information that the Secretary has determined is necessary to evaluate whether withdrawal of take authorization for the specific military readiness activity is appropriate.

DoD and USMC Policy Requirements
The DoD and USMC have incorporated policies to reflect the MOU and Final Rule mentioned above in regards to migratory bird protection. The DoD Instruction 4715.03 (Natural Resources Conservation Program) of March 18, 2011 includes policies on the protection of migratory birds in Enclosure 2, paragraph 7.n(1) and Enclosure 3, paragraph 1.h. These policies state that the DoD shall, where appropriate, protect migratory birds pursuant to the Migratory Bird Treaty Act, and seek to minimize impacts on migratory birds. MCO 5090.2, change 3 of August 26, 2013, chapter 11, subparagraph 11104.3.d states that the Marine Corps will consult the USFWS during INRMP preparation to minimize the taking of protected birds caused by actions not directly associated with military readiness activities.

Final Rule – Migratory Bird Permits; Removal of Migratory Birds from Buildings
The USFWS published a final rule (Federal Register Volume 72, Number 193, October 5, 2007) that amended 50 CFR part 21 to allow removal of migratory birds (other than federally listed threatened or endangered species, Bald Eagles, and Golden Eagles) from inside buildings in which the birds may pose a threat to themselves, to public health and safety, or to commercial interests. This regulatory addition facilitates removal of birds from buildings, which would otherwise require a migratory bird permit.

Birds removed under this rule must be captured using a humane method and, in most cases, immediately released to the wild. "*This regulation does not allow removal of birds or nests from the outside of buildings without a permit. Removal of active nests from inside buildings must be conducted by a federally permitted migratory bird rehabilitator*."

MCAS Miramar Migratory Bird Permit
MCAS Miramar maintains a Depredation-Airport Permit that covers take, temporary possession, and transport of injured birds to rehabilitation facilities to "*relieve or prevent injurious situations impacting public safety*." Preventing significant bird air strikes by aircraft is critical to successful operations of the air station. Removal actions to alleviate excrement falling onto workspaces and aircraft have been deemed impacting public safety. The permit excludes federally listed threatened or endangered species, Bald Eagles, and Golden Eagles.

The permit cannot be used for situations where birds "*are merely causing a nuisance*." Many conditions apply that should be reviewed as any specific actions are taken. Standard and specific conditions for Migratory Bird Depredation Permits are included with the permit. Actions to exclude or preclude bird use of areas where incompatible with operations should be considered prior to any bird removal attempt.

Impacts of Migratory Bird Issues on Project Planning
As part of planning and/or approving construction, re-construction, and maintenance actions, steps need to be taken to avoid impacts on migratory birds, their nests, and young. Wording needs to be placed in all contracts and work orders to prevent work delay costs to the government that may result from the presence of bird nests in work areas. The Environmental Management Department, Natural Resources Division can provide contractual language prepared for and approved by the Navy for construction contracts on MCAS Miramar.

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APPENDIX B. PLANT SPECIES KNOWN TO OCCUR AT MCAS MIRAMAR

(Undeveloped areas only. No Main Station landscaped plants included.)

Marine Corps Air Station Miramar – Observed Flora			
Scientific Name	**Common Name+**	**Status***	**Reference ****
Lycophyta (Fern-allies)			
Isoetaceae – Quill Family			
Isoetes howellii	Howell's Quillwort	ACOE vernal pool indicator, Native	4, 7
Isoetes orcuttii	Orcutt's Quillwort	ACOE vernal pool indicator, Native	4, 5, 6, 7, 16
Selaginellaceae – Spike Moss Family			
Selaginella bigelovii	Bigelow's Spike-Moss	Native	13a, 13b, 17, 19
Selaginella cinerascens	Mesa Spike-Moss	Native	9, 10, 13a, 13b, 17, 19, 25
Pterophyta (Ferns)			
Marsileaceae – Pepperwort Family			
Marsilea vestita	Hairy Pepperwort	ACOE vernal pool indicator, Native	4, 20
Pilularia americana	American Pillwort	ACOE vernal pool indicator, Native	4, 5, 6, 7, 10, 16, 20
Ophilglossaceae – Adder's-Tongue Fern Family			
Ophioglossum californicum	California Adder's-Tongue Fern	Native	13a, 19
Polypodiaceae – Polypody Family			
Polypodium californicum	California Polypody	Native	11
Pteridaceae – Brake Family			
Adiantum jordanii	California Maidenhair	Native	11, 13a, 13b
Pellaea andromedifolia	Coffee Fern	Native	12
Pellaea mucronata	Bird's-foot Cliff-Brake	Native	13a, 13b, 17, 24
Pentagramma triangularis ssp. *viscosa*	Sticky Silverback Fern	Native	11, 13a, 13b
Anthophyta (Dicotyledones)			
Adoxaceae – Adoxa Family			
Sambucus nigra ssp. *caerulea* (*S. mexicana*)	Blue Elderberry	Native	9, 13a, 13b, 22
Aizoaceae – Fig-marigold Family			
Carpobrotus species	Iceplant	Invasive, Non-native	1a, 9
Mesembryanthemum crystalliumum	Crystalline Iceplant	Invasive, Non-native	Station Natural Resources Division (NRD) Staff
Mesembryanthemum nodiflorum	Slender-leaf Iceplant	Invasive, Non-native	2
Amaranthaceae – Amaranth Family			
Amaranthus albus	White Tumbleweed	Non-native	22
Anacardiaceae – Sumac Family			
Malosma laurina	Laurel Sumac	Native	2, 9, 11, 13a, 13b, 17, 23, 25
Rhus integrifolia	Lemonadeberry	Native	9, 11, 13a, 13b, 17, 24,

Marine Corps Air Station Miramar – Observed Flora			
Scientific Name	**Common Name+**	**Status***	**Reference ****
			25, 26
Rhus ovata	Sugar Bush	Native	11
Schinus molle	Peruvian Pepper Tree	Non-native	11
Toxicodendron diversilobum	Western Poison-Oak	Native	9, 13a, 13b, 17, 24, 28
Apiaceae – Carrot Family			
Apiastrum angustifolium	Mock Parsley	Non-native	11, 12, 13a, 13b, 25
Apium graveolens	Common Celery	Non-native	13a, 13b
Conium maculatum	Common Poison Hemlock	Non-native	NRD Staff
Daucus pusillus	Rattlesnake Weed	Native	11, 12, 13a, 13b, 17, 24, 25, 26
Eryngium aristulatum var. *parishii*	San Diego Button Celery	FE, ACOE vernal pool indicator, Native	2, 3, 4, 5, 6, 7, 14, 16, 20
Foeniculum vulgare	Sweet Fennel	Invasive, Non-native	1a, 1b, 1d, 1e
Lomatium dasycarpum	Woolly-fruit Lomatium	Native	11, 13b
Osmorhiza brachypoda	California Sweet-cicely	Native	13b
Sanicula arguta	Sharp-tooth Sanicle	Native	11, 13a, 13b
Sanicula bipinnatifida	Purple Sanicle	Native	13b
Sanicula crassicaulis	Pacific Sanicle	Native	13a, 13b, 25
Apocynaceae – Dogbane Family			
Asclepias fascicularis	Narrow-leaf Milkweed	Native	11, 13a, 13b, 17
Nerium oleander	Oleander	Non-native	NRD Staff
Asteraceae – Sunflower Family			
Acourtia microcephala	Sacapellote	Native	11, 13a , 13b
Ambrosia psilostachya	Western Ragweed	Native	11, 13a, 13b, 17, 24, 26
Anthemis cotula	Mayweed	Non-native	13b, 22
Argyranthemum frutescens	Paris Daisy	Non-native	13b
Artemisia californica	California Sagebrush	Native	2, 9, 11, 12, 13a, 13b, 17, 24, 25, 25, 26
Artemisia douglasiana	Mugwort	Native	28, Staff
Artemisia dracunculus	Tarragon	Non-native	13b
Artemisia palmeri	Palmer's Sagewort	Native	8, 13a, 13b
Baccharis pilularis	Coyote Bush	Native	10, 11, 13b, 25, 26
Baccharis salicifolia	Mule-fat	Native	9, 11, 13a, 13b, 17, 18, 24, 26, 28
Baccharis sarothroides	Broom Baccharis	Native	9, 10, 11, 12, 13a, 13b, 17, 24, 25, 26, 28
Bahiopsis (*Viguiera*) *laciniata*	San Diego Sunflower	Native	9, 11, 13b, 15
Brickellia californica	California Brickellbush	Native	17, 24
Carduus pycnocephalus	Italian Thistle	Invasive, Non-native	13b, 19, 24, 25
Centaurea melitensis	Tocalote	Invasive, Non-native	2, 10, 12, 13a, 13b, 16, 17, 24, 25, 28, 29
Centromadia pungens ssp. *pungens*	Common Spikeweed	Native	28
Chaenactis artemisiifolia	Artemisia Pinchushion	Native	11, 13b

Marine Corps Air Station Miramar – Observed Flora			
Scientific Name	**Common Name+**	**Status***	**Reference ****
Chaenactis glabriuscula var. *glabriuscula*	Yellow Pincushion	Native	11, 13b
Cirsium cymosum	Peregrine Thistle	Native	13b
Cirsium occidentale	California Thistle	Native	13a
Cirsium vulgare	Bull Thistle	Non-native	1b
Corethrogyne filaginifolia	California Sand-aster	Native	9, 11, 12, 13a, 13b, 17, 24, 25, 26
Cotula australis	Australian Brass-Buttons	Non-native	11, 29
Cotula coronopifolia	African Brass-Buttons	Non-native	2, 3, 5, 6, 10, 13a, 13b, 16, 22
Cynara cardunculus	Artichoke Thistle	Invasive, Non-native	1a, 1b, 1c, 1d, 1e, 1f
Deinandra fasciculata	Fascicled Tarweed	Native	2, 3, 7, 10, 11, 12, 13a, 13b, 16, 17, 24, 25, 26, 28
Dimorphotheca sinuata	Blue-eye Cape-Marigold	Non-native	13b
Dittrichia graveolens	Stinkwort	Invasive, Non-native	1a, 1b, 1d, 1e, 1f, 29
Encelia californica	California Encelia	Native	11
Encelia farinosa	Brittlebrush	Native	NRD Staff
Erigeron (*Conyza*) *bonariensis*	Flax-leaf Fleabane	Non-native	13a, 25
Erigeron (*Conyza*) *canadensis*	Horseweed	Non-native	11, 12, 26, 28
Erigeron foliosus var. *foliosus*	Leafy Daisy	Native	11, 13b, 17
Eriophyllum confertiflorum	Golden Yarrow	Native	11, 12, 13b, 18, 25, 26
Gazania linearis	Gazania	Non-native	NRD Staff, 13b
Glebionis (*Chrysanthemum*) *coronarium*	Garland Daisy	Non-native	1a, 1b, 1c, 1d, 22
Harzardia squarrosa var. *grindelioides*	Sawtoothed Goldenbush	Native	13a, 13b, 25, 26
Hedypnois cretica	Crete Hedypnois	Non-native	10, 11, 13a, 13b, 17
Helianthus annuus	Common Sunflower	Non-native	13a, 22
Helianthus gracilentus	Slender Sunflower	Native	NRD Staff, 26
Helminthotheca (*Picris*) *echioides*	Bristly Oxtongue	Non-native	13a, 13b, 25, 29
Heterotheca grandiflora	Telegraph Weed	Native	11, 13a, 13b, 24, 25
Holocarpha virgata	Sticky Tarweed	Native	7, 10, 11, 13a, 16, 25, 26
Hypochaeris glabra	Smooth Cat's-Ear	Non-native	3, 7, 10, 11, 12, 13a, 13b, 16, 17, 25
Hypochaeris radicata	Hairy Cat's-Ear	Non-native	13b
Isocoma menziesii	Coast Goldenbush	Native	2, 9, 11, 13a, 13b, 17, 24, 25, 26, 28
Lactuca serriola	Prickly Lettuce	Non-native	10, 13a, 13b, 24, 29
Lasthenia gracilis (californica)	California Goldfields	Native	11, 12, 13a, 13b
Layia platyglossa	Tidy Tips	Native	NRD Staff, 13b

Marine Corps Air Station Miramar – Observed Flora			
Scientific Name	**Common Name+**	**Status***	**Reference ****
Logfia filaginoides (*Filago californica*)	California Filago	Native	13a, 13b, 16, 25, 26
Logfia (*Filago*) *gallica*	Narrow-leaf Filago	Non-native	10, 11, 12, 13a, 13b, 16, 17, 18, 25, 28
Madia exigua	Pygmy Madia	Native	13b
Matricaria discoidea (Chamomila suaveolens)	Common Pineapple-weed	Non-native	13b, 22
Micropus californicus	Slender Cottonweed	Native	19
Osmadenia tenella	Rosin Weed	Native	10, 11, 12, 13b
Pentachaeta aurea	Golden-rayed Pentachaeta	Native	11, 13b
Pluchea odorata	Salt Marsh Fleabane	Native	NRD Staff
Porophyllum gracile	Odora	Native	11, 13a, 13b
Pseudognaphalium beneolens	Fragrant Everlasting	Native	NRD Staff
Pseudognaphalium biolettii (Gnaphalium bicolor)	Bicolor Cudweed	Native	11, 13b, 24, 25, 26
Pseudognaphalium (*Gnaphalium*) *californicum*	California Everlasting	Native	11, 13a, 13b, 17, 24, 25, 26
Pseudognaphalium (*Gnaphalium*) *canescens*	Everlasting Cudweed	Native	13a, 13b, 17, 24
Pseudognaphalium (*Gnaphalium*) *luteoalbum*	Cudweed	Non-native	13a, 13b
Pseudognaphalium (Gnaphalium) microcephalum	White Everlasting	Native	28
Pseudognaphalium (*Gnaphalium*) *stramineum*	Cotton-batting Plant	Native	13a, 13b
Psilocarphus brevissimus	Woolly-Marbles	ACOE vernal pool indicator, Native	3, 4, 5, 6, 7, 10, 12, 16 20
Psilocarphus tenellus	Slender Woolly-Marbles	Native	4, 7, 10, 13b, 16, 20
Rafinesquia californica	California Chicory	Native	13a, 13b, 22
Senecio vulgaris	Common Groundsel	Non-native	11,13b
Silybum marianum	Milk Thistle	Invasive, Non-native	1b, 11, 13a, 13b, 24, 28
Solidago californica	California Goldenrod	Native	NRD Staff
Sonchus asper	Prickly Sow Thistle	Non-native	10, 11, 13a, 13b, 25, 29
Sonchus oleraceus	Common Sow Thistle	Non-native	10, 11, 12, 13a, 13b, 16
Stebbinsoseris heterocarpa	Grassland Stebbinsoseris	Native	12
Stephanomeria virgata	Tall Wreath Plant	Native	11, 12, 13a, 13b, 17, 24, 26
Stylocline gnaphaloides	Everlasting Nest-Straw	Native	11, 13a, 13b, 17
Taraxacum officinale	Common Dandelion	Non-native	13b
Uropappus lindleyi	Silver Puffs	Native	11, 13a, 13b
Xanthium strumarium	Cocklebur	Non-native	13a, 22
Boraginaceae – Borage Family			
Amsinckia menziesii	Rancher's Fiddleneck	Native	11, 13b, 25, 26, 28

Marine Corps Air Station Miramar – Observed Flora			
Scientific Name	**Common Name+**	**Status***	**Reference ****
Cryptantha clevelandii	Cleveland's Cryptantha	Native	22
Cryptantha intermedia	Nievitas Cryptantha	Native	13a, 13b, 22, 25, 26
Cryptantha micromeres	Minute-flower Cryptantha	Native	13b
Cryptantha muricata	Prickly Cryptantha	Native	9
Eriodictyon crassifolium	Felt-leaf Yerba Santa	Native	9, 11, 13b, 17, 19, 24, 25
Eriodictyon (*Turricula*) *parryi*	Poodle-dog Bush	Native	11
Harpagonella palmeri	Palmer's Grappling Hook	Native	11, 15, 18
Pectocarya linearis	Slender Pectocarya	Native	11, 13b, 25, 26
Phacelia cicutaria var. *hispida*	Caterpillar Phacelia	Native	11, 13b
Phacelia distans	Wild Heliotrope	Native	13b, 24, 25, 26
Phacelia grandiflora	Giant-flower Phacelia	Native	NRD Staff, 13b
Phacelia parryi	Parry's Phacelia	Native	13b, 19
Phacelia ramosissima var. *latifolia*	Branching Phacelia	Native	11
Plagiobothrys acanthocarpus	Adobe Popcornflower	ACOE vernal pool indicator, Native	5, 20, 22, 25
Plagiobothrys bracteatus	Bracted Popcornflower	ACOE vernal pool indicator, Native	5
Plagiobothrys collinus	Popcornflower	Native	11, 13b
Plagiobothrys leptocladus	Alkali Plagiobothrys	ACOE vernal pool indicator, Native	10
Plagiobothrys nothofulvus	Rusty Popcornflower	Native	12, 22
Brassicaceae – Mustard Family			
Athysanus pusillus	Dwarf Athysanus	Native	
Brassica nigra	Black Mustard	Non-native	7, 9, 10, 13a, 13b, 17, 22, 24, 25, 29
Capsella bursa-pastoris	Shepherd's Purse	Non-native	11
Cardamine californica	Milk Maids	Native	NRD Staff
Caulanthus heterophyllus	San Diego Jewelflower	Native	11, 12, 13b, 17
Coronopus didymus	Lesser Wart-cress	Non-native	22
Hirschfeldia incana	Short-pod Mustard	Non-native	9, 11, 13b, 24, 25, 29
Lepidium nitidum	Shining Peppergrass	Native	12, 13a, 13b, 22
Lepidium virginicum var. *robinsonii*	Robinson's Peppergrass	Native	8, 13b
Lobularia maritima	Sweet Alyssum	Non-native	13a
Nasturtium officinale	Watercress	Native	NRD Staff, 13b
Raphanus sativus	Wild radish	Non-native	13a, 13b, 22, 25
Sisymbrium irio	London Rocket	Non-native	29,
Sisymbrium orientale	Indian Hedgemustard	Non-native	13b
Thysanocarpus spp.	Lace Pod	Native	11, 13b
Cactaceae – Cactus Family			
Cylindropuntia californica	Cane Cholla	Native	11
Cylindropuntia prolifera	Coast Cholla	Native	9, 2002 SDNHM specimen
Ferocactus viridescens	Coast Barrel Cactus	Native	8, 9, 11, 13a, 13b, 17,

