U. S. AIR FORCE

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

MARCH AIR RESERVE BASE, CALIFORNIA

SEPTEMBER 2021

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ABOUT THIS PLAN

This installation-specific Environmental Management Plan is based on the U.S. Air Force's (USAF's) standardized Integrated Natural Resources Management Plan (INRMP) template. This INRMP has been developed in cooperation with applicable stakeholders, which includes Sikes Act cooperating agencies and/or local equivalents, to document how natural resources will be managed. Where applicable, external resources, including Air Force Instructions (AFIs); Department of Defense Instructions (DoDIs); USAF Playbooks; federal, state, and local requirements; Biological Opinions; and permits are referenced.

Certain sections of this INRMP begin with standardized, USAF-wide "common text" language that address USAF and Department of Defense (DoD) policy and federal requirements. This common text language is restricted from editing to ensure that it remains standard throughout all plans. Immediately following the USAF-wide common text sections are installation sections. The installation sections contain installation-specific content to address local and/or installation-specific requirements. Installation sections are unrestricted and are maintained and updated by the approved plan owner.

NOTE: The terms "Natural Resources Manager," "NRM," and "NRM/POC" are used throughout this document to refer to the installation person responsible for the natural resources program, regardless of whether this person meets the qualifications within the definition of a natural resources management professional in DoDI 4715.03, Natural Resources Conservation Program.

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DOCUMENT CONTROL

Standardized Integrated Natural Resources Management Plan (INRMP) Template

In accordance with the Air Force Civil Engineer Center (AFCEC) Environmental Directorate Business Rule 08, *EMP Review, Update, and Maintenance*, the standard content in this INRMP template is reviewed periodically, updated as appropriate, and approved by the Natural Resources Subject Matter Expert.

This version of the template is current as of 03 October 2018 and supersedes the 2015 version.

NOTE: Installations are not required to update their INRMPs every time this template is updated. When it is time for installations to update their INRMPs, they should refer to the eDASH Environmental Management Plan Repository to ensure they have the most current version.

Installation INRMP

Record of Review – The INRMP is updated no less than annually, or as changes to natural resource management and conservation practices occur, including those driven by changes in applicable regulations. In accordance with the Sikes Act and Air Force Manual (AFMAN) 32-7003, *Environmental Conservation*, the INRMP is required to be reviewed for operation and effect no less than every 5 years. An INRMP is considered compliant with the Sikes Act if it has been approved in writing by the appropriate representative from each cooperating agency within the past 5 years. Approval of a new or revised INRMP is documented by signature on a signature page signed by the Installation Commander (or designee), and a designated representative of the United States Fish and Wildlife Service (USFWS), state fish and wildlife agency, and National Oceanic and Atmospheric Administration (NOAA) Fisheries when applicable (AFMAN 32-7003).

Annual reviews and updates are accomplished by the installation Natural Resources Manager (NRM), and/or a Section Natural Resources Media Manager. The installation shall establish and maintain regular communications with the appropriate federal and state agencies. At a minimum, the installation NRM (with assistance as appropriate from the Section Natural Resources Media Manager) conducts an annual review of the INRMP in coordination with internal stakeholders and local representatives of USFWS, state fish and wildlife agency, and NOAA Fisheries, where applicable, and accomplishes pertinent updates. Installations will document the findings of the annual review in an Annual INRMP Review Summary. By signing the Annual INRMP Review Summary, the collaborating agency representative asserts concurrence with the findings. Any agreed updates are then made to the document, at a minimum updating the work plans.

INRMP APPROVAL/SIGNATURE PAGES

U.S. AIR FORCE RESERVE COMMAND
MARCH AIR RESERVE BASE
CALIFORNIA

This Integrated Natural Resources Management Plan (INRMP) has been prepared in accordance with regulations, standards, and procedures of the Department of Defense and the U.S. Air Force and the Sikes Act Improvement Act of 1997 (16 *United States Code* Section 670a) in cooperation with the U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife. This INRMP provides for management and stewardship of all natural resources present on the Base.

By their signatures below, or an enclosed letter of concurrence, all parties grant their concurrence and acceptance of the following document.

Approving Officials:

HAYNES.GREGORY.P.1105183832 Digitally signed by HAYNES.GREGORY.P.1105183832 Date: 2021.09.29 14:39:43 -07'00'

GREGORY P. HAYNES, Colonel, USAF Date
Commander, 452d Air Mobility Wing

MCCRAINE.RODNEY.ERIC.1067944492 Digitally signed by MCCRAINE.RODNEY.ERIC.1067944492 Date: 2021.09.21 08:50:45 -07'00'

Rodney E. McCraine, Colonel, USAF Date
Commander, 452d Mission Support Group

PALMER.DAVID.G.1387648808 Digitally signed by PALMER.DAVID.G.1387648808 Date: 2021.09.21 08:17:51 -07'00'

Mr. David Palmer Date
Chief, Environmental Flight

WAGNER.CHRISTHILD.L.1535848250 Digitally signed by WAGNER.CHRISTHILD.L.1535848250 Date: 2021.09.21 08:12:05 -07'00'

Ms. Chris Wagner Date
Natural Resource Manager

INRMP APPROVAL/SIGNATURE PAGES

U.S. AIR FORCE RESERVE COMMAND
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CALIFORNIA

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By their signatures below, or an enclosed letter of concurrence, all parties grant their concurrence and acceptance of the following document.

Approving Official:

SCOTT SOBIECH Digitally signed by SCOTT SOBIECH
Date: 2021.07.02 10:17:35 -07'00'

Mr. Scott Sobiech Date
U.S. Fish and Wildlife Service
Field Supervisor, Carlsbad Fish and Wildlife Office

INRMP APPROVAL/SIGNATURE PAGES

U.S. AIR FORCE RESERVE COMMAND
MARCH AIR RESERVE BASE
CALIFORNIA

This Integrated Natural Resources Management Plan (INRMP) has been prepared in accordance with regulations, standards, and procedures of the Department of Defense and the U.S. Air Force and the Sikes Act Improvement Act of 1997 (16 *United States Code* Section 670a) in cooperation with the U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife. This INRMP provides for management and stewardship of all natural resources present on the Base.

By their signatures below, or an enclosed letter of concurrence, all parties grant their concurrence and acceptance of the following document.

Approving Official:

DocuSigned by:
Leslie MacNair
AFEAC2ED7258498

8/25/2021

Ms. Leslie MacNair
California Department of Fish and Wildlife
Inland Deserts Region 6
Regional Manager

Date

EXECUTIVE SUMMARY

This Integrated Natural Resources Management Plan (INRMP or Plan) has been developed for March Air Reserve Base (ARB or Base), California, and the Air Force Reserve Command (AFRC) as required by Air Force Manual 32-7003, *Environmental Conservation*, Department of Defense Instruction 4715.03, *Natural Resources Conservation Program*, and the Sikes Act, as amended (16 *Unites States Code* Section 670a et seq.). This INRMP is the principal tool for managing natural resources at March ARB. It provides March ARB with descriptions of the physical and biotic environments on the installation and outlines strategies to effectively manage those resources using an adaptive ecosystem management approach. This INRMP defines natural resources management goals, objectives, and projects that are consistent with the military mission; facilitates compliance with applicable federal, state, and local laws and regulations; and ensures no net loss in the capability of installation lands to support the military mission.

Natural resources are valuable assets of the U.S. Air Force (USAF). They provide the natural infrastructure needed for testing weapons and technology and training military personnel for deployment. Implementation of this INRMP will support March ARB's responsibility to ensure that all natural resources on installation lands are properly conserved, protected, and used in sustainable ways, while maintaining the military mission at the highest possible level of efficiency.

Information for this Plan was gathered from a variety of organizations. Correspondence was initiated with several federal and state regulatory agencies and tribal governments, including the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW), and will be documented to satisfy the requirements of Title 32 *Code of Federal Regulations* Part 989, which prescribes the USAF Environmental Impact Analysis Process (EIAP). These varying perspectives allow for an accurate portrayal of the status and management needs of local ecosystems, balanced against the requirement for March ARB to accomplish its mission at the highest possible level of efficiency. As a result, the probable effects of Base operations on the surrounding natural resources were projected, allowing for the development of possible operational alternatives, which may result in lessening impacts to the environment.

The goals identified in this INRMP are as follows:

- Goal 1: Wildlife Management – Monitor and manage wildlife species on March ARB while minimizing potential impacts to the military mission.
- Goal 2: Vegetation Management – Manage vegetation on March ARB by promoting the use of native and sustainable plants and seeds, preventing the spread of non-native invasive plant species, and minimizing attractants of high bird/wildlife aircraft strike hazard (BASH) threat species.
- Goal 3: Special-status Species Management – Manage special-status species in accordance with applicable federal and state laws, regulations, and policies.
- Goal 4: Habitat Management – Manage special habitats, promote pollinators, and minimize habitat degradation within the constraints of the military mission.
- Goal 5: Pest Management – Control invasive, pest, and nuisance species inhabiting March ARB.
- Goal 6: BASH Hazards Management – Manage hazards to reduce BASH risk.
- Goal 7: Climate Change Impacts Management – Minimize impacts of climate change to natural resources.
- Goal 8: Data Management – Manage natural resource data required for program management.

From these goals, objectives and projects were identified that structure this plan's guidance. However, each management strategy described in this Plan should be monitored so that modifications can be made during implementation as conditions change.

Figure ES-1 presents the composite natural resources constraints at March ARB. The Base's comprehensive planning process should address the concerns presented in this INRMP so that the growth of the Base can progress in a manner consistent with, and complementary to, the objectives of the USAF with regard to the protection of natural resources and land management activities.