Marine Corps Air Station Miramar – Observed Flora			
Scientific Name	**Common Name+**	**Status***	**Reference ****
			18, 19, 24
Opuntia littoralis	Coastal Prickly-Pear	Native	9, 11, 13a, 13b, 17, 19, 24
Opuntia oricola	Pancake Prickly-Pear	Native	2002 SDNHM specimen, 19
Campanulaceae – Bellflower Family			
Downingia cuspidata	Toothed Downingia	ACOE vernal pool indicator, Native	2, 3, 4, 5, 6, 7, 10, 16, 20
Caprifoliaceae – Honeysuckle Family			
Lonicera subspicata var. *denudata*	Johnston's Honeysuckle	Native	11, 13a, 13b, 17, 23, 24
Caryophyllaceae – Pink Family			
Cardionema ramosissimum	Sandmat	Native	11, 17
Cerastium fontanum	Chickweed	Non-native	13a
Cerastium glomeratum	Mouse-ear Chickweed	Non-native	11, 13a, 13b, 19
Polycarpon tetraphyllum	Four-leaf Allseed	Non-native	13b
Silene antirrhina	Snapdragon Catchfly	Native	13a
Silene gallica	Common Catchfly	Non-native	11, 12, 13a, 13b, 17, 19, 24
Silene laciniata ssp. *laciniata*	Southern Pink	Native	11, 13b, 17, 19
Silene multinervia	Many-nerve Catchfly	Native	13b
Spergula arvensis	Spurry, Stickwort	Non-native	10, 11, 12, 13b, 17
Spergularia bocconi	Biccone's Sand-spurry	Non-native	11, 13a, 13b, 16
Stellaria media	Common Chickweed	Non-native	11, 13b, 19
Chenopodiaceae			
Atriplex semibaccata	Australian Saltbush	Non-native	1b, 22, 25, 26
Chenopodium album	Lamb's Quarters	Non-native	13a, 29
Chenopodium californicum	California Goosefoot	Native	13a, 13b, 19
Salsola tragus	Russian Thistle	Invasive, Non-native	1b, 1d, 2, 11, 16, 19
Cistaceae – Rock-rose Family			
Cistus creticus	Purple Rock-rose	Non-native	NRD Staff
Helianthemum scoparium	Peak Rush-rose	Native	9, 11, 12, 13a, 13b, 17, 25, 26
Cleomaceae – Spiderflower Family			
Peritoma (*Isomeris*) *arborea*	Bladderpod	Native	11, Staff
Convolvulaceae – Morning-glory Family			
Calystegia macrostegia	Western Bindweed	Native	9, 13a, 13b, 17, 19, 24, 26
Convolvulus arvensis	Field Bindweed	Non-native	11
Cressa truxillensis	Alkali Weed	Native	11
Cuscuta californica	Dodder	Native	11, 13a, 13b, 19, 24
Dichondra occidentalis	Western Dichondra	Native	11, 13a, 15
Crassulaceae – Stonecrop Family			
Crassula aquatica	Water Pygmyweed	ACOE vernal pool indicator, Native	4, 5, 6, 7, 10, 16, 20

Marine Corps Air Station Miramar – Observed Flora			
Scientific Name	**Common Name+**	**Status***	**Reference ****
Crassula connata	Pygmyweed	Native	10, 11, 12, 13a, 13b, 19, 25
Dudleya edulis	Ladies' Fingers	Native	11, 24, 25
Dudleya lanceolata	Lance-leaf Dudleya	Native	11, 19, 25
Dudleya pulverulenta	Chalk Dudleya	Native	11, 17, 18, 19, 24
Dudleya variegata	Variegated Dudleya	Native	15, 18
Cucurbitaceae – Gourd Family			
Marah macrocarpus	Wild Cucumber	Native	11, 12, 13a, 13b, 17, 19, 25
Datiscaceae – Datisca Family			
Datisca glomerata	Durango Root	Native	NRD Staff
Dipsacaceae – Teasel Family			
Dipsacus sativus	Fuller's Teasel	Non-native	13a
Elatinaceae – Elatine Family			
Elatine brachysperma	Short-seed Waterwort	Native	5, 6, 7, 10, 16, 20
Elatine californica	California Waterwort	ACOE vernal pool indicator, Native	4, 7, 22
Ericaceae – Heath Family			
Arctostaphylos glandulosa ssp. *crassifolia*	Del Mar Manzanita	FE, Native	11,13b, 15, 18, 19, 23
Arctostaphylos glandulosa ssp. *glandulosa* (*zacaensis*)	Southern Eastwood Manzanita/Zaca Lake Manzanita	Native	15, 18, 19, 23
Comarostaphylis diversifolia var. *diversifolia*	Summer-holly	Native	8, 11
Xylococcus bicolor	Mission Manzanita	Native	9, 11, 12, 13a, 13b, 17, 18, 19
Euphorbiaceae – Spurge Family			
Croton californicus	California Croton	Native	22
Croton (*Eremocarpus*) *setigerus*	Doveweed	Native	2, 3, 7, 10, 11, 13a, 13b, 16, 17, 19, 24, 25, 26
Euphorbia (*Chamaesyce*) *albomarginata*	Rattlesnake Weed	Native	17, 25, 26
Euphorbia (*Chamaesyce*) *maculata*	Spotted Spurge	Non-native	NRD Staff
Euphorbia peplus	Petty Spurge	Non-native	13a, 13b, 22, 25
Euphorbia (*Chamaesyce*) *prostrata*	Prostrate Spurge	Non-native	NRD Staff
Euphorbia (*Chamaesyce*) *polycarpa*	Small-seed Sandmat	Native	11, 13a, 13b, 16
Ricinus communis	Castor Bean	Invasive, Non-native	1a, 1b, 1d, 11, 19
Fabaceae – Pea Family			
Acacia melanoxylon	Blackwood Acacia	Invasive, Non-native	1a, 1b, 1c, 1d, 1e, 11, 19
Acmispon americanus (*Lotus purshianus*)	Spanish Clover	Native	13a, 13b, 16, 19, 25
Acmispon glaber (*Lotus*	Deerweed	Native	7, 9, 11, 12, 13a, 13b,

Marine Corps Air Station Miramar – Observed Flora			
Scientific Name	**Common Name+**	**Status***	**Reference ****
scoparius)			16, 17, 19, 24, 25, 26, 28
Acmispon (*Lotus*) *heermannii*	Heermann's Lotus	Native	13b
Acmispon maritimus (*Lotus salsuginosus*)	Humble Lotus	Native	13b
Acmispon miscranthus	Grab Lotus	Native	19
Acimispon parviflorus (*Lotus micranthus*)	Miniature Lotus	Native	13b, 19
Acimispon (*Lotus*) *strigosus*	Strigose Lotus	Native	12, 13a, 13b, 17, 19
Lathyrus vestitus	San Diego Sweet-pea	Native	11, 13b, 19, 24
Lotus corniculatus	Birdfoot Trefoil	Non-native	13a
Lupinus bicolor	Miniature Lupine	Native	10, 11, 13a, 13b, 19
Lupinus concinnus	Bajada Lupine	Native	13a, 13b
Lupinus hirsutissimus	Stinging Lupine	Native	11
Lupinus succulentus	Arroyo Lupine	Native	11, 13b, 25, 26
Lupinus truncatus	Collar Lupine	Native	11, 13b, 19
Medicago polymorpha	California Burclover	Non-native	11, 13a, 13b, 19, 29
Melilotus albus	White Sweetclover	Non-native	13a, 13b, 19, 28
Melilotus indicus	Indian Sweetclover	Non-native	11, 13a, 13b, 29
Melilotus officinalis	Yellow Sweetclover	Non-native	19
Trifolium depauperatum	Balloon-sack Clover	Native	7, 28 13a, 13b
Trifolium fragiferum	Strawberry Clover	Non-native	22
Trifolium gracilentum	Pin-point Clover	Native	13b
Trifolium hirtum	Rose Clover	Non-native	19
Trifolium microcephalum	Maiden Clover	Native	13a, 13b
Trifolium willdenovii	Valley or Tomcat Clover	Native	13b
Vicia americana	American Vetch	Native	19
Vicia ludoviciana	Deer Pea Vetch	Native	13b
Vicia sativa ssp. *sativa*	Spring Vetch	Non-native	19
Vicia villosa	Hairy Vetch	Non-native	11, 13a, 13b
Fagaceae – Beech Family			
Quercus agrifolia	Coast Live Oak	Native	9, 13a, 13b, 15, 17, 18, 24
Quercus berberidifolia	Scrub Oak	Native	9, 11, 12, 13a, 13b, 17, 19, 24
Quercus dumosa	Nuttall's Scrub Oak	Native	2, 8, 13a, 19, 26
Quercus engelmannii	Engelmann Oak	Native	NRD Staff, 13b
Gentianaceae – Gentian Family			
Zeltnera venusta (*Centaurium venustum*)	Canchalagua	Native	10, 11, 13a, 13b, 16, 19, 25
Geraniaceae – Geranium Family			
Erodium botrys	Long-beak Filaree	Non-native	2, 3, 7, 9, 10, 11, 12, 13a, 13b, 16, 17, 18, 19, 24, 25, 28, 29
Erodium cicutarium	Red-stem Filaree	Non-native	7, 10, 11, 13a, 13b, 16, 18, 19, 25, 28, 29
Erodium moschatum	White-stem Filaree	Non-native	13b, 16
Geranium californicum	California Geranium	Native	13b, 19, 25, 26

Marine Corps Air Station Miramar – Observed Flora			
Scientific Name	**Common Name+**	**Status***	**Reference ****
Geranium carolinianum	Carolina Geranium	Native	11, 13a, 13b, 19
Geranium dissectum	Cut-leaf Geranium	Non-native	NRD Staff, 13b
Geranium molle	Dove-foot Geranium	Non-native	16
Grossulariaceae – Gooseberry Family			
Ribes indecorum	White-flower Currant	Native	11, 17
Ribes malvaceum	Chaparral Currant	Native	13b
Ribes speciosum	Fuchsia-flower Gooseberry	Native	11, 13a, 13b, 22
Heliotropaceae – Heliotrope Family			
Heliotropium curassavicum	Salt Heliotrope	Native	NRD Staff, 13b
Hydrophyllaceae – Waterleaf Family			
Emmenanthe penduliflora	Whispering Bells	Native	13b, 19
Eucrypta chrysanthemifolia	Common Eucrypta	Native	11, 13a, 13b, 19
Pholistoma auritum ssp. *auritum*	Fiesta Flower	Native	11, 13b
Pholistoma racemosum	San Diego Fiesta Flower	Native	11, 13a, 13b
Hypericaceae – St. John's Wort Family			
Hypericum canariense	Canary Island St. John's Wort	Non-native	1a, 1b, 1d, 1e, 1f
Lamiaceae – Mint Family			
Marrubium vulgare	Horehound	Non-native	11, 19, 28
Monardella viminea (M. *linoides* ssp. *viminea*)	Willowy Monardella	FE, Native	8, 9, 13b, 17, 18, 19, 24
Pogogyne abramsii	San Diego Mesa Mint	FE, ACOE vernal pool indicator, Native	2, 3, 4, 5, 6, 7, 10, 14, 16, 18, 19, 20
Salvia apiana	White Sage	Native	9, 11, 13a, 13b, 17, 19, 24, 26
Salvia columbariae	Chia	Native	11, 12, 13a, 13b, 17, 19
Salvia mellifera	Black Sage	Native	2, 9, 12, 13a, 13b, 15, 17, 18, 24, 25, 26
Scutellaria tuberosa	Danny's Skullcap	Native	11, 19
Stachys ajugoides	Hedge-nettle	Native	13a, 13b, 19, 26
Stachys bullata	California Hedge-nettle	Native	13b, 24
Trichostema lanatum	Woolly Bluecurls	Native	11, 13b, 19
Lythraceae – Loosestrife Family			
Lythrum hyssopifolium	Grass Poly	Non-native	3, 4, 5, 6, 7, 10, 11, 13a, 13b, 16, 19, 20
Malvaceae – Mallow Family			
Malacothamnus densiflorus	Many-flower Bushmallow	Native	19, 24
Malacothamnus fasciculatus	Chaparral Mallow	Native	9, 11, 13a, 13b, 17, 19, 26
Malva parviflora	Cheeseweed	Non-native	11, 13a, 19, 29
Sidalcea malviflora	Checker Mallow	Native	9, 11, 13a, 13b
Molluginaceae – Carpet-weed Family			
Glinus lotoides	Lotus Sweetjuice	Non-native	16
Myrsinaceae – Myrsine Family			

Marine Corps Air Station Miramar – Observed Flora			
Scientific Name	**Common Name+**	**Status***	**Reference ****
Anagallis arvensis	Scarlet Pimpernel	Non-native	9, 10, 11, 13a, 13b, 16, 19, 25, 29
Anagallis minima (*Centunculus minimus*)	Chaffweed	ACOE vernal pool indicator, Native	4, 5, 6, 7, 10, 16, 20, 22
Anagallis monelli	Blue Pimpernel	Non-native	NRD Staff
Myrtaceae – Myrtle Family			
Eucalyptus globulus	Blue Gum	Non-native	1b, 22
Eucalyptus sideroxylon	Red Iron Bark	Non-native	22
Nyctaginaceae – Four O'Clock Family			
Mirabilis laevis (californica)	Wishbone Bush	Native	11, 12, 13a, 13b, 19
Oleaceae – Olive Family			
Olea europa	Mission Olive	Non-native	NRD Staff, 24
Onagraceae – Evening-primrose Family			
Camissonia bistorta	California Sun Cup	Native	11, 19
Camissonia cheiranthifolia	Beach Evening Primrose	Native	19
Camissonia micrantha	Miniature Sun Cup	Native	19
Camissonia robusta	Robust Sun Cup	Native	13b
Clarkia delicata	Campo Clarkia	Native	11
Clarkia purpurea ssp. *quadrivulnera*	Four-spot Clarkia	Native	11, 13a, 13b, 17, 19
Epilobium (*Zauschneria*) *canum*	California Fuchsia	Native	9, 13a, 13b, 17, 19, 24
Epilobium pygmaeum	Smooth Boisduvalia	Native	20
Orobanchaceae – Broom-Rape Family			
Castilleja affinis	Coast Paintbrush	Native	13b
Castilleja densiflora ssp. *gracilis*	Parish's Owl's-clover	Native	13a, 13b
Castilleja exserta	Purple Owl's-clover	Native	7, 10, 11, 12, 13a, 13b, 19, 25
Cordylanthus rigidus ssp. *setigerus*	Dark-tip Bird's Beak	Native	11, 19, 26
Pedicularis densiflora	Indian Warrior	Native	11, 19
Oxalidaceae – Wood-sorrel Family			
Oxalis albicans ssp. *californica*	California Wood Sorrel	Native	11, 13a, 13b, 17, 19
Oxalis pes-caprae	Bermuda Buttercup	Invasive, Non-native	1a, 1b, 11, 12, 13a, 16, 19, 29
Papaveraceae – Poppy Family			
Dicentra chrysantha	Golden Ear-drops	Native	13a, 13b
Eschscholzia california	California Poppy	Native	9, 11, 13b, 18, 19, 25, 28
Papaver californicum	Fire Poppy	Native	13b
Phrymaceae – Hopseed Family			
Mimulus aurantiacus	Coast Monkey Flower	Native	9, 11, 13a, 13b, 17, 19, 24, 25, 26
Mimulus brevipes	Slope Semiphore	Native	11, 13b, 19
Mimulus guttatus	Seep Monkey Flower	Native	11, 13a, 13b, 17
Mimulus pilosus	Downy Monkey Flower	Native	13b, 19

Marine Corps Air Station Miramar – Observed Flora			
Scientific Name	**Common Name+**	**Status***	**Reference ****
Plantaginaceae – Plantain Family			
Antirrhinum coulterianum	Coulter's Snapdragon	Native	13b, 22
Antirrhinum kelloggii	Climbing Snapdragon	Native	13b, 19
Antirrhinum nuttallianum	Nuttall's Snapdragon	Native	11, 12, 13a, 13b, 19, 25
Callitriche marginata	Long-stem Water Starwort	ACOE vernal pool indicator, Native	4, 5, 6, 7, 10, 16, 19, 20
Collinsia heterophylla	Chinese Houses	Native	11, 13b, 19
Linaria canadensis	Blue Toadflax	Native	13a, 13b, 19
Penstemon centranthifolius	Scarlet Bugler	Native	22
Plantago coronopus	Cut-leaf Plantain	Non-native	10
Plantago erecta	California Plantain	Native	7, 10, 12, 13a, 13b, 16, 19, 25, 26
Plantago elongata	Vernal Pool Plantain	ACOE vernal pool indicator, Native	6, 5, 7, 10, 16, 20
Plantago lanceolata	English Plantain	Non-native	22
Plantago major	Common Plantain	Non-native	13b
Plantago ovata	Woolly Plantain	Native	13b, 26
Veronica anagallis-aquatica	Water Speedwell	Non-native	13b, 22
Veronica peregrina	Purslane Speedwell	Native	4, 6, 10
Platanaceae – Sycamore Family			
Platanus racemosa	Western Sycamore	Native	9, 13a, 13b, 17, 19, 24, 28
Plumbaginaceae – Leadwort Family			
Limonium sinuatum	Sea-Lavender	Non-native	9, 24
Polemoniaceae – Phlox Family			
Eriastrum filifolium	Thread-leaf Woolly-Star	Native	13b
Gilia angelensis	Grassland Gilia	Native	11, 13b
Linanthus dianthiflorus	Farinose Ground Pink	Native	11, 12, 13a, 19
Navarretia atractyloides	Holly-leaf Skunkweed	Native	22
Navarretia fossalis	Spreading Navarretia	FT, ACOE vernal pool indicator, Native	4, 7, 20
Navarretia hamata	Hooked Skunkweed	Native	7, 10, 11, 12, 13a, 13b, 16, 19, 25, 26
Polygonaceae – Buckwheat Family			
Chorizanthe fimbriata	Fringed Spineflower	Native	11, 13b, 17, 19, 24, 25
Chorizanthe polygonoides var. *longispina*	Long-spined Spineflower	Native	8, 11, 13a, 13b, 16, 18, 19
Chorizanthe procumbens	Prostrate Spineflower	Native	11, 13b, 15, 19
Eriogonum fasciculatum	Flat-topped Buckwheat	Native	2, 9, 12, 13a, 13b, 15, 17, 18, 24, 25, 26, 28
Eriogonum gracile	Slender Buckwheat	Native	22
Eriogonum wrightii	Foothill Buckwheat	Native	17
Polygonum arenastrum	Common Knotweed	Non-native	19
Pterostegia drymarioides	Woodland Threadstem	Native	11, 13a, 13b, 19, 25
Rumex conglomeratus	Whorled Dock	Non-native	13b