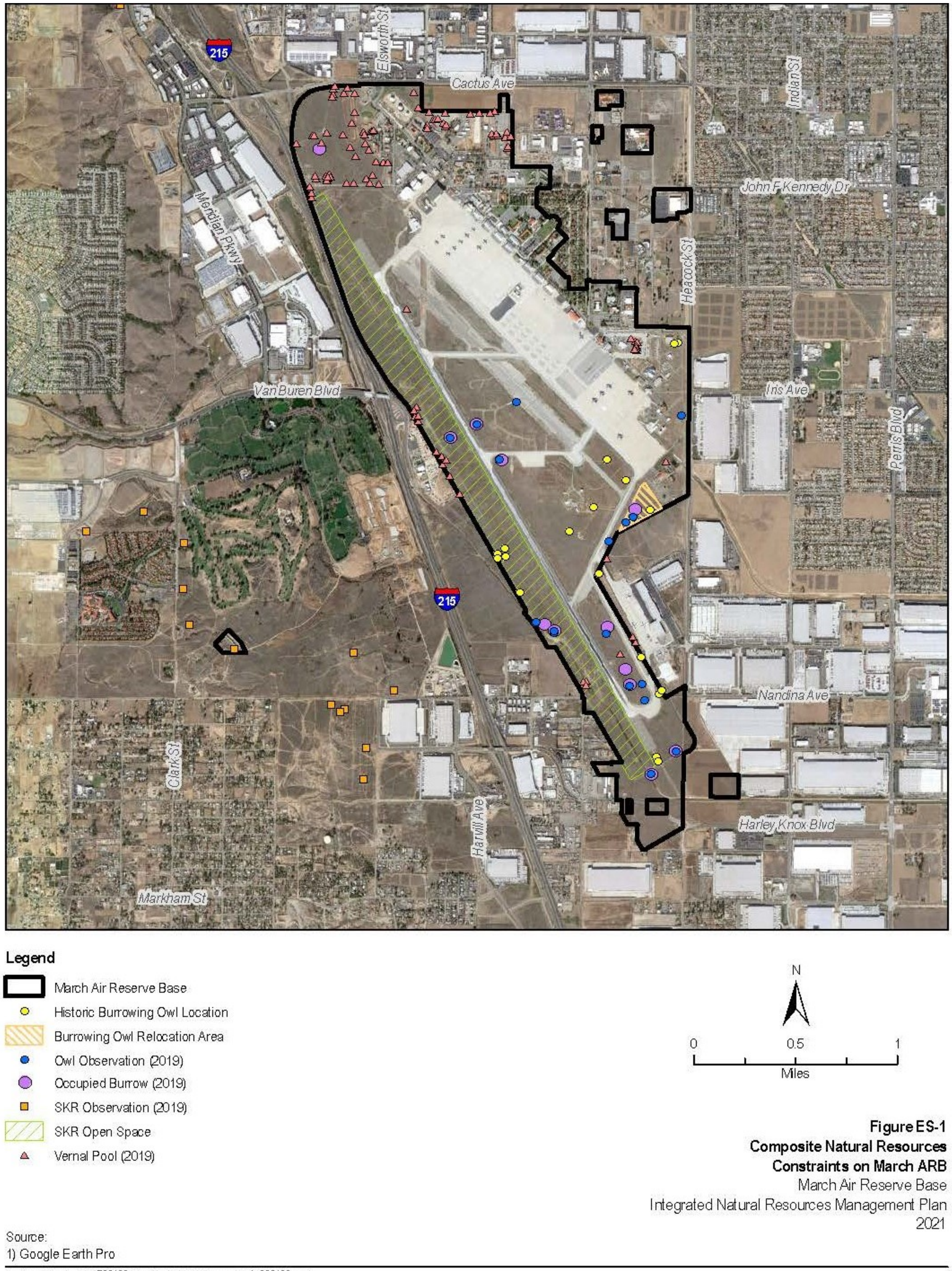

Figure ES-1. Composite Natural Resource Constraints at March ARB

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1.0 OVERVIEW AND SCOPE

This Integrated Natural Resources Management Plan (INRMP) was developed to provide for effective management and protection of natural resources. It summarizes the natural resources present on the installation and outlines strategies to adequately manage those resources. Natural resources are valuable assets of the U.S. Air Force (USAF). They provide the natural infrastructure needed for testing weapons and technology, as well as for training military personnel for deployment. Sound management of natural resources increases the effectiveness of USAF adaptability in all environments. The USAF has stewardship responsibility for the physical lands on which installations are located to ensure all natural resources are properly conserved, protected, and used in sustainable ways. The primary objective of the USAF natural resources program is to sustain, restore, and modernize natural infrastructure to ensure operational capability and no net loss in the capability of USAF lands to support the military mission of the installation. The INRMP outlines and assigns responsibilities for the management of natural resources, discusses related concerns, and provides program management elements that will help to maintain or improve the natural resources within the context of the installation's mission. The INRMP is intended for use by all installation personnel. The Sikes Act (16 *United States Code* [U.S.C.] Section [§] 670a et seq.) is the legal driver for the INRMP.

The USAF considers its goals and objectives with regard to the protection and enhancement of natural resources when planning projects and mission changes. Potential impacts are assessed, and possible alternatives that reduce negative impacts are explored. Applicable sections of this Plan will be referenced when establishing new natural resources management strategies in response to changing missions or new projects.

1.1 Purpose and Scope

This INRMP has been developed for use by March Air Reserve Base (ARB) and the U.S. Air Force Reserve Command (AFRC) in accordance with Air Force Manual (AFMAN) 32-7003, *Environmental Conservation*, Air Force Policy Directive (AFPD) 32-70, *Environmental Considerations in Air Force Programs and Activities*, and the provisions of the Sikes Act.

This INRMP provides March ARB with descriptions of the Base, including its location, history, and mission; information about the physical and biotic environments that occur on Base; and an assessment of the impacts to natural resources as a result of mission activities. The INRMP was prepared and coordinated with internal stakeholders and local representatives of the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW). It recommends various management practices, in compliance with federal, state, and local standards, designed to mitigate negative impacts and enhance the positive effects of the Base's mission on local ecosystems.

This INRMP integrates all aspects of natural resources management with the rest of the Base's mission and, therefore, becomes the primary tool for managing the Base's ecosystems while ensuring the successful accomplishment of the military mission at the highest possible levels of efficiency. The INRMP is a guide for the management and stewardship of all natural resources present on the Base. A multiple-use approach will be implemented to allow for the presence of mission-oriented activities, as well as environmental quality through the efficient management of natural resources.

Specific management strategies identified in this INRMP have been developed to maintain and conserve the ecological integrity of March ARB and the biological communities inhabiting the Base. The goals in this INRMP for March ARB are as follows:

- Goal 1: Wildlife Management – Monitor and manage wildlife species on March ARB while minimizing potential impacts to the military mission.
- Goal 2: Vegetation Management – Manage vegetation on March ARB by promoting the use of native and sustainable plants and seeds, preventing the spread of non-native invasive plant species, and minimizing attractants of high bird/wildlife aircraft strike hazard (BASH) threat species.
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- Goal 7: Climate Change Impacts Management – Minimize impacts of climate change to natural resources.
- Goal 8: Data Management – Manage natural resource data required for program management.

Each of the management strategies described in this INRMP should be modified as necessary when conditions change to keep management practices working at an optimal level.

1.2 Management Philosophy

The INRMP serves as a key component of the Installation Development Plan, which provides background and rationale for the policies and programming decisions related to land use, resource conservation, facilities and infrastructure development, and operations and maintenance to ensure that they meet current requirements and provide for future growth. The INRMP supports the mission by identifying the natural resources present on the installation, developing management goals for these resources, and integrating these management objectives into the military requirements for mission operations/support and regulatory compliance to minimize natural resource constraints.

This INRMP outlines the steps needed to fulfill compliance requirements related to natural resources management and fosters environmental stewardship. It is organized into the following principal sections:

- An overview of the current status and potential future conditions of the natural resources.
- Identification of potential impacts to or from natural resources.
- The key natural resource management areas addressed.
- Management recommendations that incorporate the installation's goals and objectives for natural resource management areas.
- Specific work plans for effective implementation of the INRMP.

Management issues and concerns, as well as goals and objectives, are developed from analysis of all the gathered information and are reviewed by March ARB personnel involved with, or responsible for, various aspects of natural resources management. The INRMP was developed using an interdisciplinary approach and is based on existing information about the physical and biotic environments, mission activities, and environmental management practices at March ARB. Information was obtained from a variety of documents, interviews with installation personnel, onsite observations, and communications with both internal and external stakeholders, including USFWS, the U.S. Army Corps of Engineers (USACE), and the CDFW. Coordination and correspondence with these agencies have been documented and satisfy a portion of the requirements of Title 32 *Code of Federal Regulations* (CFR) Part 989, *Environmental Impact Analysis Process (EIAP)*. Goals and objectives require monitoring on a continuous basis and management strategies are updated whenever there are changes in mission requirements, adverse effects to or from natural resources, or changes in regulations governing management of natural resources.

1.3 Authority

The Sikes Act requires an INRMP be written and implemented for all Department of Defense (DoD) installations with significant natural resources. This INRMP has been developed cooperatively among the installation, the USFWS, and CDFW. The USAF natural resources program ensures continued access to land, air, and water resources to conduct realistic military training and testing, as well as to sustain the long-term ecological integrity of the resource base.

This INRMP is developed under, and proposes actions in accordance with, applicable DoD and USAF policies, directives, and instructions. AFMAN 32-7003, *Environmental Conservation*, provides guidance and procedures for cultural and natural resource programs at Air Force installations, including the necessary direction and instructions for preparing an INRMP. Issues are addressed in this Plan using guidance provided under legislation, Executive Orders (EOs), directives, and instructions, including Department of Defense Instruction (DoDI) 4715.03, *Natural Resources Conservation Program*; AFPD 32-70, *Environmental Considerations in Air Force Programs and Activities*; and AFMAN 32-7003. DoDI 4715.03 provides direction for DoD installations to establish procedures for an integrated program for multiple-use management of natural resources. AFPD 32-70 establishes policy to address the environmental considerations in all Air Force programs and activities using a management system framework, assigns duties and responsibilities, and establishes long-term goals and objectives. Appendix A, Annotated Summary of Key Legislation Related to Design and Implementation of the INRMP, summarizes key legislation and guidance used to create and implement this INRMP. Refer to the complete listing of Air Force Instructions (AFIs), AFMANs, the *Federal Register*, and the U.S.C. to ensure that all applicable guidance documents, laws, and regulations are reviewed. Installation-specific policies, including state and local laws and regulations, are summarized in Table 1-1.

Table 1-1. Installation-Specific Policies

Existing Policies
Tribal relations regarding any ground disturbance
Permitted rehabilitation seed and plant list
Early Detection Rapid Response (EDRR) - invasive plant species list

1.4 Integration with Other Plans

This INRMP is a living document, subject to periodic updates or changes, which integrates all aspects of natural resources management at March ARB. Proper utilization of this Plan for the protection of natural resources should not impair the ability of the Base to perform its missions. This Plan has been written in accordance with all applicable USAF and DoD policies, directives, and instructions, and it has been reviewed and approved by the March ARB Environmental Protection Committee (EPC) and Headquarters (HQ) AFRC. This INRMP integrates and supports other management plans for March ARB to achieve consistent and complementary management of natural resources across the installation.

Installation Development Plan (IDP) – The IDP for March ARB was endorsed on 31 July 2019 and evaluates the factors affecting the physical development of the installation as well as the surrounding areas to support current and future mission requirements (AFI 32-1015). The IDP addresses the short-term (0-7 years), mid-term (8–25 years), and the long-term (26+ years), but it is a living document that will be annually updated as needed to reflect strategic vision (MARB 2019a). The information presented in this INRMP will be incorporated into the IDP. The Base comprehensive management planning process should incorporate the concerns presented in this INRMP so that the growth of the Base can progress in a manner consistent with, and complementary to, the objectives of the USAF with regard to the protection of natural resources. This INRMP provides important information to support sound land use and natural resource management decisions.

Bird/Wildlife Aircraft Strike Hazard (BASH) Plan – A BASH Plan exists at the March ARB installation and its vicinity as a result of resident and migratory bird species and other wildlife. Daily and seasonal bird movements create various hazardous conditions. March ARB’s BASH Plan (MARB 2019b) establishes procedures consistent with AFI 91-212 to minimize the hazard to aircraft at March ARB and associated aircraft in their operating areas. Because BASH hazards are associated with birds and other wildlife, the BASH Plan and this INRMP must be closely coordinated for consistent management of natural resources on the installation, creating a balance between natural resource management and March ARB’s flying mission.