Marine Corps Air Station Miramar – Observed Flora			
Scientific Name	**Common Name+**	**Status***	**Reference ****
Rumex crispus	Curly Dock	Non-native	1d, 2, 5, 6, 9, 10, 13a, 13b, 16, 17, 19, 24, 29
Rumex salicifolius	Willow Dock	Native	9, 13a, 13b, 24
Portulacaceae – Purslane Family			
Calandrinia breweri	Brewer's Calandrinia	Native	13b
Calandrinia ciliata	Red Maids	Native	11, 12, 13a, 13b, 19
Calyptridium monandrum	Common Calyptridium	Native	13a, 13b
Claytonia perfoliata	Miner's Lettuce	Native	11, 13a, 13b, 19
Primulaceae – Primrose Family			
Dodecatheon clevelandii	Padre's Shooting Star	Native	11, 13a, 13b, 19, 26
Ranunculaceae – Buttercup Family			
Clematis lasiantha	Pipestems	Native	19
Clematis pauciflora	Ropevine	Native	13a, 13b, 17, 22
Delphinium parryi	Parry's Larkspur	Native	13b, 17
Myosurus minimus	Little Mousetail	ACOE vernal pool indicator, Native	4, 5, 6
Thalictrum fendleri var. polycarpum	Smooth-leaf Meadow-rue	Native	11, 13a, 13b
Resedaceae – Mignonette Family			
Reseda luteola	Mignonette	Non-native	13b, 22
Rhamnaceae – Buckthorn Family			
Ceanothus otayensis	Otay-lilac	Native	8
Ceanothus tomentosus	Ramona-lilac	Native	11, 12, 13a, 13b, 17, 18, 19, 24, 25
Ceanothus verrucosus	Wart-stem Ceanothus	Native	15, 23
Fragula (*Rhamnus*) *californica*	Coffeeberry	Native	NRD Staff
Rhamnus crocea	Spiny Redberry	Native	9, 11, 13a, 13b, 17, 19, 24
Rhamnus ilicifolia	Hollyleaf Redberry	Native	18, 19
Rosaceae – Rose Family			
Adenostoma fasciculatum	Chamise	Native	2, 9, 11, 12, 13a, 13b, 17, 18, 23, 24, 25
Cercocarpus minutiflorus	San Diego Mountain-mahogany	Native	11, 13a, 13b, 15, 17, 18, 19, 24
Heteromeles arbutifolia	Toyon	Native	9, 11, 13a, 13b, 17, 24, 25, 28
Prunus ilicifolia	Holly-leaf Cherry	Native	9, 11, 13a, 13b, 15, 17, 18, 24
Prunus virginiana var. *demissa*	Western Choke-cherry	Native	11
Rubiaceae – Madder Family			
Galium angustifolium ssp. *angustifolium*	Narrow-leaved Bedstraw	Native	11, 12, 13a, 13b, 19, 24, 25, 26
Galium aparine	Goose Grass	Native	11, 13a, 13b, 19, 25, 26
Galium nuttallii	San Diego Bedstraw	Native	13a, 13b, 25
Galium stellatum	Star-flower Bedstraw	Native	13a
Rutaceae – Rue Family			
Cneoridium dumosum	Bush-rue	Native	9, 11, 12, 13a, 13b, 19,

Marine Corps Air Station Miramar – Observed Flora			
Scientific Name	**Common Name+**	**Status***	**Reference ****
			23
Salicaceae – Willow Family			
Populus fremontii	Western Cottonwood	Native	22
Salix exigua	Narrow-leaved Willow	Native	19, 28
Salix gooddingii	Goodding's Black Willow	Native	9, 24
Salix laevigata	Red Willow	Native	19
Salix lasiolepis	Arroyo Willow	Native	9, 13a, 13b, 19, 26, 28
Saururaceae – Lizard's-tail Family			
Anemopsis californica	Yerba Mansa	Native	13a, 13b, 26
Saxifragaceae – Saxifrage Family			
Jepsonia parryi	Coast Jepsonia	Native	11, 13a, 13b, 19
Scrophulariaceae – Figwort Family			
Myoporum laetum	Myoporum	Non-native	NRD Staff
Scrophularia californica	California Figwort	Native	19
Solanaceae – Nightshade Family			
Datura wrightii	Thorn-apple	Non-native	13a, 13b, 22, 28
Nicotiana glauca	Tree Tobacco	Invasive, Non-native	1a, 1b
Solanum americanum	White Nightshade	Non-native	12, 13b
Solanum douglasii	Douglas's Nightshade	Native	13a
Solanum eleagnifolium	White Horse-nettle	Invasive/Non-native	NRD staff
Solanum parishii	Parish's Nightshade	Native	13a, 13b, 17, 19, 25, 26
Solanum xanti	Chaparral Nightshade	Native	9, 11, 13b
Tamaricaceae – Tamarisk Family			
Tamarix species	Tamerisk, Salt Cedar	Invasive, Non-native	1a, 1b, 1d, 1e, 13a
Urticaceae – Nettle Family			
Hesperocnide tenella	Western Nettle	Native	13a, 13b
Parietaria hespera	Pellitory	Native	13a, 13b
Verbenaceae – Vervain Family			
Verbena lasiostachys	Western Vervain	Native	22, 28
Verbena menthifolia	Mint-leaf Vervain	Native	22
Violaceae – Violet Family			
Viola pedunculata	Johnny Jump-up	Native	11, 13a, 13b, 19
Viscaceae – Mistletoe Family			
Phoradendron macrophyllum	Big-leaf Mistetoe	Native	13b
Anthophyta (Monocotyledones)			
Agavaceae – Agave Family			
Hesperoyucca (Yucca) whipplei ssp. *whipplei*	Our Lord's Candle	Native	11, 13a, 13b, 17, 19, 24
Yucca schidigera	Mohave Yucca	Native	9, 11, 19, 23
Alismataceae – Water-Plantain Family			
Alisma plantago-aquatica	Water plantain	Native	NRD Staff, 13b
Alliaceae – Onion Family			
Allium haematochiton	Red-skin Onion	Native	19
Allium praecox	Early Onion	Native	13a, 13b, 19
Arecaceae – Palm Family			

Marine Corps Air Station Miramar – Observed Flora			
Scientific Name	**Common Name+**	**Status***	**Reference ****
Washingtonia robusta	Fan palm	Non-native	NRD Staff
Asphodelaceae – Asphodel Family			
Asphodelus fistulosus	Hollow-stem Asphodelus	Non-native	22, NRD Staff
Cyperaceae – Sedge Family			
Carex praegracilis	Clustered Field Sedge	Native	13b
Carex spissa	San Diego Sedge	Native	28
Carex triquetra	Triangular-fruit Sedge	Native	11, 13a, 13b
Cyperus eragrostis	Tall Flatsedge	Native	21, 28
Cyperus involucratus	African Umbrella Plant	Non-native	10, 13a, 13b, 16
Eleocharis acicularis	Needle Spike-sedge	Native	5, 6, 16
Eleocharis macrostachya	Pale Spike-sedge	Native	3, 4, 5, 6, 7, 9, 10, 13a, 13b, 16, 20
Eleocharis parishii	Parish's Spike-sedge	Native	19
Schoenoplectus (Scripus) californicus	California Bulrush (Tulle)	Native	13a, 13b, 28
Hyacinthaceae – Hyacinth Family			
Chlorogalum parviflorum	Small-flowered Soap Plant	Native	11, 12, 13a, 13b, 19, 25
Chlorogalum pomeridianum var. *pomeridianum*	Wavyleaf Soap Plant	Native	11
Iridaceae – Iris Family			
Sisyrinchium bellum	Blue-eyed Grass	Native	9, 11, 13a, 13b, 19, 24, 25, 26
Juncaceae – Rush Family			
Juncus arcticus var. *mexicanus*	Mexican Rush	Native	10, 13b, 22
Juncus bufonius	Toad Rush	Native	5, 6, 7, 10, 11, 13b, 16, 19, 20, 25, 26
Juncus dubius	Mariposa Rush	Native	4, 5, 6, 7, 9, 10, 11, 13a, 16, 19
Juncus phaeocephalus	Brown-head Rush	Native	22
Juncaginaceae – Arrow-Grass Family			
Triglochin (*Lilaea*) *scilloides*	Flowering-quillwort	Native	4, 5, 6, 7, 10, 16, 20, 22
Liliaceae – Lily Family			
Calochortus splendens	Splendid Mariposa Lily	Native	11, 13a, 13b, 19
Calochortus weedii var. *weedii*	Weed's Mariposa Lily	Native	11, 19
Fritillaria bilflora	Chocolate Lily	Native	NRD Staff, 13b
Melanthiaceae – Camas Family			
Zigadenus fremontii	Fremont's Camas	Native	11, 19
Orchidaceae – Orchid Family			
Piperia unalascensis	Slenderspire Piperia	Native	22
Poaceae – Grass Family			
Agrostis avenacea	Pacific Bentgrass	Invasive, Non-native	2, 3, 4, 5, 6, 7, 10, 11, 16
Agrostis exarata	Spike Redtop	Native	13b
Agrostis microphylla	Small-leaf Bent	Native	5, 6, 16
Agrostis pallens	Seashore Bentgrass	Native	9, 19

Marine Corps Air Station Miramar – Observed Flora			
Scientific Name	**Common Name+**	**Status***	**Reference ****
Agrostis viridis	Water Bent	Non-native	13a
Arundo donax	Giant Reed	Invasive, Non-native	1a, 1b, 1c, 1f, 22
Avena barbata	Slender Wild Oat	Invasive, Non-native	2, 3, 7, 10, 11, 12, 13a, 13b, 16, 17, 19
Avena fatua	Wild Oat	Invasive, Non-native	11, 17, 19, 24, 29
Bothriochloa barbinodis	Cane Bluestem	Native	11, 25, 26
Brachypodium distachyon	Purple Falsebrome	Non-native	13a, 13b, 17
Briza minor	Quaking Grass	Non-native	13a, 13b
Bromus carinatus	California Brome	Native	11
Bromus diandrus	Ripgut Brome	Non-native	7, 11, 12, 13a, 13b, 16, 17, 18, 19, 24, 25, 29
Bromus hordeaceus	Soft Chess	Non-native	2, 3, 7, 10, 11, 12, 13b, 16, 17, 19, 24, 25, 29
Bromus madritensis ssp. *rubens*	Foxtail Chess	Non-native	2, 3, 7, 9, 10, 11, 12, 13a, 13b, 16, 17, 18, 19, 24, 25, 28, 29
Chloris virgata	Feather Finger Grass	Non-native	NRD Staff
Cortaderia selloana	Pampas Grass	Invasive, Non-native	1a, 1b, 1d, 1e, 1f, 13a, 22, 29
Cynodon dactylon	Bermuda Grass	Non-native	11, 13a, 13b
Deschampsia danthonioides	Annual Hairgrass	ACOE vernal pool indicator, Native	3, 4, 5, 6, 7, 10, 11, 16, 19
Distichlis spicata	Saltgrass	Native	7, 13b, 24
Ehrharta longiflora	Long-flower Veldt Grass	Invasive, Non-native	13b
Elymus (*Taeniatherum*) *caput-medusae*	Medusahead	Non-native	NRD Staff
Elymus (Leymus) condensatus	Giant Wild Rye	Native	11, 13a, 13b
Elymus glaucus	Blue Wildrye	Native	13a
Festuca (*Vulpia*) *bromoides*	Six-weeks Fescue	Non-native	19
Festuca (*Vulpia*) *microstachys*	Desert Fescue	Native	NRD Staff
Festuca (*Vulpia*) *myuros*	Rat-tail Fescue	Non-native	3, 7, 10, 12, 13a, 13b, 16, 19, 24, 29
Festuca (*Vulpia*) *octoflora*	Tufted Fescue	Native	12, 13a, 13b
Festuca perennis (*Lolium multiflorum* & *L. perenne*)	Italian Ryegrass & Perennial Ryegrass	Non-native	2, 10, 11, 13a, 13b, 17, 19, 22, 24
Gastridium ventricosum	Nit Grass	Non-native	5, 6, 7, 10, 11, 12, 13a, 13b, 16, 17, 19
Hordeum murinum	Hare Barley	Non-native	13a, 13b, 24
Hordeum vulgare	Cultivated Barley	Non-native	7
Koeleria macrantha	Junegrass	Native	13b
Lamarckia aurea	Golden-top	Non-native	10, 11, 12, 13b, 16, 17, 19, 29

Marine Corps Air Station Miramar – Observed Flora			
Scientific Name	**Common Name+**	**Status***	**Reference ****
Melica imperfecta	Coast Range Melic	Native	13a, 13b, 17, 22, 25
Melinis repens	Natal Grass	Non-native	NRD Staff
Muhlenbergia microsperma	Littleseed Muhly	Native	11, 13b, 19
Muhlenbergia rigens	Deergrass	Native	11, 13a, 19
Orcuttia californica	California Orcutt Grass	FE, ACOE vernal pool indicator, Native	4, 22
Paspalum dilatatum	Dallis Grass	Non-native	NRD Staff
Pennisetum setaceum	African Fountain Grass	Non-native	1b, 1d, 11, 13b, 19
Phalaris caroliniana	Carolina Canary Grass	Non-native	13a
Phalaris lemmonii	Lemon's Canary Grass	Native	3, 5, 6, 10, 13b, 16
Phalaris minor	Little-seed Canary Grass	Non-native	11, 13b, 19
Poa annua	Annual Bluegrass	Non-native	13b, 22
Poa pratensis	Kentucky Bluegrass	Non-native	13b
Poa secunda	One-sided Bluegrass	Native	19
Polypogon monspeliensis	Annual Beard Grass	Non-native	2, 3, 5, 6, 7, 10, 11, 13a, 13b, 16, 19
Schismus barbatus	Mediterranean Schismus	Non-native	29
Scribneria bolanderi	Scribner's Grass	Native	13b
Stipa (*Nassella*) *cernua*	Nodding Needlegrass	Native	12, 25, 26
Stipa coronata (*Achnatherum coronatum*)	Crested Needle Grass	Native	17, 22
Stipa (*Nassella*) *lepida*	Foothill Needlegrass	Native	11, 13a, 13b, 19, 25, 26
Stipa (*Agrostis, Oryzopsis, Piptatherum*) *miliacea*	Smilo Grass	Non-native	13b
Stipa (*Nassella*) *pulchra*	Purple Needlegrass	Native	4, 7, 9, 10, 11, 13a, 13b, 17, 18, 19, 25, 26
Themidaceae – Brodiaea Family			
Bloomeria (*Muilla*) *clevelandii*	San Diego Goldenstar	Native	8, 9, 10, 11, 13a, 13b, 15, 18, 19
Bloomeria crocea	Common Goldenstar	Native	11, 13b
Brodiaea jolonensis	Dwarf Brodiaea	Native	7, 10, 11
Brodiaea orcuttii	Orcutt's Brodiaea	Native	3, 5, 6, 7, 8, 10, 11, 13b, 16, 18, 19
Dichelostemma capitatum	Blue Dicks	Native	9, 11, 12, 13a, 13b, 19, 25
Muilla maritima	Common Goldenstar	Native	10, 11, 13a, 13b, 19
Typhaceae – Cattail Family			
Typha domingensis	Southern Cattail	Native	13a, 13b
Typha latifolia	Broad-leaved Cattail	Native	11, 19

*Definitions:

Federal Federal categories per the Endangered Species Act, administered 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.

FC Candidate - species for which there is sufficient information to support a proposal for listing under the Endangered Species Act.

State California-listed per California Endangered Species Act of 1984, administered by the CDFG:

CE Endangered. Taxa which are in serious danger of becoming extinct throughout all, or a significant portion, of their range due to one or more causes including loss of habitat, change in habitat, over exploitation, predation, competition, or disease (Section 2062 of the Fish and Game Code).

CT Threatened. Taxa which, although not presently threatened with extinction, are likely to become endangered species in the foreseeable future (Section 2067 of the Fish and Game Code).

CR Rare. Taxa which, although not presently threatened with extinction, are present in such small numbers throughout their range that they may become endangered if the present environment worsens (Section 1901 of the Fish and Game Code).

CC Candidate. Taxa which the Fish and Game Commission has formally noticed as being under review by the Department in addition to the list of threatened and endangered species.

California Native Plant Society Per the CNPS publication, *Inventory of Rare and Endangered Vascular Plants of California*:

1B Rare, threatened, or endangered in California and elsewhere

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

3 Need more information (a review list)

4 Plants of limited distribution (a watch list)

ACOE vernal pool indicator Per Army Corps of Engineers Special Public Notice, Regional General Conditions to the Nationwide Permits, Regional General Condition #1 – Vernal Pool Notification, *Indicator Species for Vernal Pools* List, Los Angeles District, Regulatory Branch, November 1997.

Native Per California Invasive Plant Council publication *Invasive Plants of California's Wildlands:* Plant species growing within their natural range and dispersal potential.

Non-native Per California Invasive Plant Council publication *Invasive Plants of California's Wildlands:* Plant species growing beyond their natural range or natural zone of potential dispersal, including all domesticated and feral species and all hybrids involving at least one non-native parent species.

Invasive Per California Invasive Plant Council publication *Invasive Plants of California's Wildlands:* Plant species that spread into areas where they are not native, or that displace natives or bring about changes in species composition, community structure, or ecosystem function.

+Common Name follows The Jepson Manual, San Diego Natural History Museum, or California Native Plant Society terminology respectively.