Air Installations Compatible Use Zones (AICUZ) – March ARB updated its AICUZ Study in 2018 (AFRC 2018) to document changes to the AICUZ since the release of the last study in 2005. It is a re-evaluation of aircraft noise and accident potential related to USAF flying operations and is designed to aid in the development of local planning mechanisms that will protect the public safety and health, as well as preserve the operational capabilities of March ARB. The locations of natural terrain features, such as rivers, lakes, mountains, and other features, and wildlife activity are incorporated into the AICUZ Study.

Integrated Pest Management Plan (IPMP) – March ARB maintains an IPMP (MARB 2013) designed to prevent or control pests and disease vectors that might adversely impact readiness or military operations by affecting the health and safety of personnel or by damaging structures, materiel, or property. The IPMP provides actions and guidelines to ensure that non-chemical control efforts are used to the maximum extent possible before pesticides are used.

Integrated Cultural Resources Management Plan (ICRMP) – Cultural resources management issues (archaeological and historical) are addressed separately within March ARB’s Integrated Cultural Resources Management Plan (ICRMP), which guides the management of cultural resources on March ARB (MARB 2021). However, cultural resources on March ARB are briefly discussed in Section 7.14 of this Plan.

INRMP revisions and concurrence with the final plan must be coordinated through the installation chain of command and all facility managers and tenants. The NRM must ensure that the INRMP, ICRMP, BASH Plan, IPMP, and AICUZ studies; grounds maintenance contracts; and any other plans that may affect natural resources are mutually supportive and not in conflict.

2.0 INSTALLATION PROFILE

Table 2-1. Installation Profile

Office of Primary Responsibility	452 MSG/CEV has overall responsibility for implementing the natural resources management program and is the lead organization for monitoring compliance with applicable federal, state, and local regulations.
NRM/Point of Contact (POC)	Name: Chris Wagner Phone: 951-655-3653 Email: christhild.wagner@us.af.mil
State and/or local regulatory POCs (Include agency name for Sikes Act cooperating agencies)	Nancy Ferguson, Ph.D. Pacific Southwest Region (R8) Regional Sikes Act Coordinator Carlsbad Fish and Wildlife Office 2177 Salk Avenue, Suite 250 Carlsbad, CA 92008 Office: 760-431-9440 ext. 244 Nancy_Ferguson@fws.gov Heather Pert, Ph.D. Sr. Environmental Scientist, Inland Deserts Region California Department of Fish and Wildlife 3602 Inland Empire Blvd, Suite C-220 Ontario, CA 91764 Office: 858-395-9692 Heather.pert@wildlife.ca.gov
Total acreage managed by installation	2,162 acres
Total acreage of wetlands	0
Total acreage of forested land	0
Does installation have any Biological Opinions? (If yes, list title and date, and identify where they are maintained)	1-6-99-F-13, *Disposal and Reuse of March Air Force Base, Riverside County, California*, 09 April 1999 1-6-91-F-33-R, *Proposed Land Use Strategy and Management of Stephens' Kangaroo Rats on March Air Force Base*, 14 October 1993 1-6-91-F-33, *Proposed Land Use Strategy and Management of Stephens' Kangaroo Rats on March Air Force Base*, 04 December 1991 Biological Opinions are on file with 452 MSG/CEV.

Natural Resources Program Applicability (Place a checkmark next to each program that must be implemented at the installation. Document applicability and current management practices in Section 7.0)	☒ Fish and Wildlife Management ☐ Outdoor Recreation and Access to Natural Resources ☐ Conservation Law Enforcement ☒ Management of Threatened, Endangered, and Host Nation-Protected Species ☒ Water Resource Protection ☒ Wetland Protection ☒ Grounds Maintenance ☐ Forest Management ☐ Wildland Fire Management ☐ Agricultural Outleasing ☒ Integrated Pest Management Program ☒ BASH ☐ Coastal Zone and Marine Resources Management ☒ Cultural Resources Protection ☒ Public Outreach ☒ Geographic Information Systems (GIS)

2.1 Installation Overview

Current and historical information pertaining to land uses at the Base and in the surrounding communities is necessary to properly manage natural resources and assess future management activities. This section describes the location of March ARB and the surrounding community and describes the natural resources associated with the area. A brief history of the Base and its current mission are also presented.

2.1.1 Location and Area

March ARB is in southern California, approximately 60 miles southeast of Los Angeles and 80 miles north of San Diego. The Base is situated in the western portion of Riverside County and comprises an area of approximately 2,162 acres of U.S. government-owned land. This includes the cantonment area and several small, non-contiguous parcels of land in the nearby vicinity (Table 2-2). Figure 2-1 shows the location of March ARB in relation to California and the surrounding region. A USGS quadrangle map of March ARB is provided in Appendix B. The Base has two active runways, Runway 14-32 is 300 feet (ft) wide by 13,300 ft long, and Runway 12-30 is 150 ft wide by 6,900 ft long. Both runways are oriented approximately northwest to southeast and are generally parallel to Interstate 215 (I-215). A series of taxiways extending from the flight line parking apron provide access to Runway 14-32.

Land use at March ARB is dominated by the airfield, which encompasses more than half the total area of the installation. The east side of the airfield is mostly aircraft operations/maintenance, with the exception of industrial uses at the south of the Base. The west side of the airfield includes Open Space that is defined in the USFWS 1991 Biological Opinion (BO) (USFWS 1991). The remainder of the installation is a patchwork of administrative buildings, unaccompanied housing, community services, and undeveloped land (MARB 2019a).

Table 2-2. Installation/Geographically Separated Unit (GSU) Location and Area Descriptions

Installation/GSU	Main Use/Mission	Estimated Acreage	Describe Natural Resource Implications
March ARB	Provide airlift support for the USAF, train in tactical airlift and airdrop of personnel and supplies in combat, air refueling, and aeromedical evacuation	2,162[a]	Threatened and endangered (T&E) species, special-status species, vernal pools, noxious weeds, Open Space[b], active base
Small Arms Range (west of I-215)	Small arms firing range facility used primarily by March ARB's security forces.	6.85	T&E species, noxious weeds
12th Marine Corps District Recruiting Station	The mission of the 12th Marine Corps District Recruiting Station is to locate, close-with, and contract/enlist/access/ship the highest quality men and women our Country has to offer into the U.S. Marine Corps (USMC 2020).	6.96	Special-status species, noxious weeds
Land Swap (Bldg 2620)	Building 2620 was used as the installation's communications center. A small ancillary building formerly contained a generator to supply emergency power to Building 2620. Both buildings are vacant and are proposed for transfer to the March Joint Powers Authority (JPA).	2.34	Special-status species, noxious weeds
Defense Media Activity Center	Defense Media Activity is a mass media and training and education organization that creates and distributes DoD content across a variety of media platforms to audiences around the world (DoD 2020).	12.5	Special-status species, noxious weeds
Commissary	Delivers a vital benefit of the military pay system that sells grocery items at significant savings while enhancing quality of life and readiness (DeCA 2020).	16.5	Special-status species, noxious weeds
Base Exchange	Provides tax-free shopping and military-exclusive pricing (The Exchange 2020).	7.76	Special-status species, noxious weeds

Notes:

[a] Includes the six satellite areas listed in table.

[b] Open Space is defined in the USFWS 1991 BO (1-6-91-F-33; USFWS 1991) as "the area west of the extended airfield runway centerline, extending to the Base boundary." Per the 1991 BO, Open Space shall be protected and managed actively for high wildlife values with a special emphasis on Stephens' kangaroo rat.

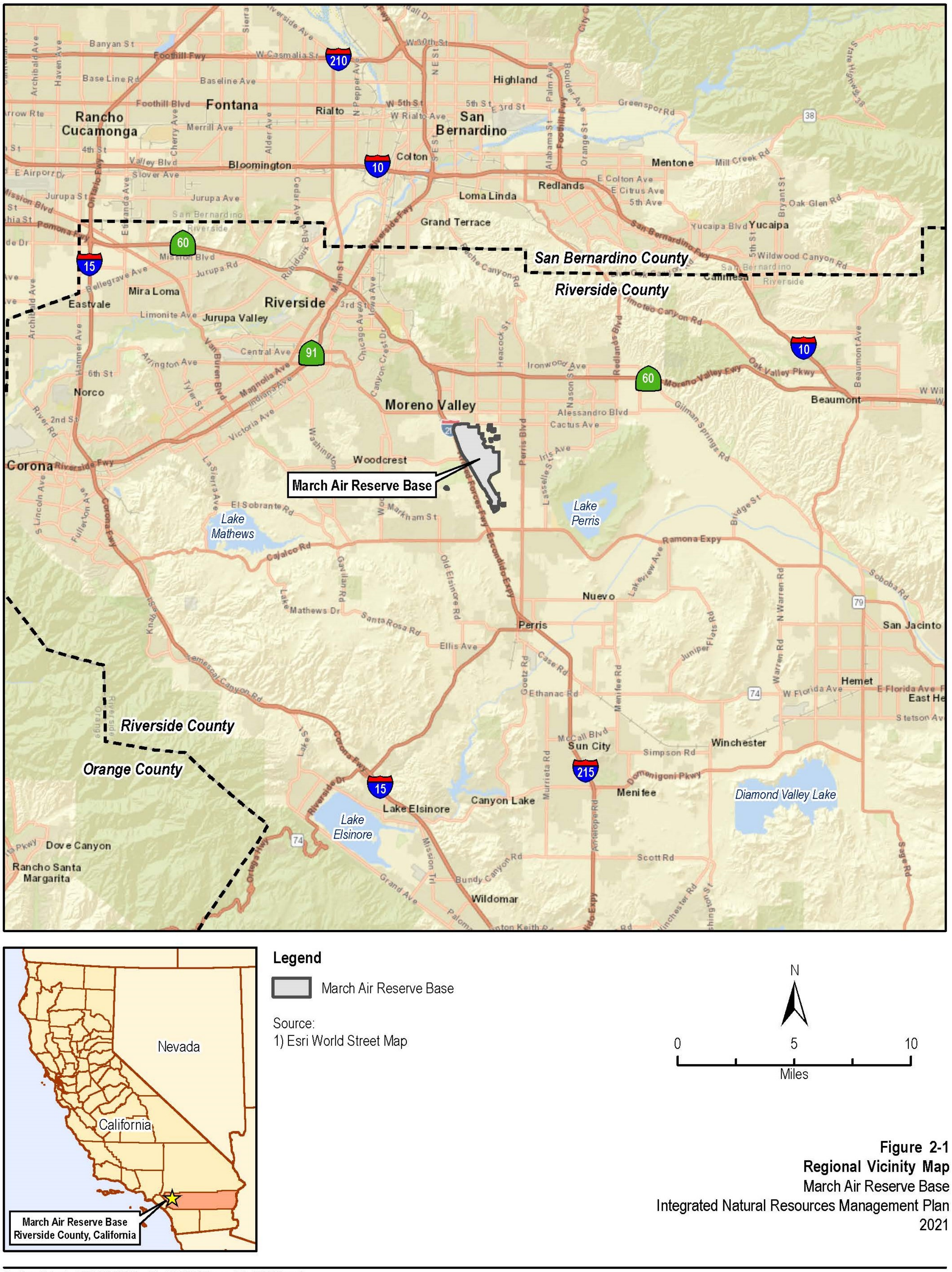


Figure 2-1. Regional Vicinity Map for March ARB

2.1.2 *Installation History*

Anticipating entry in World War I, the War Department announced its intentions to build several new military instillations. Efforts by Mr. Frank Miller, then owner of the Mission Inn in Riverside, Hiram Johnson, and other California notables, succeeded in gaining War Department approval to construct an airfield at Alessandro Aviation Field. Alessandro Field was an airstrip used by aviators from Rockwell Field on cross-country flights from San Diego and was acquired by the U.S. Army in March 1918. Serving primarily as a flight training facility, the initial land acquisition for the Base consisted of 640 acres southeast of Riverside. Shortly after the Base opened, Alessandro Aviation Field was redesignated March Field in honor of First Lieutenant Peyton C. March, Jr., son of the Army Chief of Staff, who was killed the previous month in an aviation accident at San Antonio, Texas. By late April 1918, enough progress had been made in the construction of the new field to allow the arrival of the first troops (MARB 2012).

The signing of the armistice on November 11, 1918, did not halt training at March Field initially, but by 1921, the decision had been made to phase down all activities at the new base in accordance with sharply reduced military budgets. In April 1923, March Field closed its doors with one sergeant left in charge (MARB 2012).

March Field was reactivated in 1927 to expand training units and reactivate tactical units in response to Congressional creation of the Army Air Corps. In 1931, March Field became a tactical air base and emphasis shifted to offensive and defensive aircraft operations. Subsequently, the Army expanded the facilities at March Field in preparation for World War II, and by the end of 1940, March Field was composed of a total of 1,590 acres. In the same year, Camp Haan, an anti-aircraft training encampment composed of 8,058 acres, opened. After the war, Camp Haan was acquired by March Field and later became known as West March Air Force Base (AFB) (MARB 2012).

In 1945, March Field reverted to a role as an operational fighter base. The 12th Air Force was headquartered at March Field and became a component of the newly activated Tactical Air Command when the USAF was established in 1947. The following year March Field was redesignated March AFB under Tactical Air Command jurisdiction. Jurisdiction changed hands to the Continental Air Command in 1948 and to the Strategic Air Command (SAC) in 1949. In that same year, the 15th Air Force arrived at March AFB and the 22nd Bombardment Wing (BMW) was assigned as the host unit. From 1949 to 1953, the B-29 Superfortresses dominated the flightline at March AFB. For 4 months, from July to October, the 22nd BMW contributed to the elimination of all strategic enemy targets in Korea (MARB 2012).

During the Vietnam War, the Base served as a logistical springboard for supplies and equipment en route to the Pacific. By 1966, March AFB was the largest SAC Base in the country. Near the end of the conflict, March operated as one of the reception centers for returning prisoners of war. For the next 18 years, until 1982, March AFB effectively supported America's defensive posture (MARB 2012).

In 1982, the 163rd Tactical Fighter Group resided at March AFB and SAC redesignated the 22nd BMW as the 22nd Air Refueling Wing (ARW). In 1990, the 163rd Tactical Fighter Group was redesignated the 163rd Tactical Reconnaissance Group. In 1993, the 163rd Tactical Reconnaissance Group of the California Air National Guard (CA ANG) was redesignated the 163rd Air Refueling Group and was converted from the F-4 aircraft to the KC-135 Stratotanker aircraft. In 1995, the unit was redesignated as the 163rd ARW (MARB 2012).

The 1993 Base Realignment and Closure (BRAC) mandate required HQ Air Mobility Command (AMC) to realign March AFB by transferring command to HQ Air Force Reserve (AFRES). In implementing this 1993 BRAC decision, March AFB was officially redesignated as March ARB on April 1, 1996, when the

722nd Air Refueling Wing of the AMC (formerly the 22nd ARW) deactivated. The KC-10 and T-38 aircraft of the 722nd Air Refueling Wing were transferred to Travis AFB, California. The 452nd ARW and the 445th Military Airlift Wing were combined in April 1993 to create the 452nd Air Mobility Wing (452 AMW) of AFRES, which became the Base's host unit. In March 1997, AFRES was elevated to a major command level in the USAF and named the Air Force Reserve Command (AFRC) (MARB 2012).

In 2005, the 452 AMW retired the aging C-141C Starlifter aircraft and replaced it with the more modern C-17 Globemaster III aircraft. March ARB replaced 16 C-141C aircraft with 8 C-17 aircraft, completing the drawdown and aircraft conversion in 2006. In addition, the number of KC-135R aircraft was reduced from 10 to 8 (MARB 2012).

Prior to realignment and conversion, March AFB encompassed approximately 6,500 acres. March ARB now consists of approximately 2,162 acres, including the flightline. To address the change in the military mission at the Base, a reuse plan for the former March AFB property was prepared by the March Joint Powers Commission, the governing body of the March Joint Powers Authority (JPA). The JPA was formed in 1993 and is charged with the responsibility of base reuse, planning, and development, including establishing a joint-use aviation facility. The JPA comprises four jurisdictions with boundaries touching the former March AFB, including the County of Riverside and the cities of Moreno Valley, Perris, and Riverside. The March JPA has adopted a series of goals and strategies to guide the development of a reuse plan for the former March AFB property. These emphasize the establishment of land uses that facilitate the creation of a wide range of employment types and opportunities on lands released for civilian use. Among the most important goals adopted by the March Joint Powers Commission for the reuse plan is to replace jobs lost in the March AFB realignment with new and expanded employment opportunities (MARB 2012).

2.1.3 Military Missions

Several military missions are supported by the aircraft and personnel based at March ARB. The 452 AMW is assigned both strategic and tactical airlift missions. The mission of the 452 AMW, which operates 9 C-17 cargo aircraft and 12 KC-135 refueling aircraft, is to provide airlift support for the USAF and to train in tactical airlift and airdrop of personnel and supplies in combat, air refueling, and aeromedical evacuation. An Operations Group, Maintenance Group, Mission Support Group, and Medical Group conduct and support the primary mission of March ARB. The 701st Combat Operations Squadron, a reserve tenant unit reporting to the 940th Wing at Beale AFB, is stationed at March ARB and augments the Combined Air and Space Operations Center at Osan Air Base, Republic of Korea, as part of the senior decision-making element for the Korean Theater (MARB 2019c).

The CA ANG is the primary tenant organization assigned to March ARB. The 163rd Attack Wing of the CA ANG is headquartered at March ARB and operates MQ-9 Reaper unmanned aircraft at March ARB and the Southern California Logistics Airport with a mission to safely execute global unmanned aerial system combat support. The 144th Fighter Wing of the CA ANG, headquartered in Fresno, California, operates an alert detachment at March ARB that flies F-16 aircraft in homeland security missions over Southern California, western Arizona, and Las Vegas. In addition, several other tenant organizations exist on base or adjacent to it, including Department of Homeland Security, Headquarters Fourth Air Force, 304th Sustainment Brigade and 358th Civil Affairs Brigade of the U.S. Army Reserve, and the Naval and Marine Corps Center (MARB 2019c). A list of the tenant organizations is provided in Table 2-3.

As the host unit at March ARB, the 452 AMW is responsible for providing certain services and facilities that are common to the wing and tenant organizations that are located on base. These include the Fire Department, fuel storage area, runway operations, and service for transient aircraft (MARB 2019c). The 452 AMW is also responsible for managing tenants' impacts to/from natural resources.

Table 2-3. Listing of March ARB Tenants, Partner Organizations, and Managed USAF Lands and Natural Resources Responsibility

Tenant Organization	Natural Resources Responsibility
Headquarters, 4th Air Force	452 AMW
California Air National Guard	452 AMW
701st Combat Operations Squadron	452 AMW
144th Fighter Wing	452 AMW
362nd Air Force Recruiting Squadron	452 AMW
Defense Media Center	452 AMW
Defense Visual Information Center	452 AMW
653rd Area Support Group, Army Reserve Center	452 AMW
304th Sustainment Brigade	452 AMW
358th Civil Affairs Brigade	452 AMW
Naval and Marine Corps Reserve Center	452 AMW
Department of Homeland Security	452 AMW
Civil Air Patrol, Squadron 45	452 AMW
Defense Commissary Agency	452 AMW
Army Air Force Exchange Services	452 AMW
March Joint Powers Authority	452 AMW

Source: MARB 2020

2.1.4 Natural Resources Needed to Support the Military Mission

March ARB is a flight-based military base; therefore, few on-the-ground natural resources are necessary to support the military mission. Stable soils are necessary to prevent dust and foreign object debris that could impede visibility during flying, and managed vegetation is necessary to reduce fire and BASH risk.

2.1.5 Surrounding Communities

March ARB is located in Riverside County, which is the fourth largest county in California. Riverside County comprises 7,214 square miles and extends from the Arizona border to within 10 miles of the Pacific Ocean. The total population of Riverside County exceeds 2.4 million people. From 2010 to 2018, the County population grew 11.9 percent (USCB 2018). The average population density in Riverside County is approximately 304 persons per square mile, although the eastern portion of the county is more rural and less developed than the western portion (USCB 2018). Population and economic growth in Riverside County are influenced by its proximity to the greater Los Angeles metropolitan area, which serves as the economic and population center for southern California. The Los Angeles area west of March ARB has a population of almost 10 million people and is home to 27 percent of the state's residents (USCB 2018).

The area immediately surrounding March ARB consists of residential, commercial, and light industrial development. March ARB is surrounded by urbanized areas. The City of Riverside is located to the west and northwest, the City of Moreno Valley is located to the north and east, and the City of Perris is located to the south. Unincorporated areas lie immediately west of the installation. Surrounding land use reflects the increasing suburbanization of the region. Agriculture has declined while light industry, commercial development, and residential use have increased. Residential development exists south and west of March ARB. Light industry and commercial development is occurring on all appropriately zoned land around the Base. Development is rapidly encroaching on all sides.

The City of Riverside is an urban community that was founded in 1870 as an area dedicated to education and beauty. Today, the city consists of approximately 327,700 residents, is the county seat of Riverside County, and is home to four institutions of higher learning (USCB 2018; City of Riverside 2017). Land uses in the southeastern section of the city are primarily residential and commercial. Some areas north and west of the Base are zoned for residential use (City of Riverside 2017).

Moreno Valley is an urban city of approximately 207,200 residents that incorporated in 1984 (USCB 2018). In the first half of the last century, Moreno Valley was a rural community whose few inhabitants subsisted on dry grain farming. From the 1950s through the 1970s, recreational activities became a focus of growth for the area. During the 1980s, Moreno Valley experienced explosive residential and commercial growth. Moreno Valley is located north and east of March ARB and is primarily residential and commercial. The area adjacent to the northern base boundary and Alessandro Boulevard is primarily agricultural and vacant land, with some industrial activity. Land use adjacent to the eastern edge of the Base is residential, commercial, industrial, and agricultural.