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APPENDIX C. VEGETATION COMMUNITIES KNOWN TO OCCUR AT MCAS MIRAMAR

Marine Corps Air Station Miramar – Vegetation Communities

General Vegetation Type*	Alliance*	Acres
Buckwheat Scrub	*Eriogonum fasciculatum* Shrubland Alliance	2,446.12
TOTAL:	**1 Total Alliance**	**2,446.12**
Ceanothus Chaparral	*Ceanothus tomentosus* Shrubland Alliance	1,558.13
Ceanothus Chaparral	*Ceanothus tomentosus-Quercus berberidifolia* Shrubland Alliance	1,055.43
Ceanothus Chaparral	*Ceanothus tomentosus-Xylococcus bicolor* Shrubland Alliance	153.35
Ceanothus Chaparral	*Ceanothus verrucosus* Provisional Shrubland Alliance	102.75
TOTAL:	**4 Total Alliances**	**2,869.66**
Chamise Chaparral	*Adenostoma fasciculatum* Shrubland Alliance	4,657.12
Chamise Chaparral	*Adenostoma fasciculatum-Salvia mellifera* Shrubland Alliance	891.00
Chamise Chaparral	*Adenostoma fasciculatum-Xylococcus bicolor* Shrubland Alliance	576.35
TOTAL:	**3 Total Alliances**	**6,124.47**
Freshwater Marsh	*Juncus* (*balticus* ssp. *ater*, *mexicanus*) Herbaceous Alliance	7.25
Freshwater Marsh	*Schoenoplectus californicus* Herbaceous Alliance	15.73
Freshwater Marsh	*Typha* (*angustifolia*, *domingensis*, *latifolia*) Herbaceous Alliance	3.36
TOTAL:	**3 Total Alliances**	**26.34**
Grassland/Herbaceous	*Avena* (*barbata*, *fatua*) Semi-Natural Herbaceous Stands	1,063.54
Grassland/Herbaceous	*Bromus* (*diandrus*, *hordeaceus*)-*Brachypodium distachyon* Semi-Natural Herbaceous Stands	173.80
Grassland/Herbaceous	*Bromus madritensis* ssp. *rubens* Semi-Natural Herbaceous Stands	21.68
Grassland/Herbaceous	*Deinandra fasciculata* Herbaceous Alliance	7.17
Grassland/Herbaceous	*Festuca perennis* Semi-Natural Herbaceous Stands	43.22
Grassland/Herbaceous	*Festuca myuros* Semi-Natural Herbaceous Stands	21.42
Grassland/Herbaceous	*Stipa pulchra* Herbaceous Alliance	146.62
TOTAL:	**7 Total Alliances**	**1,477.46**
Other Chaparral	*Cercocarpus betuloides* Shrubland Alliance	159.81
Other Chaparral	*Prunus ilicifolia* Shrubland Alliance	1.61
Other Chaparral	*Rhus integrifolia* Shrubland Alliance	5.91
Other Chaparral	*Xylococcus bicolor* Shrubland Alliance	40.63
TOTAL:	**4 Total Alliances**	**207.96**
Other Upland Scrub	*Acmispon glaber* Shrubland Alliance	949.51
Other Upland Scrub	*Arctostaphylos glandulosa* Shrubland Alliance	14.60
Other Upland Scrub	*Baccharis sarothroides* Shrubland Alliance	255.19
Other Upland Scrub	*Bahiopsis laciniata* Shrubland Alliance	7.04
Other Upland Scrub	*Eriodictyon crassifolium* Provisional Shrubland Alliance	6.51
Other Upland Scrub	*Malosma laurina* Shrubland Alliance	728.74

Marine Corps Air Station Miramar – Vegetation Communities		
General Vegetation Type*	**Alliance***	**Acres**
Other Upland Scrub	*Rhamnus crocea* Shrubland Alliance	19.80
TOTAL:	**7 Total Alliances**	**1,981.39**
Riparian Scrub	*Artemisia palmeri* Herbaceous Alliance	0.99
Riparian Scrub	*Baccharis salicifolia* ssp. *salicifolia* Shrubland Alliance	26.90
TOTAL:	**2 Total Alliances**	**27.89**
Riparian Woodland	*Salix lasiolepis* Shrubland Alliance	53.27
Riparian Woodland	*Platanus racemosa* Woodland Alliance	97.78
Riparian Woodland	*Quercus agrifolia* Woodland Alliance	63.57
Riparian Woodland	*Salix gooddingii* Woodland Alliance	38.16
TOTAL:	**4 Total Alliances**	**252.78**
Sage and Sagebrush	*Artemisia californica* Shrubland Alliance	319.20
Sage and Sagebrush	*Artemisia californica-Eriogonum fasciculatum* Shrubland Alliance	39.50
Sage and Sagebrush	*Artemisia californica-Salvia mellifera* Shrubland Alliance	13.10
Sage and Sagebrush	*Salvia apiana* Shrubland Alliance	5.75
Sage and Sagebrush	*Salvia mellifera* Shrubland Alliance	1,540.25
TOTAL:	**5 Total Alliances**	**1,917.80**
Scrub Oak Chaparral	*Quercus berberidifolia*/*acutidens* Shrubland Alliance***	402.34
Scrub Oak Chaparral	*Quercus* (*berberidifolia*/*acutidens*, *dumosa*) Shrubland Alliance***	280.60
TOTAL:	**2 Total Alliances**	**682.94**
Non-Native Tree	*Eucalyptus* (*globulus*, *camaldulensis*) Semi-Natural Woodland Stands	49.72
Non-Native Tree	*Olea europaea* Semi-Natural Woodland Stands	2.04
TOTAL:	**2 Total Alliances**	**51.76**
Developed	Developed	4,894.42
TOTAL:	**1 Total Alliance**	**4,894.42**
Disturbed	*Acacia melanoxylon* Semi-Natural Woodland Stands	3.06
Disturbed	*Adenostoma fasciculatum* Shrubland Alliance^^	1.14
Disturbed	*Brassica (nigra)* and Other Mustards Semi-Natural Herbaceous Stands	19.41
Disturbed	*Carduus pycnocephalus* ssp. *pycnocephalus* Semi-Natural Herbaceous Stands	7.68
Disturbed	*Cortaderia* (*jubata*, *selloana*) Semi-Natural Herbaceous Stands	9.49
Disturbed	*Erodium* Semi-Natural Herbaceous Stands	10.05
Disturbed	N/A	51.64
Disturbed	*Nicotiana glauca* Semi-Natural Woodland Stands	0.20
Disturbed	*Pennisetum setaceum* Semi-Natural Herbaceous Stands	0.83
Disturbed	*Tamarix* spp. Semi-Natural Shrubland Alliance	0.55
Disturbed	*Washingtonia robusta* Semi-Natural Woodland Stands	0.09
TOTAL:	**11 Total Alliances**	**104.14**
Plant Totals		
	Native Vegetation Alliances	16,691.14

Marine Corps Air Station Miramar – Vegetation Communities		
General Vegetation Type*	**Alliance***	**Acres**
Non-native Vegetation Alliances (Non-Native Grasses [*Avena* spp., *Bromus* spp., *Festuca* spp.], Non-Native Trees)		1,375.42
Disturbed Total		104.14
Vegetation Total		18,170.69
Developed Total		4,894.42
Station Total		**23,065.11**

Native vegetation communities are:

- Buckwheat scrub
- Ceanothus chaparral
- Chamise chaparral
- Adenostoma fasciculatum shrubland alliance
- Freshwater marsh
- Stipa pulchra herbaceous alliance
- Other chaparral
- Other upland scrub
- Riparian scrub
- Riparian woodland
- Sage and sagebrush
- Scrub oak chaparral

Notes:

*Vegetation types and alliances are defined using descriptions from *A Manual of California Vegetation, Second Edition* (Sawyer *et al*. 2009) and the *Vegetation Classification Manual for Western San Diego County* (SANDAG 2011).

**Disturbed areas are those previously impacted by human activities, but have the potential to return to a natural vegetation type. Developed areas are those that are routinely maintained, and therefore, do not have the potential to be restored to a natural vegetation type.

***Scrub oak DNA studies are currently in progress to resolve the identity of which species is present on MCAS Miramar.

^^This disturbance alliance, although containing a native species, was designated as disturbed because it is a fuel break restoration site that is in the early stages of recovery. The alliance does not currently meet the vegetated requirements of the *Adenostoma fasciculatum* shrubland alliance; therefore, it is designated as disturbed because it has the potential to return to a natural vegetation type.

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APPENDIX D. VERTEBRATE SPECIES KNOWN TO OCCUR OR POTENTIALLY OCCURRING AT MCAS MIRAMAR

MCAS Miramar provides important habitat for a wide variety of wildlife species, including thousands of invertebrates. As a result, not all vertebrate species known to occur on the Station are listed here. For information about invertebrate species please refer to the *Cumulative Report for Three Years Inventory (Oct 1995 – Sept 1998) of Distribution and Habitat Use of Lepidoptera (Insecta) Populations on Marine Corps Air Station Miramar San Diego, CA* (San Diego Natural History Museum 2004b) and *The Lepidoptera of Marine Corps Air Station Miramar: Calculating Faunal Similarity Among Sampling Sites and Estimating Total Species Richness* (Brown and Bash 1999).

Marine Corps Air Station Miramar – Known Fauna			
Scientific Name	**Common Name**	**Status***	**Reference****
Amphibians			
Order Caudata			
Family Plethodontidae			
Aneides lugubris	Arboreal salamander		15
Batrachoseps major	Garden slender salamander		8
Order Anura			
Family Pipidae			
Xenopus laevis	African clawed frog	Non-native	15
Family Pelobatidae			
Anaxyrus boreas halophilus	California toad		8
Spea hammondii	Western spadefoot	Status under review by USFWS, CSC	8
Family Hylidae			
Pseudacris regilla	Pacific chorus frog		8
Family Ranidae			
Lithobates catesbeianus	Bullfrog	Non-native	8
Reptiles			
Order Tesudines			
Family Emydidae			
Emys marmorata	Western pond turtle	CSC	10; Not Verified by 8 or 15
Trachemys scripta elegans	Northern red-eared slider	Non-native	8, 15
Order Squamata			
Family *Phrynosomatidae*			
Phrynosoma blainvillii	Coast horned lizard	CSC	8
Sceloporus occidentalis biseriatus	San Joaquin fence lizard		8
Sceloporus occidentalis longipe	Great Basin (western) fence lizard		8
Sceloporus orcutti	Granite spiny lizard		8
Uta stansburiana elegans	California side-blotched lizard		8, 15
Family Xantusiidae			
Xantusia henshawi	Granite night lizard		One 1994 occurrence cited in 7;

Marine Corps Air Station Miramar – Known Fauna			
Scientific Name	**Common Name**	**Status***	**Reference****
			Extirpated
Family *Scincidae*			
Plestiodon skiltonianus interparietalis	Coronado Island skink	CSC	8
Family *Teiidae*			
Aspidoscelis hyperythra	Orangethroat whiptail	CSC	8
Aspidoscelis tigris stejnegeri	Coastal whiptail		8
Family *Anguidae*			
Elgaria multicarinata webbii	San Diego alligator lizard		8
Family *Anniellidae*			
Anniella pulchra pulchra	Silvery legless lizard	CSC	15
Family *Leptotyphlopidae*			
Rena humilis humilis	Western blind snake		8
Family *Boidae*			
Charina trivirgata	Rosy boa		15
Family *Colubridae*			
Arizona occidentalis occidentalis	California glossy snake		Potential (Not Recorded in Recent Surveys) Probably extirpated from Miramar
Coluber mormon	Western racer		8
Diadophis punctatus similis	San Diego ringneck snake		8
Hypsiglena torquata nuchalata	California night snake		8
Lampropeltis getula californiae	California kingsnake		8
Masticophis flagellum piceus	Red coachwhip		8
Masticophis lateralis lateralis	California striped racer		8
Pituophis catenifer annectens	San Diego gopher snake		8
Rhinocheilus lecontei lecontei	Western long-nose snake		15
Salvadora hexalepis virgultea	Coast patch-nosed snake	CSC	15
Thamnophis hammondii	Two-striped garter snake	CSC	8
Tantilla planiceps	Western blackhead snake		8
Trimorphodon lyrophanes	Baja California lyre snake		15
Family *Viperidae*			
Crotalus ruber	Red-diamond rattlesnake	CSC	8
Crotalus mitchellii pyrrhus	Southwestern speckled		15

Marine Corps Air Station Miramar – Known Fauna			
Scientific Name	**Common Name**	**Status***	**Reference****
	rattlesnake		
Crotalus helleri	Southern Pacific rattlesnake		8
Birds			
Order Podicipediformes			
Family *Podicipedidae*			
Aechmorphorus clarkii	Clark's Grebe		10
Aechmophorus occidentalis	Western Grebe	BSC	10
Podiceps nigricollis	Eared Grebe		10
Podilymbus podiceps	Pied-billed Grebe		9
Order Pelecaniformes			
Family *Pelecanidae*			
Pelecanus erythrorhynchos	American White Pelican		15
Pelecanus occidentalis	Brown Pelican		3
Family *Phalacrocoracidae*			
Phalacrocorax auritus	Double-crested Cormorant	WL	14, 15
Order Ciconiiformes			
Family *Ardeidae*			
Ardea alba	Great Egret		9, 14
Ardea herodias	Great Blue Heron		9, 14
Bubulcus ibis	Cattle Egret		10
Butorides striatus	Green-backed Heron		Potential (Not Recorded in Recent Surveys)
Butorides virescens	Green Heron		9
Egretta caerulea	Little Blue Heron		10
Egretta thula	Snowy Egret		9
Nycticorax nycticorax	Black-crowned Night Heron		9, 14
Family *Threskiornithidae*			
Plegadis chihi	White-faced Ibis		10
Family *Cathartidae*			
Cathartes aura	Turkey Vulture		9
Order Anseriformes			
Family *Anserinae*			
Branta canadensis	Canada Goose		9
Chen caerulescens	Snow Goose		10
Family *Anatidae*			
Aix sponsa	Wood Duck		15
Anas crecca	Green-winged Teal		9, 13
Anas platyrhynchos	Mallard		9, 14
Anas acuta	Northern Pintail		9
Anas discors	Blue-winged Teal		9
Anas cyanoptera	Cinnamon Teal		9
Anas clypeata	Northern Shoveler		9
Anas strepera	Gadwall		9, 14
Anas americana	American Widgeon		2, 13
Aythya valisineria	Canvasback	BSC	Potential (Not Recorded in Recent Surveys)
Aythya americana	Redhead		10

Marine Corps Air Station Miramar – Known Fauna			
Scientific Name	**Common Name**	**Status***	**Reference****
Aythya collaris	Ring-necked Duck		15
Aythya affinis	Lesser Scaup		15
Bucephala clangula	Common Goldeneye		Potential
Bucephala albeola	Bufflehead		15
Lophodytes cucullatus	Hooded Merganser		9
Oxyura jamaicensis	Ruddy Duck		9, 14
Order Falconiformes			
Family *Accipitridae*			
Subfamily *Pandioninae*			
Pandion haliaetus	Osprey	WL	9
Subfamily *Accipitrinae*			
Accipiter cooperii	Cooper's Hawk	WL	9, 14
Accipiter striatus	Sharp-shinned Hawk	WL	9, 13
Aquila chrysaetos	Golden Eagle	BGEPA/FP/WL	9
Buteo lineatus	Red-shouldered Hawk		9, 13
Buteo jamaicensis	Red-tailed Hawk		9, 14
Buteo regalis	Ferruginous Hawk	WL	9
Circus cyaneus	Northern Harrier	CSC	9, 13
Elanus leucrus	White-tailed Kite	FP	6
Family *Falconidae*			
Falco columbarius	Merlin	WL	9, 13
Falco mexicanus	Prairie falcon	WL	9
Falco peregrinus anatum	American peregrine falcon	BSCFP	9
Falco sparverius	American Kestrel		9, 14
Order Galliformes			
Family *Odontophoridae*			
Callipepla californica	California Quail		9, 14
Callipepla gambelii	Gambel's Quail		13
Family Phasianidae			
Meleagris gallopavo	Wild Turkey		4
Order Gruiformes			
Family *Rallidae*			
Fulica americana	American Coot		9, 14
Gallinula chloropus	Common Moorhen		9
Porzana carolina	Sora		9
Rallus limicola	Virginia Rail		9
Order Charadriiformes			
Family *Charadriidae*			
Charadrius semipalmatus	Semipalmated Plover		10
Charadrius vociferus	Killdeer		9, 14
Pluvialis squatarola	Black-bellied Plover		15
Family *Recurvirostridae*			
Himantopus mexicanus	Black-necked Stilt		15
Recurvirostra americana	American Avocet		
Family *Scolopacidae*			

Marine Corps Air Station Miramar – Known Fauna			
Scientific Name	**Common Name**	**Status***	**Reference****
Actitis macularia	Spotted Sandpiper		15
Calidris alpina	Dunlin		10
Calidris bairdii	Baird's Sandpiper		10
Calidris canutus	Red Knot	BSC	15
Calidris mauri	Western Sandpiper		15
Calidris melanotos	Pectoral Sandpiper		15
Calidris minutilla	Least Sandpiper		9
Catoptrophorus semipalmatus	Willet		Potential (Not Recorded in Recent Surveys)
Gallinago gallinago	Common Snipe		9
Limosa fedoa	Marbled Godwit	BSC	Potential (Not Recorded in Recent Surveys)
Limnodromus griseus	Short-billed Dowitcher	BSC	Potential (Not Recorded in Recent Surveys)
Limnodromus scolopaceus	Long-billed Dowitcher		15
Numenius americanus	Long-billed Curlew	BSC/WL	15
Numenius phaeopus	Whimbrel	BSC	16
Phalaropus fulicaria	Red Phalarope		10
Phalaropus lobatus	Red-necked Phalarope		15
Phalaropus tricolor	Willon's Phalarope	BSC	Potential (Not Recorded in Recent Surveys)
Tringa flavipes	Lesser Yellowlegs		10
Tringa melanoleuca	Greater Yellowlegs		9
Tringa solitaria	Solitary Sandpiper		15
Family *Laridae*			
Subfamily *Larinae*			
Larus argentatus	Herring Gull		10
Larus californicus	California Gull		9
Larus canus	Mew Gull		Potential (Not Recorded in Recent Surveys)
Larus delawarensis	Ring-billed Gull		9, 13
Larus occidentalis	Western Gull		9, 13
Larus philadelphia	Bonaparte's Gull		15
Subfamily *Sterninae*			
Sterna caspia	Caspian Tern		9
Sterna forsteri	Forster's Tern		14, 15
Order Columbiformes			
Family *Columbidae*			
Columba livia	Feral Pigeon	Non-Native	9, 13
Columba fasciata	Band-tailed Pigeon		10
Columbina passerine	Common Ground-dove		Potential (Not Recorded in Recent Surveys)
Streptopelia decaocto	Eurasian collared dove		14
Zenaida asiatica	White-winged Dove		1
Zenaida macroura	Mourning Dove		9, 14
Order Cuculiformes			
Family *Cuculidae*			

Marine Corps Air Station Miramar – Known Fauna			
Scientific Name	**Common Name**	**Status***	**Reference****
Subfamily *Neomorphinae*			
Geococcyx californianus	Greater Roadrunner		9, 14
Order Strigiformes			
Family *Tyonidae*			
Tyto alba	Barn Owl		9, 14
Family *Strigidae*			
Asio flammeus	Short-eared Owl	CSC	15
Asio otus	Long-eared Owl	CSC	9
Athene cunicularia hypugaea	Burrowing Owl	BSC/CSC	9, 13
Bubo virginianus	Great Horned Owl		9, 14
Otus kennicottii	Western Screech-owl		9
Order Caprimulgiformes			
Family *Caprimulgidae*			
Subfamily *Chordeilinae*			
Chordeiles acutipennis	Lesser Nighthawk		9
Subfamily *Caprimulginae*			
Phalaenoptilus nuttallii	Common Poor-will		9
Order Apodiformes			
Family *Apodidae*			
Subfamily *Chaeturinae*			
Chaetura pelagica	Chimney Swift		15
Chaetura vauxi	Vaux's Swift	CSC	9, 14
Subfamily C*ypseloidinae*			
Cypseloides niger	Black Swift	BSC/CSC	15
Subfamily *Aponinae*			
Aeronautes saxatalis	White-throated Swift		9, 14
Family *Trochillidae*			
Subfamily *Trochilinae*			
Archilochus alexandri	Black-chinned Hummingbird		9, 14
Calypte anna	Anna's Hummingbird		9, 14
Calypte costae	Costa's Hummingbird	BSC	9, 14
Selasphorus rufus	Rufous Hummingbird		9
Selasphorus sasin	Allen's Hummingbird	BSC	9
Order Coraciiformes			
Family *Alcedinidae*			
Subfamily *Cerylinae*			
Ceryle alcyon	Belted Kingfisher		9
Order Piciformes			
Family *Picidae*			
Subfamily *Picinae*			
Colaptes auratus	Red-shafted Flicker		9
Melanerpes formicivorus	Acorn Woodpecker		9