The City of Perris is an urban community of approximately 79,133 residents located south of the Base that incorporated in 1911 (USCB 2018). It was founded as a station on the Transcontinental Route of the Santa Fe Railroad. In the 1890s, heavy storms washed out the railroad tracks, forcing the city to focus economic development on agriculture, which lasted from the 1890s through the 1960s. Today, Perris is zoned as primarily residential (50 percent), industrial (22 percent), and commercial (11 percent) (City of Perris 2016).

2.1.6 Local and Regional Natural Areas

March ARB lies near several state parks and national forests, including Mount San Jacinto State Park and Wilderness Area, San Jacinto Wildlife Area, Santa Rosa Plateau Ecological Reserve, San Bernardino National Forest, Cleveland National Forest, and Lake Perris State Recreation Area.

2.1.6.1 Mount San Jacinto State Park and Wilderness Area

The Mount San Jacinto State Park and Wilderness Area is located approximately 7 miles east of March ARB. The park is surrounded by San Bernardino National Forest and is managed by the California Department of Parks and Recreation. Most of the park and wilderness area sit at an elevation above 6,000 ft. San Jacinto Peak is the highest in the Santa Rosa Range and the second highest peak in southern California. The northeastern face of the San Jacinto Range plunges 9,000 ft in less than 6 miles, making it one of the sheerest escarpments on the continent. The area is almost entirely forested, made up of incense cedar (*Calocedrus decurrens*), white fir (*Abies concolor*), Coulter pine (*Pinus coulteri*), Jeffrey pine (*Pinus jeffreyi*), Ponderosa pine (*Pinus ponderosa*), lodgepole pine (*Pinus contorta*), and sugar pine (*Pinus lambertiana*) (Mount San Jacinto Natural History Association 2017).

2.1.6.2 San Jacinto Wildlife Area

The San Jacinto Wildlife Area, located approximately 8 miles southeast of March ARB, comprises approximately 19,000 acres of wetlands, riparian woodlands, and annual grasslands. It is owned and operated by CDFW. Wildlife species, especially avian, are numerous. A large variety of raptors, including bald eagles (*Haliaeetus leucocephalus*) and six species of owls, frequent the San Jacinto Wildlife Area

(CDFW 2020a). In addition, the wildlife area supports several federally listed threatened and endangered (T&E) species, such as the Stephens' kangaroo rat (SKR; *Dipodomys stephensi*) (CDFW 2020a).

2.1.6.3 Santa Rosa Plateau Ecological Reserve

The Santa Rosa Plateau Ecological Reserve is located at the southern end of the Santa Ana Mountains in southern California, near the City of Murrieta. The Reserve comprises 8,300 acres and protects unique ecosystems like Engelmann oak woodlands, coast live oak woodlands, riparian wetlands, coastal sage scrub, chaparral, bunchgrass prairie, and vernal pools. Some species protected on the Reserve include mule deer (*Odocoileus hemionus*), mountain lion (*Puma concolor*), American badger (*Taxidea taxus*), bobcat (*Lynx rufus*), southwestern pond turtle (*Actinemys pallida*), western spadefoot toad (*Spea hammondii*), Santa Rosa Plateau fairy shrimp (*Linderiella santarosae*), and golden eagle (*Aquila chrysaetos*) (WRC RCA 2011). In addition, the Reserve supports the vernal pool fairy shrimp (*Branchinecta lynchi*) (WRC RCA 2011), which is federally listed as threatened. Recreational activities include hiking, horseback riding, mountain biking, and interpretive programs (Riverside County Regional Park and Open-Space District 2018). The Reserve is cooperatively managed by Riverside County Regional Park and Open-Space District, CDFW, USFWS, Metropolitan Water District of Southern California, and The Nature Conservancy.

2.1.6.4 San Bernardino National Forest

The San Bernardino National Forest is approximately 25 miles north and east of the Base and includes the San Bernardino Mountains on the easternmost of the Transverse Range and the San Jacinto and Santa Rosa Mountains on the northernmost of the Peninsular Range. Elevations range from 2,000 to 11,499 ft (USFS 2020). The forest contains a great diversity of terrain and habitat, including mountain lakes, boggy meadows, quiet brooks, and rushing streams. The San Bernardino National Forest has one of the highest concentrations of T&E botanical species, most of which exist in unique treeless habitats with deep-clay deposits called pebble plains. The pebble plain habitat type is found only in the San Bernardino National Forest. The diversity of habitats and species range from high desert, mountainous valley with wetland meadows to high-elevation alpine habitats. The area is almost entirely forested, consisting of incense cedar (*Calocedrus decurrens*), white fir (*Abies concolor*), Coulter pine (*Pinus coulteri*), Jeffrey pine (*Pinus jeffreyi*), Ponderosa pine (*Pinus ponderosa*), lodgepole pine (*Pinus contorta*), and sugar pine (*Pinus lambertiana*) with areas of high desert chaparral species. The San Bernardino National Forest also supports golden eagles, bald eagles, California spotted owl (*Strix occidentalis occidentalis*), California condor (*Gymnogyps californianus*), black bear (*Ursus americanus*), and Nelson's bighorn sheep (*Ovis canadensis nelson*).

2.1.6.5 Cleveland National Forest

The Cleveland National Forest is approximately 20 miles west of March ARB. Forest features include the Agua Tibia Wilderness; the San Mateo Canyon, of which almost 30,000 acres are proposed for wilderness status; and the Pine Creek roadless area. More than 200 resident and migrant bird species can be seen in the forest, which includes nearly 500,000 acres of chaparral and forest (USFS 2019).

2.1.6.6 Lake Perris State Recreation Area

Lake Perris State Recreation Area is a 120-acre manmade lake that formed behind the Perris Dam. Lake Perris is located approximately 5 miles east of March ARB. Lake Perris supports the SKR, which is federally listed as endangered, and bald eagles (USFWS 2010). Bald eagles are known to nest and use the lake as foraging and wintering areas.

2.2 Physical Environment

This section describes the general physical environment of the Base, including the regional climate, topography, geology, and soils, as well as the Base's watersheds and drainage patterns.

2.2.1 Climate

March ARB lies in an area characterized by a distinctive climate that is determined by its terrain and geographical location. The Base lies within a coastal plain with connecting broad valleys and low hills, bound by the Pacific Ocean on the southwest and high mountains on the remainder of the perimeter. The region lies in the semi-permanent high-pressure zone of the eastern Pacific. The climate of southern California is a product of cold ocean water and latitude. The maritime influence usually prevails in the area, causing a persistent maritime layer or temperature inversion layer. As a result, the area is often hazy, foggy, or smoggy. This usually mild climatological pattern is interrupted infrequently by periods of extremely hot weather, winter storms, or strong winds (MARB 2012).

The average annual temperature at March ARB is 65.5 degrees Fahrenheit (°F). Generally, the climate is characterized by hot, arid summers with an average high of 92°F and moderate winters with an average low of 44°F (U.S. Climate Data 2019). Monthly averages are displayed in Table 2-4:

Table 2-4. Monthly Temperature and Rainfall Averages for Riverside, California

Month	Maximum Temperature (°F)	Minimum Temperature (°F)	Rainfall (inches)
January	68	43	2.32
February	68	44	2.40
March	71	46	1.69
April	76	49	0.67
May	80	54	0.20
June	87	57	0.08
July	94	62	0.04
August	95	62	0.08
September	91	59	0.16
October	83	53	0.47
November	74	46	0.83
December	67	42	1.38

Source: U.S. Climate Data 2019

During the summer, the region lies under a high-pressure zone associated with descending dry air from the upper atmosphere, which generally prevents precipitation in the summer. Precipitation is markedly greater in the winter months, from November through April. The average annual rainfall at March ARB is 9.7 inches (MARB 2019c). The prevailing winds during the year are from the southwest at approximately 4 knots. However, autumn typically brings the Santa Ana winds, which blow from the Mojave Desert toward the ocean. The winds push the marine layer out to sea and become heated by compression as they drop into the basin, resulting in very dry weather conditions (MARB 2012).

The growing season, or number of frost-free days, lasts approximately 272 days at March ARB. There is a 10 percent probability of frost between November 18 and March 7 and a 50 percent probability of frost between December 23 and January 26 (The Regents of the University of California 2009).

DoD recognizes that climate change will affect both the natural landscape and built infrastructure and is prepared to employ creative ways to address these impacts. Potential climate change impacts are identified as rising temperatures, changes in precipitation patterns, increases in storm frequency and intensity, and increased frequency and severity of wildfires. These issues are further addressed in Section 7.16.

2.2.2 Landforms

The topography of the main cantonment area of March ARB is relatively flat, with a slope of less than 1 percent to the southeast. Elevations within the main cantonment area range from a height of approximately 1,521 ft above mean sea level in the northwest to approximately 1,465 ft above mean sea level in the southeast corner (MARB 2012).

March ARB lies in the San Jacinto watershed of the Santa Ana Basin at the northern end of the Perris Plain within the Peninsular Ranges Province. The Base is situated on an alluvial plain. The San Bernardino Mountains, located north of the Base, are aligned on an east-west orientation. This alignment is caused by the northward motion of the Pacific tectonic plate along the San Andreas Fault (MARB 2012).

The San Jacinto Mountains, located east of March ARB, are part of the Peninsular Ranges. The Perris Plain, which extends south of the Base, is a north-south-trending alluvial valley bound by low-lying granite bedrock on the west and a series of tributary valleys and granite mountains on the east. The valley floor has a gentle slope of approximately 20 ft per mile in a south-southeasterly direction (MARB 2012).

2.2.3 Geology and Soils

The bedrock under March ARB is granite in composition, mainly monozonite or granodiorite. The major minerals present are quartz and feldspar, with less than 5 percent biotite and hornblende. March ARB lies between two major fault zones: the Elsinore-Whittier fault to the southwest and the San Jacinto fault to the northeast. The Base is located in Seismic Hazard Zone IV, which is characterized by areas likely to sustain major damage from earthquakes and corresponds to intensities of VIII or higher on the Modified Mercalli Scale and a magnitude of 6+ on the Richter Scale. However, the Base has no active faults. The Casa Loma Fault, located approximately 6 miles to the east and northeast, is the closest splay of the San Jacinto Fault to March ARB (MARB 2012).

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) printed publication of soil field mapping in Western Riverside County, *Soil Survey for Western Riverside Area, California* was released in 1971 (NRCS 1971). The NRCS publishes current soils data via the online Web Soil Survey portal (NRCS 2020a). Soils for the Base are summarized below.

Two major soil associations are present in the March ARB area, the Cieneba-Rocky Fallbrook association and the Monserate-Arlington-Exeter association. The Cieneba-Rocky Fallbrook association is derived from granitic rock and occurs on the western portion of the Base. These soils are typically 1 to 3 ft thick, have a surface layer of sandy loam to fine sandy loam, are well drained, with coarse to medium grain, and have slopes ranging from 2 to 50 percent. These soils occur on undulating to steep terrain, such as granitic rock uplands and low mountains. The Monserate-Arlington-Exeter association is derived from granitic alluvium and occurs on the eastern side of the Base. These soils have a surface layer of sandy loam to loam, are well drained, with fine to medium grain, and are gently sloping. The soils are typically underlain by a shallow, relatively low permeability silica hardpan at a depth of 28 to 50 inches, resulting in moderately high runoff potential. These soils occur on alluvial fans and terraces and in valleys (NRCS 2020b).

The soils in the northwest and western portions of the Base are primarily areas of Monserate sandy loams and Greenfield sandy loams. Soils in the northeast and east portions of the Base are areas of Monserate sandy loams, Greenfield sandy loams, Exeter sandy loams, and Fallbrook sandy loams. Ramona sandy loams, Hanford fine sandy loams, Pachappa fine sandy loams, and Exeter sandy loams occur along the southeastern boundary and in the south portion of the Base (NRCS 2020a). Descriptions of the properties for the soil series present on March ARB is included in Appendix C. Figure 2-2 is a map showing the soils present and their locations on March ARB.

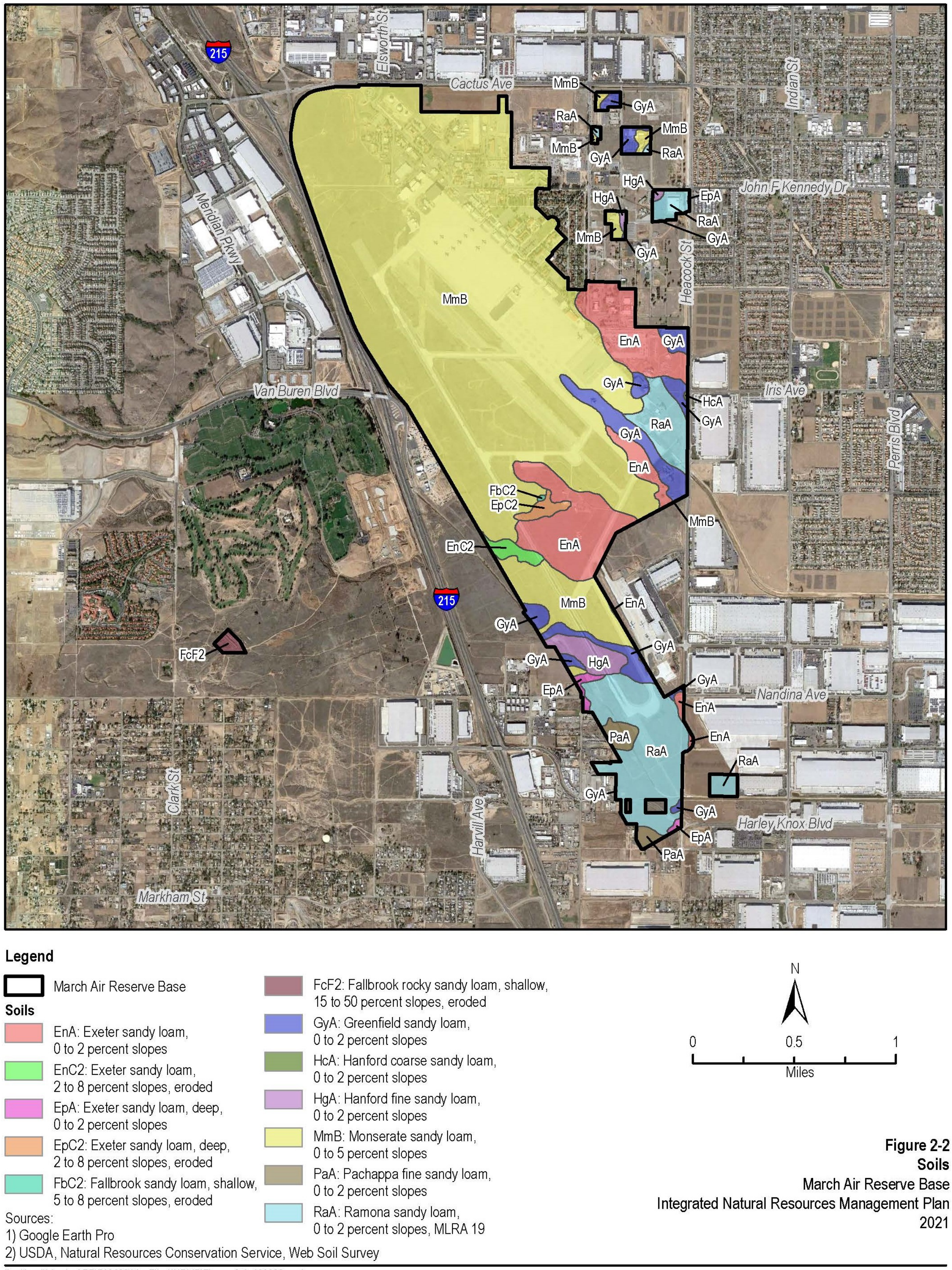


Figure 2-2. Soil Series Present on March ARB

2.2.4 Hydrology

This section describes the general hydrology of the Base and the surrounding area, including groundwater, wetlands, surface water, and stormwater on the Base.

2.2.4.1 Groundwater

The Base and surrounding Riverside County are located above coastal aquifers within the South Coast Hydrologic Region. March ARB is underlain by the Perris North subbasin of the San Jacinto Groundwater Basin. The San Jacinto Groundwater Basin is bounded by the San Jacinto Mountains to the east, the San Timoteo Badlands to the northeast, the Box Mountains to the north, the Santa Rosa Hills and Bell Mountain to the south, and unnamed hills to the west (CDWR 2006). The groundwater under March ARB is typical of Basin and Range basin-fill aquifer systems – primarily unconsolidated sand and gravel of Quaternary and Tertiary age – highly permeable systems capable of yielding large quantities of water under unconfined conditions (USGS 2003). Groundwater flow below March ARB is generally to the southeast and is controlled by the subsurface structure to a large extent (EMWD and WMWD 2010).

Groundwater quality in the vicinity of March ARB is generally considered good, with total dissolved solid concentrations ranging from 350 parts per million (ppm) to 1,000 ppm; however, in some parts of the Perris Plain, total dissolved solid concentrations can be as high as 12,000 ppm. Past groundwater monitoring on the Base has identified contamination by various volatile organic compounds (MARB 2004). Contaminant plumes that include benzene and chlorinated solvents (trichloroethene [TCE] and tetrachloroethene) occur on the central west, central, central east, and southerly portions of March ARB (EMWD and WMWD 2010). Water services to the Base are provided by an outside supplier and groundwater from the Base is not used for potable purposes (MARB 2004).

Groundwater levels have been rising below March ARB since 1984. Some areas of the Base report groundwater at 1 to 10 ft below the surface (MARB 2004). The water levels below the runways at March ARB have been increasing approximately 1.5 to 2 ft below the surface per year. Causes of the increased water levels may include a reduction of groundwater production on the north end of the Base from Box Springs and March ARB wells; continued groundwater inflow from the north and west of the Base; leakage from aging local water infrastructure; the conversion of agricultural lands to residential; and possible influence from the enhanced groundwater extraction and treatment system, which is operated along the eastern boundary of the Base. The rising groundwater causes multiple complications, including construction delays, risk of liquefaction, and cost increases due to construction dewatering (EMWD and WMWD 2010).

2.2.4.2 Watershed

March ARB is located within the San Jacinto Watershed (U.S. Geological Survey Hydrologic Unit Code 18070202), an approximately 770-square-mile area that extends from the San Jacinto Mountains to the north and east and to Lake Elsinore to the west. The watershed drains into the San Jacinto River, 6 miles southeast of the Base (SWRCB 2016).

2.2.4.3 Surface Water and Impoundments

The nearest, permanent surface water bodies are located 2.5 miles southeast of the March ARB boundary, with the exception of small impoundments used for agricultural purposes. Natural drainages on and around March ARB are generally ephemeral, flowing only when there is precipitation. During heavier precipitation events on the Base, ground saturation and flooding may occur. A large percentage of March ARB is covered with impermeable, constructed features that reduce infiltration and increase surface runoff. In general, drainage on the Base flows in a southeasterly direction and surface water runoff on the Base is dominated by a network of manmade ditches, storm drains, drainage swales, and underground sewer lines. Drainage occurs by overland flow to storm drain inlets connected to a series of underground pipes or percolates into the groundwater system via subsurface soil. Drainage from the installation discharges into Heacock Channel to the east and into Oleander Avenue Channel to the south. The system drains into the Perris Valley Storm Drain, which flows to the San Jacinto River, 6 miles to the southeast, and then to Lake Elsinore (MARB 2019c).

2.2.4.4 Wetlands

Given the Base is located primarily in a valley shrubland/grasslands habitat, no wetland systems are indicated by the USFWS National Wetland Inventory (USFWS 2020a). Jurisdictional delineations of March ARB conducted in 2009 found 19,200 linear ft of drainages and 28 seasonally ponded features subject to Clean Water Act (CWA) regulation on Base (SAIC 2010). Jurisdictional determinations by the USACE in 2014 and 2015 identified an additional 10,764 linear ft of jurisdictional stream and 0.57 acre of wetland in Heacock Channel and 3,990 linear ft of jurisdictional stream within the Perris Valley Storm Drain within the installation boundaries (Glenn Lukos 2014, 2015). Jurisdictional delineation reports for March ARB are included in Appendix D. A total of 76 seasonally ponded features were identified on Base during the 2019 wet season fairy shrimp surveys (CH2M 2020a).

2.2.4.5 Stormwater

March ARB is delineated into four localized watersheds, identified as Watershed No. 1, Watershed No. 2, Watershed No. 3, and Watershed No. 4. Each watershed discharges to an outfall of the same numerical designation (Discharge Serial Nos. 001, 002, 003, and 004), as described in the *Stormwater Pollution Prevention Plan* for March ARB (MARB 2019c).

Watershed No. 1 encompasses a large swath of land through the middle of the installation and includes most of the fueling facilities, runway, and aircraft parking apron. Over half of the acreage in this watershed is undeveloped land around the runway and aircraft parking apron. Because of the large surface area associated with the parking apron, taxiways, and runway, nearly half the land is also impervious. The offsite tributary area to Discharge Serial No. 001 includes runoff from the former base housing area (known as Arnold Heights) west of I-215 and north of Van Buren Boulevard and portions of the right-of-way of I-215. Runoff is conveyed to the east side of March ARB via a system of storm drainpipes and open channels to discharge to the Perris Valley Storm Drain. A large, open basin functioning as an oil/water separator is located adjacent to the open channel, just upstream of the discharge point to the Perris Valley Storm Drain. Under low flow conditions, a low weir in the open channel diverts flow to the oil/water separator. Under high flow conditions, stormwater flows over the weir and directly into the Perris Valley Storm Drain, which is a tributary to the San Jacinto River, Reach 3 (MARB 2019c).