Marine Corps Air Station Miramar – Known Fauna			
Scientific Name	**Common Name**	**Status***	**Reference****
Melanerpes lewis	Lewis's Woodpecker	BSC	10
Picoides nuttallii	Nuttall's Woodpecker		9, 14
Picoides pubescens	Downy Woodpecker		9
Sphyrapicus nuchalis	Red-naped Sapsucker		15
Sphyrapicus ruber	Red-breasted Sapsucker		9
Sphyrapicus varius	Yellow-bellied Sapsucker		10
Order Passeriformes			
Family *Tyrannidae*			
Subfamily *Fluvicolinae*			
Contopus cooperi	Olive-sided Flycatcher	BSC/CSC	9
Contopus sordidulus	Western-wood Pewee		9, 14
Empidonax difficilis	Pacific-slope Flycatcher		9, 14
Empidonax difficilis	Western Flycatcher		15
Empidonax hammondii	Hammond's Flycatcher		15
Empidonax traillii	Willow Flycatcher	BSC/CE	15
Myiarchus cinerascens	Ash-throated flycatcher		9, 13, 14
Empidonax traillii extimus	Southwestern Willow Flycatcher	FE/CE	10 (Has not been verified to subspecies)
Sayornis nigricans	Black Phoebe		9, 14
Sayornis saya	Say's Phoebe		9, 14
Subfamily *Tyranninae*			
Tyrannus melancholicus	Tropical Kingbird		Potential (Not Recorded in Recent Surveys)
Tyrannus verticalis	Western Kingbird		9, 13
Tyrannus vociferans	Cassin's Kingbird		9, 14
Family *Laniidae*			
Lanius ludovicianus	Loggerhead Shrike	BSC/CSC	9, 14
Family *Vireonidae*			
Vireo bellii bellii	Least Bell's Vireo	FE/CE/BSC	9, 14
Vireo cassinii	Cassin's Vireo		15
Vireo gilvus	Warbling Vireo		9, 14
Vireo huttoni	Hutton's Vireo		9, 14
Vireo solitarius plumbeox	Solitary Vireo		Potential (Not Recorded in Recent Surveys)
Family *Corvidae*			
Aphelocoma californica	Western Scrub-jay		9, 14
Corvus brachyrhynchos	American Crow		9, 14
Corvus corax	Common Raven		9, 14
Family *Alaudidae*			
Eremophila alpestris	California Horned	WL	9, 14

Marine Corps Air Station Miramar – Known Fauna			
Scientific Name	**Common Name**	**Status***	**Reference****
	Lark		
Family *Hirundinidae*			
Subfamily *Hirundinianae*			
Hirundo rustica	Barn Swallow		9, 14
Petrochelidon pyrrhonota	Cliff Swallow		9, 14
Progne subis	Purple Martin		10
Riparia riparia	Bank Swallow	CT	Potential (Not Recorded in Recent Surveys)
Stelgidopteryx serripennis	Northern Rough-winged Swallow		9, 14
Tachycineta bicolor	Tree Swallow		9
Tachycineta thalassina	Violet-green Swallow		9
Family *Paridae*			
Baeolophus inornatus	Oak Titmouse	BSC	9
Poecile gambeli	Mountain Chickadee		15
Family Sitiidae			
Sitta carolinensis	White-breasted Nuthatch		9
Family *Aegithalidae*			
Psaltriparus minimus	Bushtit		9, 14
Family T*roglodytidae*			
Campylorhynchus brunneicapillus sandiegensis	Coastal Cactus Wren (San Diego)	BSC/CSC	15
Cistothorus palustris	Marsh Wren		9
Salpinctes obsoletus	Rock Wren		9
Thryomanes bewickii	Bewick's Wren		9, 14
Troglodytes aedon	House Wren		9, 14
Family *Regulidae*			
Regulus calendula	Ruby-crowned Kinglet		9
Family *Sylviidae*			
Subfamily *Polioptilinae*			
Polioptila caerulea	Blue-gray Gnatcatcher		9, 14
Polioptila californica californica	Coastal California Gnatcatcher	FT/CSC	9, 12, 14
Family *Turdidae*			
Catharus guttatus	Hermit Thrush		9
Catharus ustulatus	Swainson's Thrush		15
Sialia currucoides	Mountain Bluebird		15
Sialia mexicana	Western Bluebird		9, 13
Turdus migratorius	American Robin		9
Family *Timaliidae*			
Chamaea fasciata	Wrentit		9, 14
Family *Mimidae*			
Mimus polyglottos	Northern Mockingbird		9, 13
Oreoscoptes montanus	Sage Thrasher	BSC	10

Marine Corps Air Station Miramar – Known Fauna			
Scientific Name	**Common Name**	**Status***	**Reference****
Toxostoma redivivum	California Thrasher		9, 14
Family *Sturnidae*			
Sturnus vulgaris	European Starling	Non-native	9, 14
Family *Motacillidae*			
Anthus rubescens	American Pipit		9, 13
Family *Bombycillidae*			
Bombycilla cedrorum	Cedar Waxwing		9
Family *Passeridae*			
Passer domesticus	House Sparrow	Non-native	9, 13
Family *Ptilogonatidae*			
Phainopepla nitens	Phainopepla		9, 13
Family *Fringillidae*			
Subfamily *Carduelinae*			
Carduelis lawrencei	Lawrence's Goldfinch	BSC	9
Carduelis pinus	Pine Siskin		15
Carduelis psaltria	Lesser Goldfinch		9, 14
Carduelis tristis	American Goldfinch		9, 13
Carpodacus cassinii	House Finch		9, 14
Carpodacus purpureus	Purple Finch		10
Family *Parulidae*			
Dendroica coronata	Yellow-rumped Warbler		9, 13
Dendroica nigrescens	Black-throated Gray Warbler		9
Dendroica occidentalis	Hermit Warbler		10
Dendroica palmarum	Palm Warbler		10
Dendroica townsendi	Townsend's Warbler		15
Geothlypis trichas	Common Yellowthroat	BSC	9, 14
Oporornis tolmiei	Macgillivray's Warbler		9
Setophaga petechial brewsteri	Yellow Warbler	CSC/BSC	9, 14
Vermivora celata	Orange-crowned Warbler		9, 14
Vermivora ruficapilla	Nashville Warbler		9
Wilsonia citrina	Hooded Warbler		9
Wilsonia pusilla	Wilson's Warbler		9, 14
Icteria virens	Yellow-breasted Chat	CSC	9, 14
Family *Thraupidae*			
Piranga ludoviciana	Western Tanager		9, 14
Piranga rubra	Summer Tanager	CSC	10
Family *Emberizidae*			
Aimophila ruficeps canescens	Southern California Rufous-crowned Sparrow	WL	9, 14
Ammodramus savannarum	Grasshopper		9, 13

Marine Corps Air Station Miramar – Known Fauna			
Scientific Name	**Common Name**	**Status***	**Reference****
	Sparrow		
Artemisiospiza belli belli	Bell's Sage Sparrow	BSC/WL	9
Chondestes grammacus	Lark Sparrow		9, 14
Junco hyemalis	Dark-eyed Junco		9
Melospiza lincolnii	Lincoln's Sparrow		9
Melospiza melodia	Song Sparrow	BSC	9, 14
Passerculus sandwichensis	Savannah Sparrow		9, 13
Passerella iliaca	Fox Sparrow		9
Pipilo chlorurus	Green-tailed Towhee		15
Pipilo crissalis	California Towhee		9, 14
Pipilo maculatus	Spotted Towhee	BSC	9, 14
Pooecetes gramineus	Vesper Sparrow		9, 13
Spezilla atrogularis	Black-chinned Sparrow	BSC	9
Spizella passerina	Chipping Sparrow		9
Sturnella neglecta	Western Meadowlark		9, 14
Zonotrichia atricapilla	Golden-crowned Sparrow		9
Zonotrichia leucophrys	White-crowned Sparrow		9, 13
Family *Cardinalidae*			
Guiraca caerulea	Blue Grosbeak		9, 14
Passerina amoena	Lazuli Bunting		9, 13
Passerina cyanea	Indigo Bunting		10
Pheucticus ludovicianus	Rose-breasted Grosbeak		15
Pheucticus melanocephalus	Black-headed Grosbeak		9, 14
Family *Icteridae*			
Agelaius phoeniceus	Red-winged Blackbird		9, 14
Agelaius tricolor	Tricolored Blackbird	Status under review by USFWS, /BSC/CCE	15
Cassidix mexicanus	Great-tailed Grackle		9, 14
Euphagus cyanocephalus	Brewer's Blackbird		9, 13
Icterus bullockii	Bullock's Oriole		9, 14
Icterus cucullatus	Hooded Oriole		9, 14
Molothrus ater	Brown-headed Cowbird		9, 14
Xanthocephalus xanthocephalus	Yellow-headed Blackbird		9
Mammals			
Order Didelphidae			
Family *Didelphiidae*			
Didelphis virginiana	Opossum		10
Order Insectivora			
Family *Soricidae*			
Notiosorex crawfordi	Desert shrew		10

Marine Corps Air Station Miramar – Known Fauna			
Scientific Name	**Common Name**	**Status***	**Reference****
crawfordi			
Sorex ornatus ornatus	Ornate shrew		7, 10
Order Chiroptera			
Family *Vespertilionidae*			
Eptesicus fuscus	Big brown bat		10, 11
Lasiurus borealis	Red bat		10, 11
Myotis yumanensis sociabilis	Yuma myotis		10, 11
Pipistrellus hesperus	Western pipistrel		10, 11
Family *Molossidae*			
Eumops perotis	Western mastiff bat		10, 11
Nyctinomops femorasaccus	Pocketed free-tailed bat	CSC	10, 11
Tadarida brasiliensis	Mexican free-tailed bat		10, 11
Order Lagomorpha			
Family L*eporidae*			
Lepus californicus bennittii	San Diego black-tailed jackrabbit	CSC	10
Sylvilagus audubonii sanctidiegi	Desert cottontail		10
Sylvilagus bachmani	Brush rabbit		10
Order Rodentia			
Family *Sciuridae*			
Spermophilus beecheyi nudipes	California ground squirrel		10
Family *Geomyidae*			
Thomomys bottae sanctidiegi	San Diego Valley pocket gopher		10
Family *Heteromyidae*			
Chaetodipus californicus femoralis	Dulzura pocket mouse	CSC	15
Chaetodipus fallax fallax	Northwestern San Diego pocket mouse	CSC	10
Dipodomys agilis	Agile kangaroo rat		10
Dipodomys simulans	Dulzura kangaroo rat		7, 10
Family *Muridae*			
Microtus californicus sanctidiegi	California vole		7, 10
Mus musculus	House mouse	Non-native	10
Neotoma macrotis	Dusky-footed woodrat		7, 10
Neotoma lepida intermedia	San Diego desert woodrat	CSC	10
Onychomys torridus ramona	Southern grasshopper mouse		10
Peromyscus boylii rowleyi	Brush mouse		7, 10
Peromyscus californicus insignis	California mouse		7, 10

Marine Corps Air Station Miramar – Known Fauna			
Scientific Name	**Common Name**	**Status***	**Reference****
Peromyscus eremicus fraterculus	Cactus mouse		7, 10
Peromyscus maniculatus gambellii	Deer mouse		7, 10
Rattus rattus	Black rat	Non-native	10
Reithrodontomys megalotis longicaudus	Western harvest mouse		7, 10
Order Carnivora			
Family *Canidae*			
Canis latrans clepticus	Coyote		10
Urocyon cinereoargenteus californicus	Gray fox		10
Family *Procyonidae*			
Bassariscus astutus	Ringtailed cat		Potential (Not Recorded in Recent Surveys)
Procyon lotor	Common raccoon		10
Family *Mustelidae*			
Mustela frenata	Long-tailed weasel		10
Mephitis mephitis holtzneri	Striped skunk		10
Spilogale putorius microrhina	Western spotted skunk		Potential (Not Recorded in Recent Surveys)
Family *Felidae*			
Felis concolor californicus	Mountain lion		10
Lynx rufus californicus	Bobcat		10
Order Artiodactyla			
Family *Cervidae*			
Odocoileus hemionus fuliginata	Mule deer		10
Fish			
Order Cypriniformes			
Family *Cyprinidae*			
Pimephales promelas	Fathead minnow		5
Order Perciformes			
Family *Centrarchidae*			
Lepomis macrochirus	Bluegill		5
Micropterus salmoides	Largemouth bass		5
Order Cyprinodontiformes			
Family *Poeciliidae*			
Gambusia affinis	Mosquitofish		5
Order Siluriformes			
Family *Ictaluridae*			
Ictalurus punctatus	Channel catfish		5

*Definitions:

Federal Federal categories per the Endangered Species Act, administered 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.

Proposed (PT, PE) Any species that has been proposed for listing as a threatened or endangered species

BGEPA Bald and Golden Eagle Protection Act of 1940

BSC Bird Species of Concern includes species that are of concern because of (a) documented or apparent population declines, (b) small or restricted populations, or (c) dependence on restricted or vulnerable habitat, which are

listed with the intent of avoiding future designations under the ESA.

State State categories per the 1984 California Endangered Species Act[25]

CE Endangered - any species officially listed by the California Fish and Wildlife Commission that is in danger of extinction throughout all or a significant portion of its range.

CT Threatened - any species officially listed by the California Fish and Wildlife Commission that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

CCE State candidate for listing as endangered

CCT State candidate for listing as threatened

FP State Fully Protected species - species protected by the California Fish and Game Code which states that the species "...may not be taken or possessed at any time and no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected" species, although take may be authorized for necessary scientific research;

CSC California Species of Concern (Animal); and

WL California Department of Fish and Wildlife's watch list

Status Information taken from California Department of Fish and Wildlife, *Special Animals*, December 2015

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2. Black, Chuck. 2010. Personal observation of American widgeon.

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4. Black, Chuck. 2013. Personal observation of wild turkey in East Miramar bivouac area.

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6. Black, Chuck. 2016. Personal observation of white-tailed kite.

7. CJSeto Support Services LLC. 2011. *Long-term ecosystem monitoring of the vertebrate fauna at Marine Corps Air Station Miramar, San Diego, California: Small Mammal Component, 2009.* Report prepared under contract M67865-08-T-0051. 10pp+appendices.

8. CJSeto Support Services LLC. 2012a. *Long-term ecosystem monitoring of the vertebrate fauna at Marine Corps Air Station Miramar, San Diego, California: Reptile & Amphibian Component, 2009.* Report prepared under contract M67865-08-T-0051. 17pp+appendices.

9. CJSeto Support Services LLC. 2012b. *Long-term ecosystem monitoring of the vertebrate fauna at Marine Corps Air Station Miramar, San Diego, California: Bird Survey Component, 2009.* Report prepared under contract M67865-08-T-0051. 23pp+figs+appendices.

10. Hunsaker, D., II, and G.W. Cox. 2000. *Vertebrate Survey, Naval Air Station Miramar.* Final Report, Contract N68711-96-LT-60036. Prepared for MCAS Miramar Environmental Management Department and Southwest Division, Naval Facilities Engineering Command, San Diego, CA. 189 pp.

11. Hunsaker, D, II. 2001. *Habitat Use and Relative Density of Bats at Naval Air Station Miramar.* Final Report, Contract N68711-96-LT-60035. Prepared for MCAS Miramar Environmental Management Department and Southwest Division, Naval Facilities Engineering Command, San Diego, CA. 94 pp.

12. MCAS Miramar 2013 GIS data.

13. Naval Facilities Engineering Command Southwest (NAVFAC SW). 2013. *Burrowing Owl Surveys at MCAS Miramar*. MCAS Miramar. San Diego, CA.

14. San Diego Natural History Museum. 2014. *Least Bell's Vireo (Vireo bellii pusillus) and Southwestern Willow Flycatcher (Empidonax traillii extimus) Surveys and Nest Monitoring at Marine Corps Air Station, Miramar*. Prepared for MCAS Miramar, San Diego, CA. San Diego, CA. 27 pp.

15. Varanus Biological Services, Inc., and San Diego Natural History Museum. 2001. *Final Report for Habitat Use and Relative Density of Reptile and Amphibian Populations at Marine Corps Air Station Miramar, San Diego, California*. Contract Number N68711-95-LT-C029. Prepared for MCAS Miramar Environmental Management Department and Southwest Division, Naval Facilities Engineering Command, San Diego, CA. San Diego, CA. 100 pp.

16. Varanus Biological Services, Inc., and San Diego Natural History Museum. 2003. *Long-term Ecosystem Monitoring Project on Marine Corps Air Station Miramar*. Prepared for MCAS Miramar Environmental Management Department and Southwest Division, Naval Facilities Engineering Command, San Diego, CA. San Diego, CA.

APPENDIX E. MCAS MIRAMAR INRMP PROJECTS

Existing in-house management actions and planned projects under this INRMP are listed in Table E.1 below for the objectives identified in Chapter 7 by natural resources management category (*e.g.*, Special Status Species Management, Vernal Pool Habitat Management, and General Wetland Management). Planned projects for each objective are budget items entered into the Marine Corps Status Tool for Environmental Programs (STEP) budget system and are described in a standard format as a means of monitoring overall INRMP implementation.

Table E.1 is formatted for each Action or Project as described below.

Management Category: As identified in Section 7.2 of this INRMP
Objective: As identified under the associated management category in Section 7.2 of this INRMP
Action/Project Title (STEP No.): Title and project STEP number
Description: A brief summary of the planned action/project
Priority: Each action/project is assigned a budget classification that establishes funding priority, using the USMC Common Output Levels of Service (COLS), as summarized below:

COLS Level 3 – Core requirements of the natural resources program that are necessary to maintain compliance with required conservation laws, regulations, Executive Orders, Final Governing Standards, and policies. COLS Level 3 actions/projects are critically important to support Station operations and must be implemented as programmed to consider the INRMP implemented successfully.

COLS Level 2 – Additional core program actions/projects that have lower risks associated with non-completion and are not critical to direct support of the military mission. COLS Level 2 actions/projects could include best management practices or be related to addressing future compliance and policy requirements.

COLS Level 1 – Additional actions/projects that enhance the program, promote sustainability opportunities, and conservation of environmental assets. Similar and more so than COLS Level 2, COLS Level 1 actions/projects are not critical to direct support of the military mission.