Discharges from Watershed No. 2 originate from the balance of the aircraft parking apron not associated with Discharge Serial No. 001, including the administrative facilities and maintenance hangars adjacent to Graeber Street and bounded by the Base Operations Tower. More than 98 percent of the land in this watershed is impervious due to hangars, administrative buildings, lodging facilities, parking lots, and the aircraft parking apron. Stormwater from Discharge Serial No. 002 joins with runoff originating from administrative, lodging, and commercial facilities south of Meyer Drive and runoff originating from an off-base area outside the northeastern boundary of the installation. This flow is ultimately conveyed eastward via a system of pipes and open channels that merge with Heacock Channel in the vicinity of 8th Street and the eastern boundary of the installation. Heacock Channel is a tributary to the Perris Valley Storm Drain, which in turn is a tributary to the San Jacinto River, Reach 3 (MARB 2019c).

Discharges from Watershed 3 originate from the runway and taxiways and the vegetated areas adjacent to the runway and taxiways. As a result, only 19 percent is impervious land area. With the exception of the runway and taxiways, no other industrial activity occurs within Watershed No. 3. Runoff is conveyed generally by shallow swale, open channel, or pipe culvert to the southeasterly corner of March ARB, where it enters a ditch adjacent to Heacock Avenue and eventually intersects the Oleander Avenue Channel. Stormwater then flows south toward the intersection of Oleander Channel. It then turns eastward and discharges to the Perris Valley Storm Drain Lateral B that is a tributary to the San Jacinto River, Reach 3 (MARB 2019c).

Discharges from Watershed 4 originate from vehicle and base maintenance facilities, visitor lodging quarters, and administrative offices in the northeast corner of the installation. No airfield facilities are within Watershed No. 4, and 95 percent of the land in the watershed is impervious. Runoff is conveyed generally by pipe culvert to the open channel paralleling Meyer Drive. The open channel is a tributary to the Heacock Channel, which is a tributary to the Perris Valley Storm Drain, which in turn is a tributary to the San Jacinto River, Reach 3 (MARB 2019c).

2.2.4.6 Floodplains

Per Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panels 06065C0745G, 06065C0765G, 06065C1410G, 06065C0761G, and 06065C1430H, the entire installation is categorized as either Zone D, indicating an area of undetermined but possible flood hazards, or Zone X, an area determined to be outside the 100- or 500-year floodplain (FEMA 2008, 2014).

Although no portion of the Base is within a mapped floodplain, the FEMA Map Assistance Center indicated that the Base has not been mapped (MARB 2012). Areas of Zone A, which are inside a 100-year floodplain, lie parallel to the eastern boundary of the Base on the east side of 8th Street and in a small area north of Alessandro Boulevard and north of the Base (FEMA 2008).

Figure 2-3 illustrates the cantonment area boundaries, the watershed boundaries, the outfall discharge sites, and the potential flood zones at March ARB.

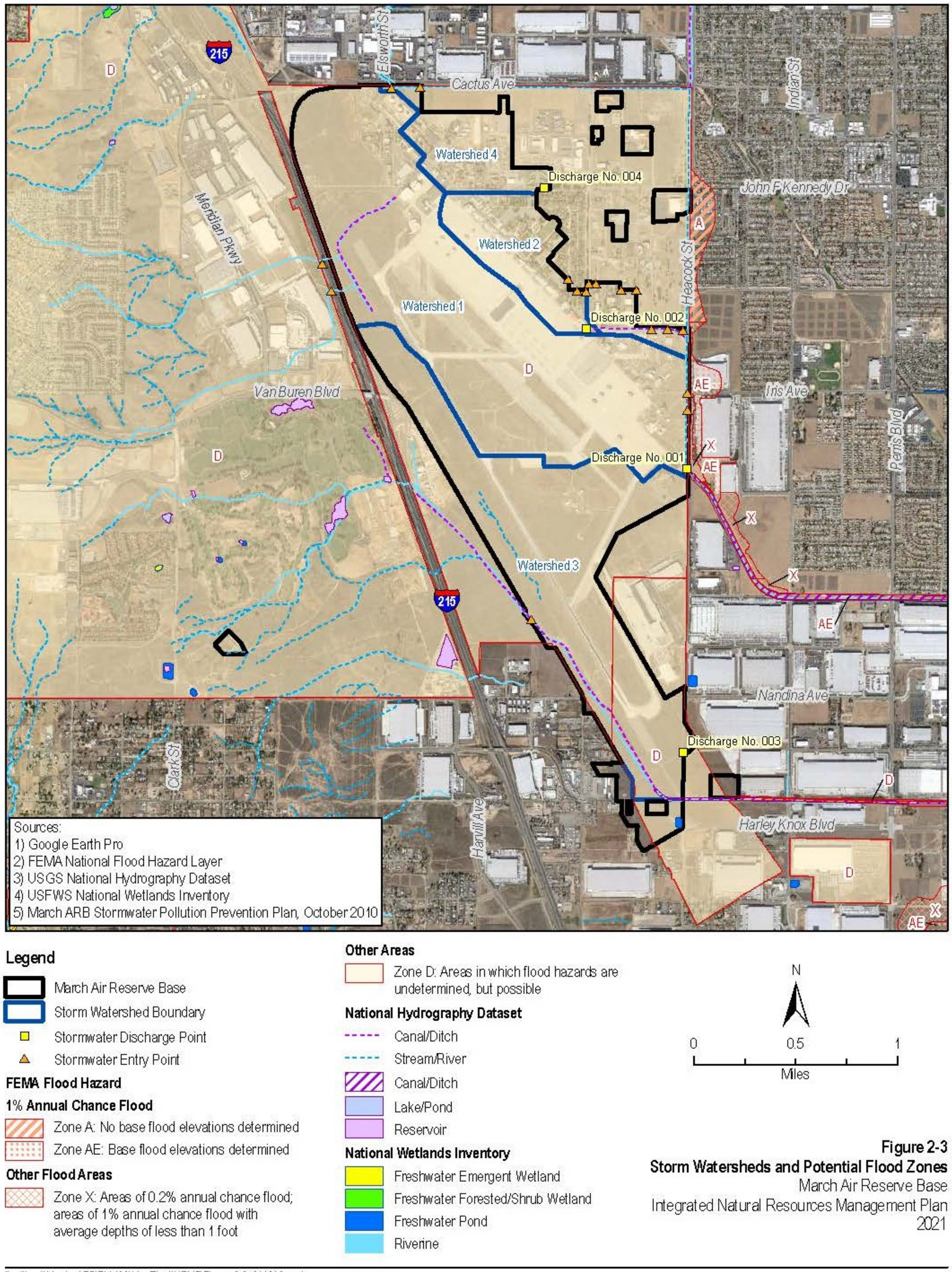


Figure 2-3. Watersheds and Potential Flood Zones at March ARB

2.2.4.7 Climate Change Effects on Hydrology

Changes in precipitation patterns, which may include changes in the type, quantity, and timing of precipitation, could affect water resources in the region that includes March ARB. However, impacts to hydrology at March ARB itself would be minimal. Intensifying droughts could lead to decreases in river flow, groundwater depletion, and water shortages in the region (USGCRP 2018). Atmospheric rivers, regions of high-water vapor transport that can produce intense precipitation, may increase in frequency over southern California in the future. Current global climate models (GCMs) project a nearly 40 percent increase in precipitation during atmospheric river events by the late twenty-first century under the representative concentration pathway [RCP] 8.5 scenario (Hall et al. 2018). Water quality could be affected by increased flooding and corresponding erosion and runoff.

2.3 Ecosystems and the Biotic Environment

This section describes the general biotic environment of the Base and the surrounding area, including wetlands, current native vegetative cover, lawn and landscaped areas, native fauna, and wildlife habitats present on the Base.

2.3.1 Ecosystem Classification

March ARB lies within the Perris Valley and Hills subsection of the national Hierarchical Framework of Ecological Units (USFS 2018).

- Division: Mediterranean
- Domain: Humid Temperate
- Province: California Coastal Range Open Woodland-Shrub-Coniferous-Forest-Meadow
- Section: Southern California Mountains and Valleys
- Subsection: Perris Valley and Hills

2.3.2 Vegetation

2.3.2.1 Historical Vegetation Cover

The Cismontane Southern California Natural Region surrounds March ARB. This region is characterized by scrub vegetation commonly known as chaparral. The long, hot summers and moderate winter precipitation has influenced and promoted the evolution of this drought-adapted scrub vegetation. Plant communities of the Cismontane Southern California Natural Region consist primarily of different types of chaparral and coastal sage scrub. Grasslands and localized riparian communities are interspersed throughout the region (MARB 2012).

Most of this region has been urbanized, which has resulted in the loss of undisturbed habitat. However, remnant, endemic species may occur throughout the region. Coastal sage scrub was historically the most prevalent shrub community in the area surrounding March ARB. This community was formerly widespread in southern California between the coastline and the sea-facing foothills of the Peninsular Ranges and Transverse Ranges, but more than 90 percent of this habitat's original distribution has been lost to urban and agricultural development. Coastal sage scrub is typically dominated by California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), prickly pear cactus (*Opuntia* spp.), and various mints (*Salvia* spp.) (MARB 2012).

The former species composition of native grasslands in Southern California is not known (MARB 2012).

In southern California, an estimated 95 to 97 percent of riparian habitat has been eliminated primarily by human development and flood control practices. Typical vegetative species include willows (*Salix* spp.), Fremont cottonwood (*Populus fremontii*), California sycamore (*Plantanus racemosa*), and mulefat (*Baccharis salicifolia*), and Emory baccharis (*Baccharis salicina*) (MARB 2012).

2.3.2.2 Current Vegetation Cover

As a result of periodic mowing and disturbance of land at the Base, the vegetation does not fit into the traditional vegetation classification systems. At present, the most common flora consists of exotic annual grasses introduced from Europe, including wild oats (*Avena* spp.), red brome (*Bromus rubens*), soft chess (*Bromus hordeaceus*), and barley (*Hordeum* spp.), as well as introduced forbs including mustard (*Brassica* spp.) and filaree (*Erodium* spp.) (MARB 2012).

Native and introduced grasses and native and introduced forbs dominate most undeveloped land, but there are remnants of native shrub vegetation communities growing with very low stature on parts of the Base. Five general vegetation categories and broad land cover types exist on March ARB: grasslands, seasonal wetlands and vernal pools, disturbed, landscaped, and developed (Figure 2-4). The dominant plant community within the boundary of March ARB is grasslands. Most of the undeveloped portion of the Base is mowed, which has affected the composition of the remaining vegetation. Vegetation on the eastern half of the main cantonment area has been removed or significantly altered by development, construction, landscaping, and other disturbances from urbanization. Few native plant communities occur within the main cantonment area. Remnant riparian vegetation consisting of cottonwood, mulefat, narrowleaf cattail (*Typha angustifolia*), common sow thistle (*Sonchus oleraceus*), sandbar willow (*Salix exigua*), and arroyo willow (*Salix lasiolepis*) occurs in dispersed segments along natural and man-made drainage areas on March ARB (MARB 2012). Appendix E provides a list of plant species observed within March ARB.