Funding Requested: Schedule of funds requested by fiscal year
Funding Source: General sources of funding

- Operations and Maintenance, Marine Corps (O&M, MC)
    - Operations Budget (OPBUD)
    - Centrally Managed Environmental Program (CMP)
- Agricultural Outlease Income

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Table E.1 MCAS Miramar INRMP Implementation Projects

Management Category	Objective	Action/Project Title (STEP No.)	Description	Priority	Funding Requested					Funding Source
					2018	2019	2020	2021	2022	
General Vegetation Management and Soil Conservation	Develop and Implement Natural Land and Habitat Restoration or Rehabilitation	NR - Invasive Plant Management (MI3CONISOPB46280001)	General Stationwide invasive plant control effort, focusing on invasive plants that interfere with training activities, cause health issues, and/or result in habitat degradation.	COLS Level 3	X	X	X	X	X	O&M, MC (OPBUD)
General Vegetation Management and Soil Conservation and Special Status Species Management	Continue Long-Term Ecosystem Monitoring (LTEM) of Vegetation and Soil Conditions and Protect Other Species of Special Regional Concern (i.e., Species at Risk [SAR])	AGR - Long-term Ecosystem Monitoring - Flora (MI2CONONC2246697000)	Miramar has completed 2 previous ecosystem monitoring efforts for at least a decade worth of data. This project would be a continuation of that effort.	COLS Level 2			X			Agricultural Outlease Income
General Vegetation Management and Soil Conservation and Natural Resources-Related Outdoor Recreation Management	Maintain Watershed Productivity, Quality, and Function and Provide Outdoor Recreation Opportunities When Feasible	NR - Minor Projects/Damage Repair (MI2CONONOPB48040006)	Provides funds for minor unanticipated project needs and/or damage repair where immediate response is important. Also funds the MCAS Miramar Fish Pond State aquaculture permit.	COLS Level 2	X	X	X	X	X	O&M, MC (OPBUD)
Grounds Maintenance and Landscaping	Ensure that Grounds Maintenance and Landscaping Operations are Consistent with Marine Corps Conservation Goals and Objectives	NR - Conservation Garden Outreach (MI1CONIPOPB46460002)	Per MCO 5090.2 (§11201.2), the Natural Resources Division established a demonstration garden to promote water conservation and water-wise native plant use. Conservation methods, techniques, ecology, and practices are tested and assessed. The project should have annual updates to remain current.	COLS Level 1	X	X	X	X	X	O&M, MC (OPBUD)
Special Status Species Management	Proactively Maintain Up-to-Date Data for Special Status Species	NR – Rare/Endangered Butterfly Monitoring (MI3CONESOPB51570016)	Surveys for Quino checkerspot butterfly and Hermes copper butterfly in potentially suitable habitat across MCAS Miramar.	COLS Level 3					X	O&M, MC (OPBUD)
Special Status Species Management	Proactively Maintain Up-to-Date Data for Special Status Species	NR - Endangered Least Bell's Vireo Survey (MI3CONESOPB48310010)	Surveys for least Bell’s vireo over the entire Station, with potential nest monitoring, cowbird control, and banding. Programmed every 3 years. Concurrent surveys will be conducted for the southwestern willow flycatcher.	COLS Level 3		X			X	O&M, MC (OPBUD)
Special Status Species Management	Proactively Maintain Up-to-Date Data for Special Status Species and Proactively Manage Special Status Species’ Habitat	NR - Threatened California Gnatcatcher Monitoring (MI3CONESOPB44670014)	Funding increase for additional NAVFAC costs and habitat monitoring in REPI relieved areas.	COLS Level 3	X			X		O&M, MC (OPBUD)
Special Status Species Management	Proactively Maintain Up-to-Date Data for Special Status Species and Protect Other Species of Special Regional Concern (i.e., SAR)	NR - Upland Endangered Plant Monitoring (MI3CONESOPB46620003)	Monitoring and development of Station management plans for two listed upland endangered plants at MCAS Miramar with declining populations (willowy monardella and Del Mar manzanita). Additionally, ESA candidate species may need to be incorporated if they become federally listed.	COLS Level 3			X			O&M, MC (OPBUD)
Vernal Pool Habitat Management	Take Proactive Action to Prevent Damage to Vernal Pool Habitat	AGR – Conservation Outreach (MI1CONIPC2251257013)	This phase will establish signage or a short path and viewpoint of the vernal pool ecosystem within the Miramar Mounds National Natural Landmark site and provide signage and updates to the conservation/research garden.	COLS Level 1	X					Agricultural Outlease Income
Vernal Pool Habitat Management	Take Proactive Action to Prevent Damage to Vernal Pool Habitat	AGR - MMNN Landmark Interpretive Trail - Phase 1 (MI1CONONC2245937007)	This is the first phase of implementation of a planned trail. This would support vernal pool tour requests on the Miramar Mounds National Natural Landmark site.	COLS Level 1		X				Agricultural Outlease Income

Management Category	Objective	Action/Project Title (STEP No.)	Description	Priority	Funding Requested					Funding Source
					2018	2019	2020	2021	2022	
Vernal Pool Habitat Management	Take Proactive Action to Prevent Damage to Vernal Pool Habitat	AGR - MMNN Landmark Interpretive Trail - Phase 2 (MI1CONONC2245947008)	Continues to implement previously developed plan to construct a trail in Phase 1. This would support vernal pool visits on the Miramar Mounds National Natural Landmark site.	COLS Level 1				X		Agricultural Outlease Income
Vernal Pool Habitat Management	Implement Vernal Pool Habitat Restoration and Re-Establishment to Maintain No Net Loss of Vernal Pool Habitat Basin Resources	NR - Vernal Pool Credit Development - Phase I (MI2CONESC2245570011)	First effort to develop vernal pool wetland habitat for multiple associated endangered species in advance of a specific requirement to develop credits, and in accordance with a vernal pool crediting agreement being developed with the USFWS (ESA) and ACOE (CWA).	COLS Level 2					X	O&M, MC (CMP)
Vernal Pool Habitat Management and Special Status Species Management	Implement Vernal Pool Habitat Restoration and Re-Establishment to Maintain No Net Loss of Vernal Pool Habitat Basin Resources and Proactively Manage Special Status Species' Habitat	AGR - Vernal Pool Credit Development - Phase I (MI2CONONC2245580012)	First effort to develop vernal pool wetland habitat associated with endangered species in advance of specific requirement to mitigate. Purpose is to create advance mitigation credits in accordance with an advance vernal pool crediting agreement being developed with the USFWS (ESA) and ACOE (CWA).	COLS Level 2					X	Agricultural Outlease Income
Vernal Pool Habitat Management and Special Status Species Management	Take Proactive Action to Prevent Damage to Vernal Pool Habitat and Proactively Maintain Up-to-Date Data for Special Status Species and Proactively Manage Special Status Species' Habitat	NR - Vernal Pool Management (MI2CONESOPB48060008)	This project funds small management needs associated with the conservation of vernal pool wetland habitat and the six endangered/ threatened species it supports on MCAS Miramar. Includes protective measures, weed removal/control, mapping, small studies/data analysis, and/or long-term trend monitoring.	COLS Level 2	X	X	X	X	X	O&M, MC (OPBUD)
Wildlife Damage Management	Reduce the Potential for Wildlife Damage	NR - Airfield Wildlife Hazard Assessment Update (MI2CONONOPB49410020)	Assessment by California State Department of Fish and Wildlife (CDFW) personnel of bird and mammal (e.g., coyote, rabbit, deer) activity on the airfield that might have potential for Bird/Animal Air Strike Hazard (BASH) incidents, with recommendations on actions to reduce this activity and prevent BASH potentials.	COLS Level 2		X				O&M, MC (OPBUD)
INRMP Planning	Review and Update this INRMP at Least Every Five Years	NR - Update/Revise INRMP with EA (MI3CONIPOPB46140015)	Next revision to the INRMP and EA, from the previous INRMP revision and EA completed in 2017. This effort needs to start at least one year before the next review/revision is due in 2022.	COLS Level 3				X		O&M, MC (OPBUD)
Effective INRMP Implementation with Professional Staffing	Provide Staffing and Supplies/Equipment to the Natural Resources Program	NR - Training and Travel Conservation (MI2CONNTOPB48030004)	Project supports the Station Botanist, Wildlife Biologist, and Natural Resources Director positions.	COLS Level 2	X	X	X	X	X	O&M, MC (OPBUD)
Effective INRMP Implementation with Professional Staffing	Provide Staffing and Supplies/Equipment to the Natural Resources Program	NR - Equipment and Supplies (MI2CONONOPB47030005)	Funding for natural resource management-specific materials, supplies, and tools/equipment.	COLS Level 2	X	X	X	X	X	O&M, MC (OPBUD)
Effective INRMP Implementation with Professional Staffing	Provide Staffing and Supplies/Equipment to the Natural Resources Program	AGR - Natural Resources Project Support (MI3CONONC2248087001)	Funding for NAVFAC support on various natural resource projects including project initiation, development, acquisition strategy, in-house management support, and minor contract modifications as required.	COLS Level 3	X	X	X	X	X	Agricultural Outlease Income
Effective INRMP Implementation with Professional Staffing	Provide Staffing and Supplies/Equipment to the Natural Resources Program	NR - Natural Resources Manpower (MI3CONNROPB48050007)	Funds the Station Botanist, Wildlife Biologist, and Natural Resources Division Director positions.	COLS Level 3	X	X	X	X	X	O&M, MC (OPBUD)

Management Category	Objective	Action/Project Title (STEP No.)	Description	Priority	Funding Requested					Funding Source
					2018	2019	2020	2021	2022	
Agricultural Funds	Manage the Agriculture Outlease	AGR - Agriculture Outlease Management Support (MI3CONONC2243657003)	Funds NAVFAC SW oversight and management of MCAS Miramar agricultural outlease activities. Includes funding for an annual environmental audit that is typically coordinated with other lease inspection activities, and Integrated Pest Management Plan oversight.	COLS Level 3	X	X	X	X	X	Agricultural Outlease Income

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Table E.2 is a summary of funding avenues and dollars required for implementation of this INRMP.

Table E.2. INRMP Implementation Costs*

Type Funds Programmed	FY 18	FY 19	FY 20	FY 21	FY 22	Totals
COLS Level 3						
O&M, MC**	**$794**	**$581**	**$741**	**$1,039**	**$792**	**$3,948**
OPBUD**	$794	$581	$741	$1,039	$792	$3,948
CMP	$0	$0	$0	$0	$0	$0
Agricultural Outlease Income	**$54**	**$56**	**$57**	**$81**	**$66**	**$314**
Subtotals (COLS Level 3)	**$848**	**$637**	**$799**	**$1,120**	**$858**	**$4,262**
COLS Level 2						
O&M, MC	**$27**	**$93**	**$28**	**$30**	**$390**	**$567**
OPBUD	$27	$93	$28	$30	$30	$207
CMP	$0	$0	$0	$0	$360	$360
Agricultural Outlease Income	**$0**	**$0**	**$280**	**$0**	**$360**	**$640**
Subtotals (COLS Level 2)	**$27**	**$93**	**$308**	**$30**	**$750**	**$1,207**
COLS Level 1						
O&M, MC	**$60**	**$49**	**$58**	**$67**	**$78**	**$312**
OPBUD	$60	$49	$58	$67	$78	$312
CMP	$0	$0	$0	$0	$0	$0
Agricultural Outlease Income	**$202**	**$250**	**$0**	**$250**	**$0**	**$702**
Subtotals (COLS Level 1)	**$262**	**$299**	**$58**	**$317**	**$78**	**$1,014**
Grand Totals	**$1,137**	**$1,029**	**$1,164**	**$1,467**	**$1,686**	**$6,483**

* Funding in thousands of dollars.

** Project MI3CONNROPB48050007, which provides staffing for the Natural Resources Program, is captured within COLS Level 3, O&M, MC (OPBUD) funding for years 2018-2022 ($370,000-$385,000, respectively).

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APPENDIX F. RESOURCE AGENCY, TRIBAL, AND PUBLIC COORDINATION AND INRMP REVIEW

MCAS Miramar provided the USFWS, CDFW, potentially affected Indian tribal governments, potentially interested parties, MCAS Miramar lessees/easement holders, and the general public with opportunities to review and comment on drafts of the INRMP and its associated EA. The Draft INRMP and its associated Draft EA were made available from December 16, 2017 to January 22, 2018 on the MCAS Miramar web site. On December 15-17, 2017 a Public Notice was placed in The San Diego Union-Tribune announcing the availability of the Draft INRMP and Draft EA for review and comment and the availability on the MCAS Miramar web site. The following copies of letters are representative of the correspondence associated with these actions. The first two letters are concurrences from the CDFW and USFWS.

A comment matrix that shows how each agency and public comment received was addressed is included in Appendix C of the EA.

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USFWS and CDFW Concurrence Letters.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

In Reply Refer To:
FWS-SDG-08B0449-18CPA0267

June 6, 2018
Sent by Email

Susan Vanwinkle
Assistant Environmental Management Officer
Environmental Management Department
Marine Corps Air Station Miramar
P.O. Box 45200, Building 6306
San Diego, California 92145-2001

Subject: Concurrence on the Integrated Natural Resources Management Plan for Marine Corps Air Station Miramar, San Diego, California

Dear Ms. Vanwinkle:

This is in response to your April 20, 2018, email requesting our concurrence that the Integrated Natural Resources Management Plan (INRMP) for Marine Corps Air Station Miramar, San Diego, California is compliant with the Sikes Act [16 United States Code (U.S.C.) §670a *et seq*.].

Based on our review, we concur that the INRMP Revision meets the requirements of the Sikes Act to manage natural resources on the identified installation.

We appreciate the Marine Corps' coordination on the development and review of the INRMP Revision. If you have any questions regarding further coordination, please contact Katy Kughen at 760-431-9440, extension 201.

Sincerely,

GEORGE STEWART

Digitally signed by GEORGE STEWART
Date: 2018.06.06 16:43:38 -07'00'

G. Mendel Stewart
Field Supervisor

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
South Coast Region
3883 Ruffin Road
San Diego, CA 92123
(858) 467-4201
www.wildlife.ca.gov

EDMUND G. BROWN JR., Governor
CHARLTON H. BONHAM, Director

June 4, 2018

Colonel Jason G. Woodworth
U.S. Marine Corps, Commanding Officer
Marine Corps Air Station Miramar
P.O. Box 452001, San Diego, CA 92145-2001

Subject: Review and Endorsement of the Draft Final Integrated Natural Resources Management Plan, Marine Corps Air Station Miramar, California

Dear Colonel Woodworth:

The California Department of Fish and Wildlife (Department) has reviewed the Draft Final Integrated Natural Resources Management Plan (INRMP) for Marine Corps Air Station Miramar (MCAS), dated April 2018. This INRMP was prepared pursuant to the Sikes Act as amended through 2012 (16 United States Code §670a) in cooperation with the appropriate State Fish and Wildlife Agency (i.e., the Department). The Department is responsible for the conservation, protection, and management of the state's biological resources, including rare, threatened, and endangered plant and animal species, pursuant to the California Endangered Species Act. The Department also administers the Natural Community Conservation Planning program, a California regional habitat conservation planning program.

The purpose of the 2018 MCAS INRMP is to provide responsible planning and management of the natural resources present on the installation's facilities that integrate the concerns and mission of the Department while efficiently supporting the MCAS mission.

As part of our efforts to fulfill our role in the Sikes Act Improvement Act as amended and foster improved conservation, protection, and management of particular species and/or habitat types present on MCAS, the Department, by way of this letter, grants concurrence with and acceptance of the 2018 MCAS Draft Final INRMP.

If you have any questions or comments pertaining to this letter, please contact Paul Schlitt at (858) 637-5510 or via email at Paul.Schlitt@wildlife.ca.gov.

Sincerely,

Edmund Pert
Regional Manager
South Coast Region

ec: Gail Sevrens, CDFW, San Diego
Jonathan Snyder, USFWS, Carlsbad

Conserving California's Wildlife Since 1870

Letter to USFWS and CDFW Requesting Concurrence.

UNITED STATES MARINE CORPS
MARINE CORPS AIR STATION MIRAMAR
P.O. BOX 452001
SAN DIEGO, CALIFORNIA 92145-2001

IN REPLY REFER TO:
5090/4991
April 20, 2018

U.S. Fish and Wildlife Service
Attention: Mr. J. Snyder
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Suite 250
Carlsbad, CA 92008

California Department of Fish and Game
Attention: Mr. P. Schlitt
3883 Ruffin Road
San Diego, CA 92123

Ladies and Gentlemen:

SUBJECT: MARINE CORPS AIR STATION MIRAMAR DRAFT FINAL INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

In accordance with the Sikes Act Improvement Act of 1997 (Public Law 105-85), Department of Defense, and U.S. Marine Corps policy, we have prepared an update of the Marine Corps Air Station (MCAS) Miramar (Station) Integrated Natural Resources Management Plan (INRMP) to address natural resources management on the Station in support of our military mission. This has been accomplished in cooperation with Ms. Katy Kughen of the local U.S. Fish and Wildlife Service (USFWS) Carlsbad Field Office and Mr. Paul Schlitt of the local California Department of Fish and Wildlife (CDFW) South Coast Regional Office. This coordination was to develop an INRMP that reflects mutual agreement concerning conservation, protection, and management of natural resources on the Station. The purpose of this letter is to provide the draft final INRMP, along with an Environmental Assessment (EA) for implementing the plan, and to request a letter of endorsement from your agency indicating that the document reflects mutual agreement. Your letter will be bound in the final INRMP document.

Our coordination with your agencies began with notification of our intent to revise the INRMP and a scoping meeting on January 16, 2014. At the scoping meeting the group decided to start the coordination process with chapter-by-chapter review of an initial draft update. This chapter-by-chapter review occurred between January 2015 and June 2017. On September 14, 2017, we delivered a complete draft INRMP to your offices soliciting review and comment. We received comments on this draft INRMP from CDFW in November 2017. On April 16, 2018, we received final formal comments from the USFWS. The enclosed draft final INRMP addresses the comments we received. For your reference, we have enclosed a comment matrix to help you understand how we addressed the comments. We do still have the ability to make relatively simple changes, but it is too late to include additional new data, revise data calculations, and revise figures.

During the period of December 15, 2017 – January 22, 2018, we held an opportunity for the public to review and comment on the draft INRMP and draft EA posted on our Environmental Management System web page. A notice of availability was published in the San Diego Union newspaper on December 15-17, 2017. We sent letters to potentially interested parties, lease and easement holders, and local Indian Tribes soliciting review and comment on the draft INRMP. Appendix F of the INRMP provides copies of correspondence from many of these efforts, including letters to and from your offices. A complete comment matrix of responses to all comments is included as an appendix to the EA.

In conducting your final review, please note that the enclosed draft final INRMP is written as though this coordination has been completed and mutual agreement/concurrence has been received. Your letters of concurrence will be bound within Appendix F of the final INRMP once the MCAS Miramar Commanding Officer has endorsed the INRMP.

We appreciate your participation in this process. In anticipation of our change of command that will occur in mid-July, we request for your letter of concurrence no later than 1 June. This will allow time for us to address any final comments and submit a final INRMP to our Commanding Officer for his endorsement before he leaves. Our point of contact is Mr. David Boyer, Director, Natural Resources Division, at (858) 577-1125.

Sincerely,

S. B. COLON
Major, U.S. Marine Corps
Environmental Management Officer
By direction of the Commanding Officer

Enclosures: 1. Draft Final INRMP (1 printed/1 CD copy)
2. Agency and Public Comment/Response Matrix
3. Environmental Assessment

Copy to: Marine Corps Installations West (Env. Sec./Planning and Conservation) w/o enclosures
Marine Corps Installations Command (GF 7) w/o enclosures

USFWS Comments on Public Draft INRMP/EA.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

In Reply Refer To:
FWS-SDG-18B0168-18TA0849

April 16, 2018
Sent by Email

Susan Vanwinkle
Assistant Environmental Management Officer
Environmental Management Department
Marine Corps Air Station Miramar
P.O. Box 45200, Building 6306
San Diego, California 92145-2001

Attention: Mr. David Boyer

Subject: Comments on the Draft Integrated Natural Resource Management Plan, Marine Corps Air Station Miramar, San Diego County, California

Dear Ms. Vanwinkle:

We have reviewed the August 2017 Draft Integrated Natural Resource Management Plan (Draft INRMP) for Marine Corps Air Station Miramar (MCAS Miramar). In general, we believe that the Draft INRMP does an excellent job describing the natural resources on MCAS Miramar and the actions that will be implemented by the U.S. Marine Corps (Marine Corps) to protect and manage these resources. Most of our comments regarding the Draft INRMP address updating species information in Sections 4 Biological Resources, Section 5 Management Areas and Land Use Compatibility, and Section 7 Natural Resources Management Goals and Objectives.

Section 4.0 Biological Resources

Comment 1: Please update and reorganize Figure 4.6. We recommend the following:

- Include the 2017 station-wide surveys for the least Bell's vireo (*Vireo bellii pusillus*; vireo);
- Add the Hermes copper butterfly (*Lycaena hermes*; Hermes copper) historical occurrence/occupied habitat polygons;
- For the coastal California gnatcatcher (*Polioptila californica californica*; gnatcatcher), vireo, and Del Mar Manzanita (*Arctostaphylos glandulosa crassifolia*) surveys, group all years together, create Pre- and Post-Cedar Fire groups, or use different qualifiers; the current grouping units make it unclear

as to why different post-fire years have separate data points (e.g., 2004, 2007, 2009, and 2016 breeding sites are grouped together as a Post-Cedar Fire category, and 2013 breeding sites are grouped as a second Post-Cedar Fire category); and

- Remove the qualification that the Quino checkerspot butterfly (*Euphydryas editha quino*; Quino) data points are Post-Cedar Fire as Quino had not been documented as occurring on MCAS Miramar Pre-Cedar Fire.

Comment 2: We recommend that Hermes copper be removed from Table 4.7 and placed in Table 4.6 as it was in the 2011-2015 INRMP. We recommend updating the Hermes copper entry in the table to state that the species status assessment to help inform the listing determination for Hermes copper is scheduled to be published in the Federal Register. Please include a statement in the table that Hermes copper and Quino surveys are scheduled for the 2018 flight seasons, with follow-up surveys to be completed during the 2019 flight seasons.

Comment 3: Please include additional language on pages 4-26 and 4-27 regarding offsetting measures that the Marine Corps will implement if Hermes copper is federally listed. We recommend that similar measures be identified for Hermes copper as are proposed for Quino: that the Marine Corps will limit field training in occupied habitat during the flight season and provide guidance for off-road activities, including foot traffic. The purpose of these measures is to minimize activities near larval host plants to avoid habitat damage and crushing of egg and larval stages of listed butterflies.

Comment 4: We recommend that the southwestern willow flycatcher (*Empidonax traillii extimus*; flycatcher) be removed from Table 4.7 and placed back in Table 4.6 as it was in the 2011-2015 INRMP. Although there are no known nesting occurrences of the flycatcher on MCAS Miramar, it is likely that some of the transient willow flycatchers that have been observed on MCAS Miramar are the listed entity and are migrating through MCAS Miramar on their way to breeding locations in California. Because of this, we feel it is important to continue to list the flycatcher within Table 4.6, which identifies special status species occurring on MCAS Miramar and not place it within the list of other species of regional concern. Please also update similar information that is included on page 4-25 and throughout the document.

Comment 5: In Table 4.7, it is stated that the monarch butterfly (*Danaus plexippus*; monarch) "only travel as far south as San Diego." Please update this section to reflect the currently known distribution of the monarch, which includes Baja California and Mexico. Additionally, Table 4.7 states that "MCAS Miramar does not have milkweed or winter roost sites." However, Appendix B, page B-2 of both the 2011-2015 INRMP and the August 2017 Draft INRMP, identifies *Asclepias*

fascicularis, narrow-leaf milkweed, a known host plant for the monarch, as having been documented on MCAS Miramar. Please update this entry to correctly reflect that appropriate oviposition sites and larval host plants occur on MCAS Miramar and that although monarchs have been observed on MCAS Miramar, there are no known wintering roost sites. Please also update the similar information that is included on page 4-27 and throughout the document.

Comment 6: Please update the information on page 4-27, in Table 4.7, and throughout the document, to include a statement that although tricolored blackbirds (*Agelaius tricolor*) are not known to breed on MCAS Miramar, individuals have been documented using wetland habitats during the non-breeding season.

Section 5.0 Management Areas and Land Use Compatibility

Comment 7: We recommend adding Quino to Table 5.1 which identifies vernal pool habitat, special status species locations/territories, and essential habitat totals by Management Area.

Comment 8: Section 5.1 discusses the relationship of the Management Area designations to federally listed species. Please add discussions on Hermes copper and Quino to this section. In Section 5.1.2, include Hermes copper and Quino to the list of species that receive the benefit of Level II Management Areas. On page 5-6 of Section 5.1.2, please identify management considerations for Hermes copper and Quino, such as avoidance of adverse effects by limiting training activities within the Management Areas during the flight seasons and providing guidance for off-road activities, including foot traffic, to minimize activities near larval host plants to avoid habitat damage and crushing of egg and larval stages of listed butterflies.

Section 6.0 Project and Mitigation Planning

Comment 9: Please include Quino to the second bullet on page 6-17 that lists species that have presence and absence survey protocols.

Section 7.0 Natural Resources Management Goals and Objectives

Comment 10: On page 7-18, please add a bullet for Hermes copper using similar language to that used for Quino that the management area designations will be updated accordingly after comprehensive surveys are completed.

Comment 11: We also recommend including information regarding previous positive and negative surveys, referencing any habitat mapping that has occurred in the past, referencing conservation of the Lakeside Down property and including information on any future planned surveys and habitat mapping. Since a listing determination for Hermes copper is scheduled to be published in the Federal

Register, we recommend that Page 7-18 be modified to include information on Hermes copper that is similar to that provided for federally listed species. We recommend providing this information, including measures that have been completed, are being conducted, and are planned so that it is clear that the INRMP provides protection and benefit to this species if it is listed.

Comment 12: On page 7-18, we recommend that the bullet point for Quino be expanded to include information for measures completed, being conducted, and planned in a similar way as the bullet points for the other listed species on MCAS Miramar. Include information regarding previous surveys, reference any habitat mapping that has occurred in the past, and include information on any future planned surveys and habitat mapping.

Comment 13: Please update the information on page 7-13 to state that vireo occur east and west of the Interstate-15 and add appropriate information from the 2017 station-wide surveys.

We commend the Marine Corps for its commitment to protecting the unique biological resources on MCAS Miramar and encourage the Marine Corps to address our recommendations regarding project planning and consultation. Thank you for the opportunity to comment on the Draft INRMP. If you have any questions regarding this letter, please contact Katy Kughen at 760-431-9440, extension 201.

Sincerely,

JONATHAN SNYDER

Digitally signed by JONATHAN SNYDER
Date: 2018.04.16 13:13:59 -07'00'

for Karen Goebel
Assistant Field Supervisor

CDFW Comments on Public Draft INRMP/EA.

11/27/2017

California Department of Fish and Wildlife (CDFW)

Staff: Paul Schlitt, Senior Environmental Scientist (Specialist)

SUBJECT: Review of the 2018-2022 Marine Corps Air Station Miramar Draft Integrated Natural Resources Management Plan

1. Section 1.1.1 Requirement for Preparation of an INRMP (Page 1-2, 3rd paragraph, last sentence) - The City of Santee is only at the draft stage in developing their MSCP Subarea Plan. Please include a footnote or amend text to reflect that condition.

2. Section 2.6 MCAS Miramar Non-military Land-use (Page 2-15 Reclaimed Water Program Facilities and Pipeline) - CDFW has previously reviewed and commented on the City of San Diego Wet Weather Intermittent Stream Discharge project. Considerable erosion is already evident in the ephemeral drainage channel; this channel is proposed to receive additional discharges from the City's water reclamation facility. Regardless of the timing for permitting the wet weather in-stream discharge project, what discussions/actions have occurred between MCAS Miramar and the City of San Diego concerning the implementation of additional best management practices and protection of downstream conditions within San Clemente Canyon watershed? Addressing this issue is beneficial from a water quality perspective and to lessen potential impacts to the small population of willowy monardella (*Monardella viminea*) that is located in West San Clemente Canyon.

3. Section 4.5.2 Wildlife Corridors (Page 4-20, 1st paragraph) – The wildlife corridors (i.e. Oak and Spring Canyons) connecting Mission Trails Regional Park to MCAS Miramar are negatively affected by recreational use in the areas. According to the narrative, site visits to the large culvert revealed minimal wildlife use and substantial human visitation, however details of when that site visit occurred was not provided in INRMP. Has MCAS Miramar considered removing the fencing at the large culvert extending under State Route 52? With the extension of the Stowe trail through MCAS Miramar, have resource management staff observed a shift and/or reduction of human visitation within the area where the culvert is located?

4. Table 6.2.2b (Mitigation Trigger for Vernal Pool Watersheds and Basins) - The mitigation guidance addressing *Required Impact Avoidance, Minimization, and Compensation* states, "For non-jurisdictional true vernal pools, implement compensation of the same habitat type at a 1:1 ratio." In comparison, the narrative on page 6-11 states, "The loss of *true vernal pools* must be mitigated at least on a 1:1 ratio to achieve 'no net loss' of wetlands; however, regulatory agencies typically require higher mitigation ratios due to uncertainties of complete replacement of functions and values." CDFW recommends revising the mitigation guidance in Table 6.2.2a and 6.2.2b (e.g., ratios) to reflect those conditions for when commensurate mitigation would be greater than a 1:1 ratio.

5. Table 6.2.2b (Mitigation Trigger for All Upland Vegetation Communities, Disturbed Areas, and Developed Areas) - The summary of compensation measures states, "For impacts in Level I, II, III, and IV areas, implement habitat compensation for regionally rare native plant community types (e.g. sage and sagebrush scrub) at a 1:1 ratio targeting the same habitat elsewhere." What situations require mitigation of direct impacts to a particular habitat type greater than a 1:1 ratio (e.g., direct impacts to native grassland habitat or a population of a narrow endemic plant)? If mitigation ratios are adjusted as a condition of consultation with the respective regulatory agencies, please include the specific thresholds and details within the INRMP.

Affidavit of Publication regarding the Public Notice of Availability of the Draft Environment Assessment for the Implementation of the MCAS Miramar INRMP.

The San Diego Union-Tribune

PROOF of Publication

Bill To:
Tetra Tech - CU00632065
5383 Hollister Ave
Ste 130
Santa Barbara,CA 93111-2342

STATE OF ILLINOIS
COUNTY OF Cook

The Undersigned, declares under penalty of perjury under the laws of the State of California: That he/she is and at all times herein mentioned was a citizen of the United States, over the age of twenty-one years, and that he/she is not a party to, nor interested in the above entitled matter; that he/she is Chief Clerk for the publisher of

San Diego Union-Tribune

a newspaper of general circulation, printed and published daily in the City of San Diego, County of San Diego, and which newspaper is published for the dissemination of local news and intelligence of a general character, and which newspaper at all the times herein mentioned had and still has a bona fide subscription list of paying subscribers, and which newspaper has been established, printed and published at regular intervals in the said City of San Diego, County of San Diego, for a period exceeding one year next preceding the date of publication of the notice hereinafter referred to, and which newspaper is not devoted to nor published for the interests, entertainment or instruction of a particular class, profession, trade, calling, race, or denomination, or any number of same; that the notice of which the annexed is a printed copy, has been published in said newspaper in accordance with the instruction of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

December 15, 2017; December 16, 2017; December 17, 2017

I certify under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Dated in the City of Chicago, State of Illinois
on this 18th of December 2017.

Stefanie Sobie
San Diego Union-Tribune
Legal Advertising

Proof of Publication of

See Attached

5351678

The San Diego Union-Tribune

Bill To:
Tetra Tech - CU00632065
5383 Hollister Ave
Ste 130
Santa Barbara,CA 93111-2342

Sold To:
Tetra Tech - CU00632065
5383 Hollister Ave
Ste 130
Santa Barbara,CA 93111-2342

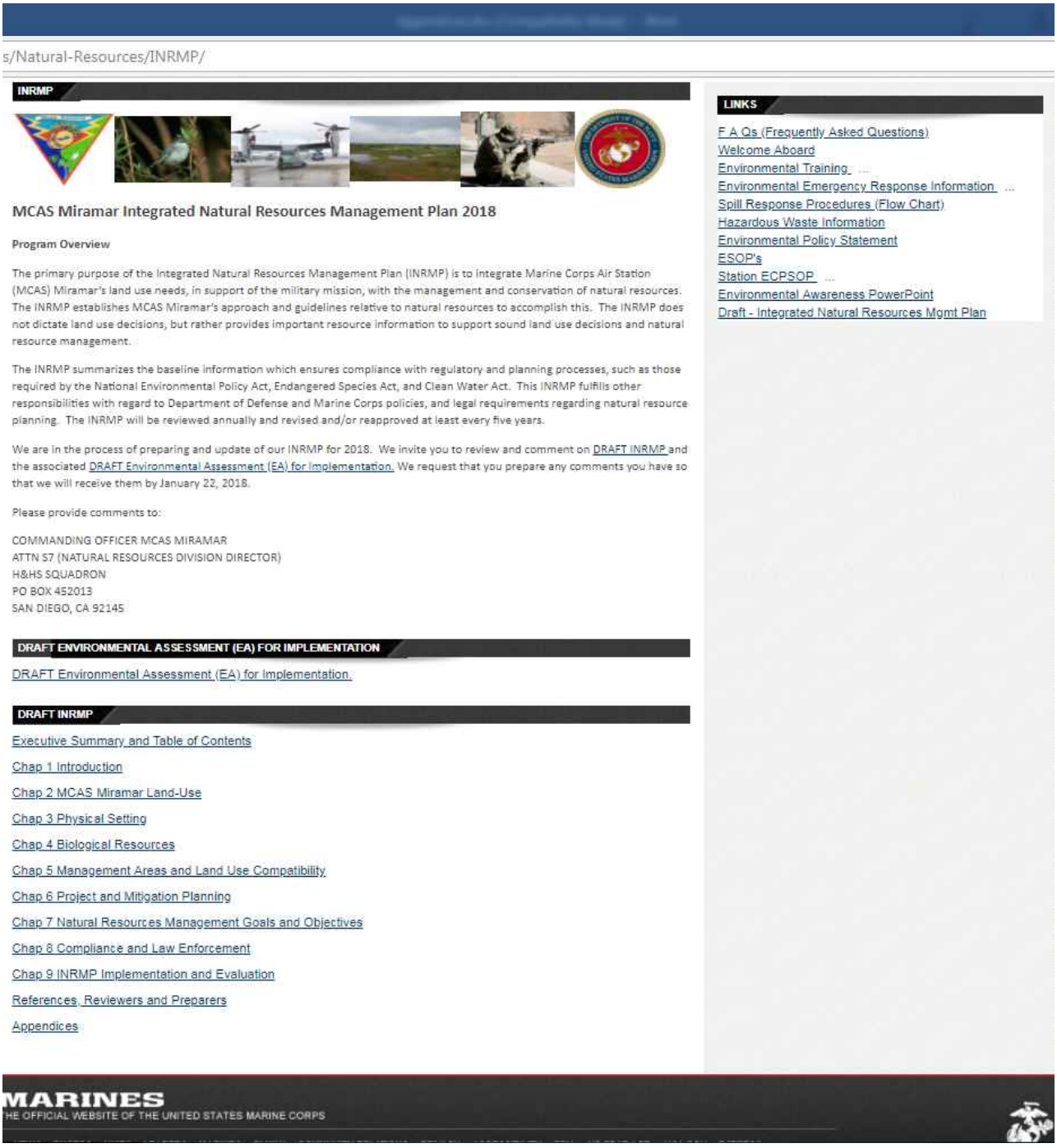
Notice of Public Review Period for the MCAS Miramar Draft Integrated Natural Resources Management Plan

Marine Corps Air Station (MCAS) Miramar is now soliciting public review and comment on the draft update of its Integrated Natural Resources Management Plan (INRMP) and draft Environmental Assessment for Implementation. The INRMP integrates the management of natural resources in support of the military readiness mission of MCAS Miramar. The Draft INRMP has been posted on the MCAS Miramar environmental management system web site at www.miramarems.com.

Comments and information should be sent such that they will be received by 22 January. Please use the following mailing address:

COMMANDING OFFICER,
MCAS MIRAMAR
ATTN S7 (MR BOYER)
H&HS SQUADRON
PO BOX 452013
SAN DIEGO, CA 92145

Snapshot of MCAS Miramar Web Site with the posted Draft INRMP and EA files.



s/Natural-Resources/INRMP/

INRMP

MCAS Miramar Integrated Natural Resources Management Plan 2018

Program Overview

The primary purpose of the Integrated Natural Resources Management Plan (INRMP) is to integrate Marine Corps Air Station (MCAS) Miramar's land use needs, in support of the military mission, with the management and conservation of natural resources. The INRMP establishes MCAS Miramar's approach and guidelines relative to natural resources to accomplish this. The INRMP does not dictate land use decisions, but rather provides important resource information to support sound land use decisions and natural resource management.

The INRMP summarizes the baseline information which ensures compliance with regulatory and planning processes, such as those required by the National Environmental Policy Act, Endangered Species Act, and Clean Water Act. This INRMP fulfills other responsibilities with regard to Department of Defense and Marine Corps policies, and legal requirements regarding natural resource planning. The INRMP will be reviewed annually and revised and/or reapproved at least every five years.

We are in the process of preparing and update of our INRMP for 2018. We invite you to review and comment on DRAFT INRMP and the associated DRAFT Environmental Assessment (EA) for Implementation. We request that you prepare any comments you have so that we will receive them by January 22, 2018.

Please provide comments to:

COMMANDING OFFICER MCAS MIRAMAR
ATTN S7 (NATURAL RESOURCES DIVISION DIRECTOR)
H&HS SQUADRON
PO BOX 452013
SAN DIEGO, CA 92145

DRAFT ENVIRONMENTAL ASSESSMENT (EA) FOR IMPLEMENTATION

DRAFT Environmental Assessment (EA) for Implementation

DRAFT INRMP

Executive Summary and Table of Contents
Chap 1 Introduction
Chap 2 MCAS Miramar Land-Use
Chap 3 Physical Setting
Chap 4 Biological Resources
Chap 5 Management Areas and Land Use Compatibility
Chap 6 Project and Mitigation Planning
Chap 7 Natural Resources Management Goals and Objectives
Chap 8 Compliance and Law Enforcement
Chap 9 INRMP Implementation and Evaluation
References, Reviewers and Preparers
Appendices

LINKS

F A Qs (Frequently Asked Questions)
Welcome Aboard
Environmental Training ...
Environmental Emergency Response Information ...
Spill Response Procedures (Flow Chart)
Hazardous Waste Information
Environmental Policy Statement
ESOP's
Station ECPSOP ...
Environmental Awareness PowerPoint
Draft - Integrated Natural Resources Mgmt Plan

MARINES
THE OFFICIAL WEBSITE OF THE UNITED STATES MARINE CORPS

Letters distributed to interested parties (41 letters were mailed out).

UNITED STATES MARINE CORPS
MARINE CORPS AIR STATION MIRAMAR
P.O. BOX 452001
SAN DIEGO, CALIFORNIA 92145-2001

IN REPLY REFER TO:
5090/ 4919
DEC 0 7 2017

Dear Potentially Interested Party:

SUBJECT: PUBLIC REVIEW OF THE MARINE CORPS AIR STATION MIRAMAR DRAFT INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Marine Corps Air Station (MCAS) Miramar invites public review and comment on the draft update of its Integrated Resources Management Plan (INRMP) prepared in accordance with the Sikes Act Improvement Act of 1997 and the associated draft Environmental Assessment (EA) for implementation. This plan will govern the natural resources management program of MCAS Miramar to support the military readiness mission for the next five years.

To facilitate review, we have placed the two documents on the environmental portion of the MCAS Miramar web site: http://www.miramar-ems.marines.mil.

We request that any information or comments you wish to provide for our consideration be in writing such that we receive them by January 22, 2018. Please use the following address:

COMMANDING OFFICER MCAS MIRAMAR
ATTN S7 (MR BOYER)
PO BOX 452013
SAN DIEGO CA 92145

If you have questions, you may contact our Natural Resources Division staff at (858) 577-1125.

Sincerely

S. M. VAN WINKLE
Asst. Environmental Management Officer
By direction of the Commanding Officer

Representative letter to lease and easement holder. Similar letters were sent to other lease and easement holders.

UNITED STATES MARINE CORPS
MARINE CORPS AIR STATION MIRAMAR
P.O. BOX 452001
SAN DIEGO, CALIFORNIA 92145-2001

11011
Ser/RE0043
January 3, 2018

Orlando Gardner
Realty Specialist RPAO
Army Reserve 63rd Regional Support Command
63d RSC DPW PLANS 230 RT Jones Rd
Mountainview, CA 94043

SUBJ: PUBLIC REVIEW PERIOD FOR THE MARINE CORPS AIR STATION MIRAMAR DRAFT INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

Mr. Gardner:

In compliance with the Sikes Act, Marine Corps Air Station (MCAS) Miramar has prepared an Integrated Natural Resources Management Plan (INRMP). The INRMP addresses resource management on all of the lands for which MCAS Miramar has real property accountability, including lands occupied by others pursuant to a license, lease, easement, use agreement, or right of way. Natural resources management actions undertaking by, or on behalf of, the Marine Corps are planned for and do occur on or around your area of operation.

Your real estate interest with the Station provides that the rights shall be subject to such reasonable rules and regulations to ensure that the exercise of such rights shall not interfere with the Government activities at the facility. One purpose of this letter is to provide notice that your actions in regards to the natural resources on the Station must be consistent with the philosophies and supportive of the objectives of the MCAS Miramar INRMP.

Given that the INRMP covers lands associated with your operations, we are providing you with notice that we are in the process of revising our INRMP. At this time, we solicit your review and comment on our Draft INRMP to ensure that issues important to you are considered. To address the implementation of planned actions in the INRMP, we have prepared an Environmental Assessment (EA) that you may also review and provide comment on.

For your convenience, we have placed the draft INRMP and draft EA on the environmental portion of the MCAS Miramar web site at: http://www.miramar-ems.marines.mil.

If you have any comments or information to provide, we request that you transmit them such that we will receive them by January 22, 2018. Please use the following address:

COMMANDING OFFICER, MCAS MIRAMAR
ATTN S7 (MR DAVID BOYER)
H&HS SQUADRON
PO BOX 452013
SAN DIEGO CA 92145

If you have questions about the natural resource management aspects of this plan, please contact our Natural Resources Division staff at (858) 577-1125. For questions related to your real estate interests, please contact Robert Turley at (858) 577-9220.

Sincerely,

BRINKMAN.TRAVIS.DUANE.1244909120 Digitally signed by BRINKMAN.TRAVIS.DUANE.1244909120 Date: 2018.01.03 14:55:01 -08'00'

T.D. BRINKMAN
Lieutenant Commander, U.S. Navy
Public Works Officer, Installation and Logistics
By direction of the Commanding Officer

Coordination letter sent to USFWS and CDFW.

UNITED STATES MARINE CORPS
MARINE CORPS AIR STATION MIRAMAR
P.O. BOX 452001
SAN DIEGO, CALIFORNIA 92145-2001

IN REPLY REFER TO:
5090/ 4874
SEP 13 2017

U.S. Fish and Wildlife Service
Attention: Mr. J. Snyder
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Suite 250
Carlsbad, CA 92008

California Department of Fish and Game
Attention: Mr. P. Schlitt
4949 Viewridge Avenue
San Diego, CA 92123

Ladies and Gentlemen:

SUBJECT: REVIEW OF THE MARINE CORPS AIR STATION MIRAMAR DRAFT INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

As part of our continuing coordination on the update of our Marine Corps Air Station (MCAS) Miramar Integrated Natural Resources Management Plan (INRMP), we are providing a complete draft of our INRMP and draft Environmental Assessment (EA) on implementation for your review and comment. We believe we incorporated your staff comments from the chapter-by-chapter reviews we have shared over the past 14 months with Ms. Katy Kughen and Mr. Paul Schlitt. Included with the draft INRMP is a comment/response matrix prepared by our contractor to track how your previous comments were addressed. The enclosed compact disk contains electronic files of these documents.

One month following our transmission of the draft INRMP and EA for your review and comment, we plan to solicit public review and comment on the draft INRMP and EA documents. This will be accomplished by transmitting notification letters and posting the documents on the environmental portion of the MCAS Miramar web site linked from: http://www.miramar-ems.marines.mil/Divisions/Natural-Resources-Division/Natural-Resources/. During this public review and comment period of 30 days, you may continue your review, but please contact us within the first 30 days from your receipt of this letter if you find something in the draft INRMP sufficiently objectionable to require revision prior to our posting for public review.

We request that you provide any review comments you have by November 27, 2017. If you have any questions, please contact our Natural Resources Division Director, Mr. David Boyer, at (858)577-1125 and electronic mail: david.a.boyer1@usmc.mil.

Sincerely,

S. M. Van Winkle

S. M. VAN WINKLE
Asst. Environmental Management Officer
By direction of the Commanding Officer

Enclosure: CD containing: 1. Draft INRMP
2. Comment/Response Matrix
3. Draft Environmental Assessment

Copy to: MCIWest (Env. Sec./Planning and Conservation)
MCICOM (GF 7)

2

Early Chapter-by-Chapter Coordination and Review with State and Federal Fish and Wildlife Agencies January 2015 – June 2017

An initial scoping meeting was held on MCAS Miramar on 16 January 2014 and was attended by Mr. Paul Schlitt from the California Department of Fish and Wildlife (CDFW), Ms. Katy Kughen from the U.S. Fish and Wildlife Service (USFWS), MCAS Miramar Natural Resources Division, and Tetra Tech. The purpose of this meeting was to discuss an early chapter-by-chapter review of the updated MCAS Miramar INRMP. As each chapter of the INRMP was updated, it was sent to CDFW and USFWS for initial review and comment. This approach allowed comments from the agencies to be addressed in text prior to the preparation of the Public Draft INRMP. It also spaced out the review over a longer period of time allowing for a more detailed review, rather than requesting comments on the entire INRMP all at once.

The first updated INRMP chapters were provided to CDFW and USFWS in January 2015. Comments were received as early as February 2015 from the state and federal fish and wildlife agencies and were addressed in text. This process continued throughout 2016 and 2017, with the last comments received from the state and federal fish and wildlife agencies in June 2017.

Sample coordination letters distributed to the local Tribes.

UNITED STATES MARINE CORPS
MARINE CORPS AIR STATION MIRAMAR
P.O. BOX 452001
SAN DIEGO, CALIFORNIA 92145-2001

IN REPLY REFER TO:
5090/ 4947
JAN 19 2017

Mr. Virgil Perez, Chairman
Iipay Nation of Santa Ysabel
P.O. Box 130
Santa Ysabel, CA 92070

Dear Mr. Perez:

Marine Corps Air Station (MCAS) Miramar continues work to update our Integrated Cultural Resources Management Plan (ICRMP) and the Integrated Natural Resources Management Plan (INRMP). We presented these efforts to you before in letters of February 2014 and June 2016. Our work has produced draft updates that we seek your input on.

Integrated Cultural Resources Management Plan (ICRMP) Update. This plan integrates and guides our management of archaeological, historical, and other culturally important resources at MCAS. Specific site information will be kept in a confidential appendix that is not publically available. Management and consultation procedures will be reviewed and updated as needed. We solicit your participation in this update and any information you would like to provide.

Integrated Natural Resources Management Plan (INRMP) Update. This plan integrates and guides our natural resource management on the Station. We are updating natural resource information and management actions along with information about Station operations and land uses. Our draft update is posted for public review at:http://www.miramar-ems.marines.mil/programs/natural-resources/INRMP/.

We are inviting you to participate with further planning of these plans as they may relate to your cultural interests. Enclosed are electronic versions of the ICRMP and the INRMP on a CD-ROM. If you would like a paper version of these documents, please contact us. If you wish to provide any information or comment, or you need additional information, we request that you contact us. Please provide comments on the INRMP by February 24, 2018. Please provide your comments on the ICRMP by March 26, 2018.

Our point of contact is Mr. David Boyer, Director, Natural Resources Division, at (858)577-1125 or by electronic mail at david.a.boyer1@usmc.mil.

Sincerely,

S.M. VAN WINKLE
Asst. Environmental Management Officer
By direction of the Commanding Officer

Enclosure: CD-ROM with ICRMP and Draft INRMP

UNITED STATES MARINE CORPS
MARINE CORPS AIR STATION MIRAMAR
P.O. BOX 452001
SAN DIEGO, CALIFORNIA 92145-2001

IN REPLY REFER TO:
5090 4648
13 JUN 2016

Mr. Robert Pinto, Sr., Chairman
Ewiiaapaayp Band of Kumeyaay Indians
P.O. Box 2250
Alpine, CA 91901

Dear Mr. Pinto:

Marine Corps Air Station Miramar is planning a number of actions which may be considered "undertakings" by the National Historic Preservation Act (NHPA). In accordance with our responsibilities under the NHPA, we are contacting you to determine whether you attach religious or cultural significance to the sites involved and if you desire to be consulted further regarding any one or more of these projects. None of these actions are dependent upon each other, but we have chosen to initially present them to you in one letter to determine your level of interest for each. We also solicit any specific knowledge you have regarding the occurrence of historic or prehistoric sites in the vicinity of any of the project sites. Record searches and field surveys have been done or are planned in an effort to determine if any of the projects could affect a historically significant site. Any information you can provide would be helpful for this effort.

The following paragraphs briefly discuss the projects and any alternatives being considered. All projects are on the Air Station. Some projects have been presented to you before and are again included because we are still planning the actions. The enclosed figure shows the general location of each project. We have also included a "Response Form" that you may use to express any interests or information you wish to share regarding one, or more, of the projects or alternatives. Our point of contact for this communication is identified in the last paragraph of this letter so that you may contact him if you prefer.

F-35 Aircraft Facilities Development. We continue planning new and rehabilitated airfield facilities needed to support basing of the new F-35 Joint Strike Fighter at the Air Station. This project has been presented to you in previous communications, but some additional area is now involved. The project requires relocation of an aircraft wash rack and vehicle access roads, demolition of some existing buildings and aircraft hangars, new construction of aircraft hangars and support facilities, replacement of some security fence, and replacement of a new small arms storage magazine.

Bunker Demolition in East Miramar. We are planning to demolish two Cold War era test bunkers in East Miramar that were originally constructed in 1961. The project will result in complete removal of

building materials and utilities. After removal of the buildings, the sites will be graded to eliminate holes and reduce erosion. Our plans currently intend to reseed the site with native plant species to help stabilize the soil. There are already access roads to the sites, and we expect this demolition work to occur within the area previously disturbed by original construction.

De La Garza Road Stream Crossing Repair/Replacement. We are planning to repair, by replacement, an existing paved road crossing of the Rose Canyon streambed on our Main Station area that was damaged by flooding this past winter (De La Garza Road). The existing culverts, concrete, asphalt, and riprap will be removed and a new set of box culverts will be installed with concrete aprons and new riprap protection. The road crossing will then be restored with asphalt connections.

San Diego Gas & Electric Natural Gas Pipeline in East Miramar. We are cooperating with the San Diego Gas and Electric Company to support their need for a large natural gas transmission pipeline through the Station. The current alternatives enter the Station from the north and follow an existing County Water Authority pipeline corridor for about 2 miles. Alternatives consider pipeline placement along either the east or west sides of this corridor. The pipeline section on MCAS Miramar is at the southern end of a 47-mile long project that begins near Rainbow, California. Overall project planning is being managed by the California Public Utilities Commission as the lead agency.

Integrated Natural Resources Management Plan (INRMP) Update. We presented this to you before, but we continue our preparation on a 5-year update to our INRMP for MCAS Miramar. This plan integrates and guides our natural resource management on the Station. We will be updating natural resource information and management actions along with information about Station operations and land uses. Our current INRMP can be reviewed at the following web site: http://www.miramar-ems.marines.mil/Divisions/NaturalResourcesDivision/NaturalResources.aspx.

Integrated Cultural Resources Management Plan (ICRMP) Update. We recently started work to update our ICRMP for MCAS Miramar. This plan integrates and guides our management of archaeological, historical, and other culturally important resources on the Station. We will be updating this plan with information from surveys and evaluations completed in the past six years. Specific site information will be kept in a confidential appendix that is not publically available. Management and consultation procedures will be reviewed and updated as needed. We solicit your participation in this update and any information you would like to provide. Our current ICRMP can be viewed at the following web site: http://www.miramar-ems.marines.mil/Portals/60/Docs/MEMS/Cult Res/ICRMP Final (April%202011).pdf.

We are inviting you to participate with further planning of these projects as they may relate to your cultural interests. Because the U.S. Army Corps of Engineers may be issuing permits associated with one or more these projects, they may use our lead agency communications and consultation results for their permitting processes.

If you wish to provide any information or comment, or you need additional information, we request that you contact us by August 11, 2016. Our point of contact is Mr. David Boyer, Director, Natural Resources Division, at (858)577-1125 or by electronic mail at "david.a.boyer1@usmc.mil".

Sincerely,

E. S. BENJAMIN
Lieutenant Colonel, U.S. Marine Corps
Environmental Management Officer
By direction of the Commanding Officer

Enclosures: (1) Location Figure
(2) Response Form

UNITED STATES MARINE CORPS
MARINE CORPS AIR STATION MIRAMAR
P.O. BOX 452000
SAN DIEGO CA 92145-2000

IN REPLY REFER TO:
5090 4137
24 FEB 2014

Ms. Gwendolyn Parada, Chairwoman
La Posta Band of Mission Indians
P.O Box 1120
Boulevard, CA 91905

Dear Ms. Parada:

Marine Corps Air Station Miramar is planning a number of actions which may be considered "undertakings" by the National Historic Preservation Act (NHPA). In accordance with our responsibilities under the NHPA, we are contacting you to determine whether you attach religious or cultural significance to the sites involved and if you desire to be consulted further regarding any one or more of these projects. None of these actions are dependent upon each other, but we have chosen to initially present them to you in one letter to determine your level of interest for each. We would also solicit any specific knowledge you have regarding the occurrence of historic or prehistoric sites in the vicinity of any of the project sites. Record searches and field surveys are planned or are being done in an effort to determine if any of the projects could affect a historically significant site. Any information you can provide would be helpful for this effort.

The following paragraphs briefly discuss the projects and any alternatives being considered. All projects are on the Air Station. The enclosed figure shows the general location of each project and project alternatives. We have also included a "Response Form" that you may use to express any interests or information you wish to share regarding one, or more, of the projects or alternatives.

We have started planning for the development of vernal pool wetland habitat mitigation areas that may formally be set up as a mitigation and conservation bank with the U.S. Army Corps of Engineers and U.S. Fish and Wildlife Service. We are doing this in cooperation with these agencies, and in coordination with the U.S. Environmental Protection Agency. Up to six areas on MCAS Miramar may be authorized by this planning for restoration, re-establishment, establishment, and long-term conservation of vernal pool wetlands. Vernal pool associated threatened and endangered species would be

introduced to the newly created habitat. Actions associated with this habitat development would include re-contouring the top 2-3 feet of soil to create basins and mounds, planting native species, and non-native plant control. Some soil remediation work may also be needed to clean up from past land uses.

We are beginning the process of preparing a 5-year update to our Integrated Natural Resources Management Plan (INRMP) for MCAS Miramar. This plan integrates and guides our natural resource management on the Station. We will be updating natural resource information and management actions along with information about Station operations and land uses. Our current INRMP can be reviewed at the following web site: http://www.miramar-ems.marines.mil/Divisions/NaturalResourcesDivision/NaturalResources.aspx.

We are planning to construct a sewer equalization tank in Rose Canyon for the purposes of better managing sewage flow from the Station. Our preferred alternative replaces an existing sewer line with a long linear tank under an existing paved road in the bottom of Rose Canyon. Construction will require an additional 3-5 feet beyond the paved road that would be restored to native plants following construction. An alternative also being considered is construction of a more traditional storage tank on the side of the canyon with a pump station just upstream of preferred alternative. Construction laydown areas would be in nearby areas already disturbed or developed and would be the same for both alternatives.

Our Marine Corps Community Services department is planning to build an outdoor adventure park on a part of the Station between Interstate Highway 15 and Kearny Villa Road, and north of Miramar Way. This area once supported horse stables and is adjacent to their recreational vehicle storage lot. The outdoor adventure park would include a rock climbing/repelling wall, BMX bicycle track, themed paintball and airsoft BB gun areas, exercise course, playground, outdoor amphitheater, batting cages, and picnic area with associated fencing, landscaping and parking.

Finally, we are planning to expand the aircraft parking area for KC-130 aircraft to the east of the existing aircraft parking area and associated hangar. This is required to make room on the fightline for new F-35 Joint Strike Fighter aircraft. The project requires relocation of an aircraft wash rack and vehicle access road, demolition of a some existing buildings, and development of a few vernal pools that would be re-established elsewhere in compensation.

We are inviting you to participate with further planning of these projects as they may relate you your cultural interests. Because the U.S. Army Corps of Engineers may be issuing permits associated with one or more these projects, they may use our lead agency communications and consultation results for their permitting processes.

If you wish to provide any information or comment, or you need additional information, we request that you contact us by April 10, 2014. Our point of contact is Mr. David Boyer, Director, Natural Resources Division, at (858) 577-1125 or by electronic mail at "david.a.boyer1@usmc.mil".

Sincerely,

J. E. SZEPESY
Lieutenant Colonel, U.S. Marine Corps
Environmental Management Officer
By direction of the Commanding Officer

Enclosures: (1) Location Figure
(2) Response Form