2.3.2.3 Annual Grasslands

Annual grasslands on March ARB consist of a mix of non-native and native grasses and forbs. Common plant species on the Base include brome grasses (Spanish brome [*Bromus madritensis*], ripgut brome [*B. diandrus*], cheat grass [*B. tectorum*], and soft chess), wild oats, burclover (*Medicago polymorpha*), and Bermuda grass (*Cynodon dactylon*). Annual grassland also supports an array of native plants, including common goldfields (*Lasthenia gracilis*), royal goldfields (*Lasthenia coronaria*), miniature lupine (*Lupinus bicolor*), desert dandelion (*Malacothrix glabrata*), California poppy (*Eschscholzia californica*), and Kellogg’s tarplant (*Deinandra kelloggii*).

Additionally, in some areas of the Base, native shrub species occur, including California sagebrush, California buckwheat, spreading goldenbush (*Isocoma menziesii*), Palmer’s goldenbush (*Ericameria palmeri*), and common sandaster (*Corethrogyne filaginifolia*). As a result of grounds maintenance on the Base, these areas are regularly mowed and the shrubs are small and, in some cases, resprouts. As a result, they are not substantial enough to constitute a separate vegetation community. Figures 2-5 and 2-6, respectively, are photographs of annual grasslands and mowed shrub species within annual grasslands on March ARB.

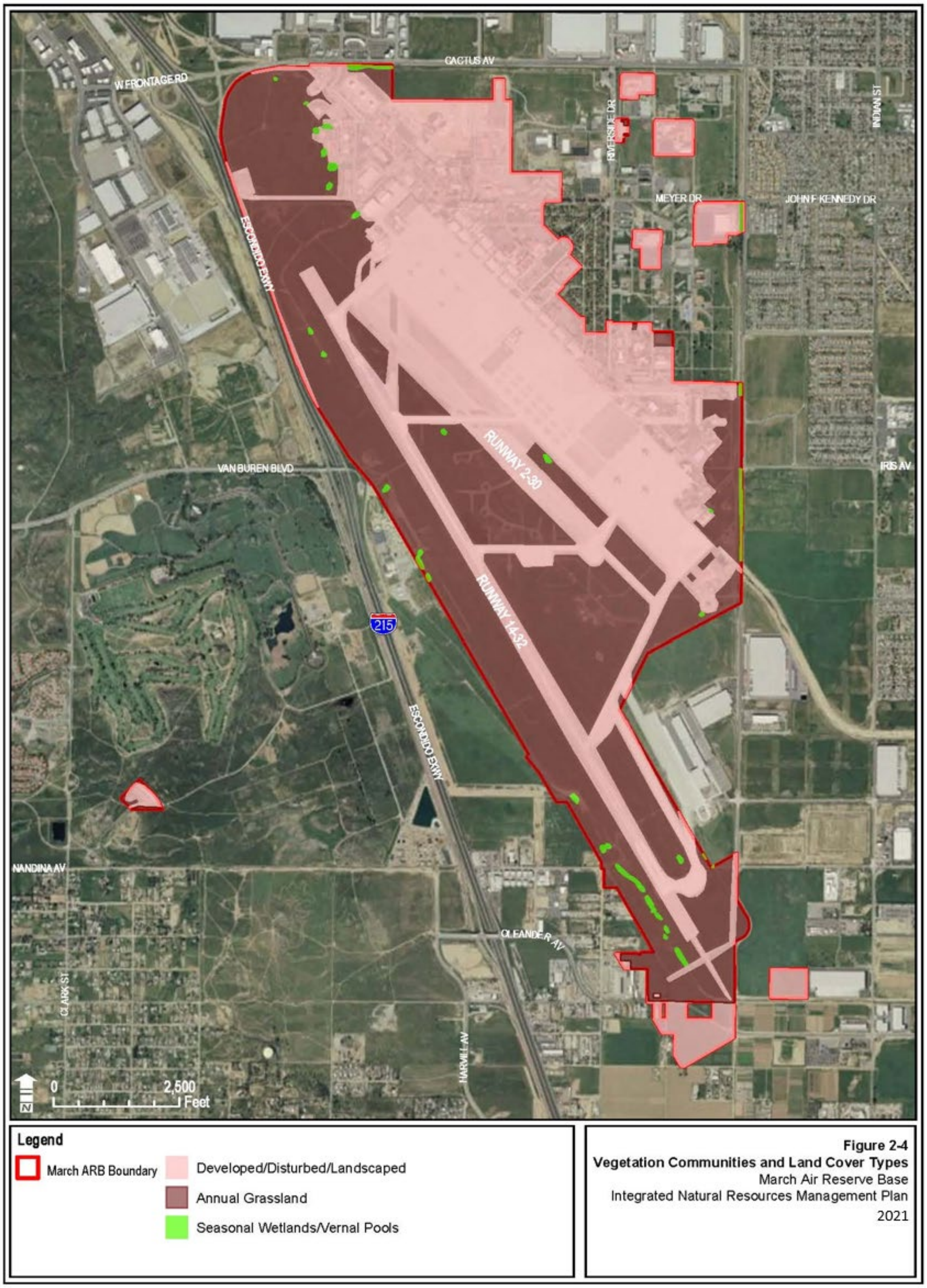


Figure 2-4. Vegetation Communities and Land Cover Types Present within March ARB

Figure 2-5. Photograph of Annual Grassland Habitat on March ARB

Figure 2-6. Photograph of Mowed Shrubs in Annual Grassland Habitat on March ARB

2.3.2.4 Vernal Pools/Seasonal Wetlands

Vernal pools/seasonal wetlands are filled with water during the rainy season. The water evaporates after the rain stops, eventually drying out in the spring or early summer. The receding water level stimulates wildflower blooms, which create concentric circles around the pool. Vernal pools/seasonal wetlands are unique vegetation communities that provide habitat for many endemic and rare native plant and wildlife species. Plant species observed in the vernal pools/seasonal wetlands on March ARB include dwarf woolly marbles (*Psilocarphus brevissimus* var. *brevissimus*), Valley popcorn flower (*Plagiobothrys canescens*), bracted popcorn flower (*Plagiobothrys bracteateus*), sand spurrey (*Spergularia marina*), annual hair grass (*Deschampsia danthonioides*), sand pygmy weed (*Crassula connata*), cut-leaf plantain (*Plantago coronopus*), California plantain (*Plantago erecta*), rib-grass (*Plantago lanceolata*), rabbitsfoot grass (*Polypogon monspeliensis*), slender tarplant (*Deinandra fasciculata*), vinegar weed (*Trichostema lanceolatum*), and doveleaf (*Croton setiger*). Figure 2-7 is a photograph of vernal pool habitat on March ARB, and Figure 2-8 is a photograph of seasonal drainage swale habitat on March ARB. No special-status vernal pool specialist plants have been found in the vernal pools on March ARB.

Figure 2-7. Photograph of Vernal Pool Habitat on March ARB

Figure 2-8. Photograph of Seasonal Drainage Swale Habitat on March ARB

2.3.2.5 Invasive Plant Species

The greatest threat to native plant communities on March ARB is the existence of invasive plant species that may out-compete native vegetation to the point of exclusion.

Planted and escaped landscape species are common throughout the Base. Grass varieties consist of commonly introduced species, including Kentucky bluegrass (*Poa pratensis*), annual bluegrass (*Poa annua*), Bermuda grass (*Cynodon* spp.), and fescue mixes (*Festuca* spp.). Various introduced shrub and tree species are also present at March ARB. Brazilian pepper tree (*Schinus terebinthifolius*), Peruvian pepper tree (*Schinus molle*), eucalyptus (*Eucalyptus* spp.), European olive (*Olea europaea*), and oleander (*Nerium oleander*) are common near buildings, roads, and the perimeter of the Base (MARB 2012).

Areas surrounding runways and taxiways are dominated by native and non-native grasses and ruderal vegetation. Non-native grasslands are characterized by exotic annual forbs, such as mustards (*Brassica* spp.) and filarees, and by exotic grasses, such as wild oat, red brome, cheat grass, Mediterranean grass (*Schismus barbatus*), and barley (MARB 2012). Russian thistle (*Salsola tragus*) is common in disturbed areas of the Base, and tamarisk (*Tamarix* spp.) can be found in drainages and swales.

2.3.2.6 Landscaped and Developed Areas

Landscaped Areas

The landscaped areas within the Base consist of common grasses (e.g., Kentucky bluegrass, annual bluegrass, and several planted garden species – California native species and cultivars). Characteristic species throughout the landscaped areas include Washington fan palm (*Washingtonia robusta*), Canary Island date palm (*Phoenix canariensis*), ornamental pine (*Pinus* spp.), Peruvian pepper tree, and rosemary (*Rosemarinus officinalis*). Figure 2-9 is a photograph of landscaped areas on March ARB. More recent landscapes are being created with xeriscaping, which includes river rock, colorful bark with a few colorful nursery cultivar plants, and shrubs.

Figure 2-9. Photograph of a Landscaped Area on March ARB

Developed Areas

Developed areas occur throughout March ARB and are described as those lands devoid of vegetation, including dirt and/or paved roadways, runways, taxiways, utility lines, walkways, buildings, and parking lots.

2.3.2.7 Vegetation and Climate Change

Annual grasslands are the dominant vegetation type at March ARB. Climate change projections indicate warming will continue to increase in the coming decades. Small mean changes in average precipitation are predicted for the region; however, both dry and wet extremes are expected to increase in the future. Storms are projected to increase, which could extend the flood-hazard season in California. Extremely dry years are also expected to increase over southern California (Hall et al. 2018). As a result of these changes, the composition and abundance of grassland species at March ARB will likely vary by year and will depend on timing of available soil water (Bagne et al. 2012). Plant productivity could increase during periods of higher precipitation and decrease during droughts.

2.3.3 Fish and Wildlife

The environmental setting of March ARB makes it an attractive habitat to some wildlife species. Numerous surveys have been undertaken on the Base to assess and inventory biological resources (MARB 2012; CH2M 2020a, 2020b; ECORP 2020). Wildlife that occurs at March ARB includes invertebrate, bird, mammal, fish, reptile, and amphibian species. Appendix F lists the wildlife species observed on March ARB.

2.3.3.1 Birds

Birds comprise the most diverse taxonomic group of animals on Base. The number of grassland birds, wading birds, and other bird species on Base and their population sizes are moderate to abundant and stable. Non-native European starlings (*Sturnus vulgaris*) and native house finches (*Carpodacus mexicanus*) occur throughout the Base. Mourning dove (*Zenaida macroura*), black phoebe (*Sayornis nigricans*), common raven (*Corvus corax*), northern mockingbird (*Mimus polyglottos*), and Brewer's blackbird (*Euphagus cyanocephalus*) are common species (MARB 2012). The grasslands attract many seasonal songbirds such as mountain bluebirds (*Sialia currucoides*), white-crowned sparrow (*Zonotrichia leucophrys*), western meadowlark (*Sturnella neglecta*), and savannah sparrow (*Passerculus sandwichensis*). Grasslands are also habitat for the tricolored blackbird (*Agelaius tricolor*), which is state-listed as threatened, and several state-listed Species of Special Concern (SSC) including the mountain plover (*Charadrius montanus*) and loggerhead shrike (*Lanius ludovicianus*).

Raptors (birds of prey) prey on small mammals, including mice and shrews, reptiles, insects, and other birds. Raptors are commonly observed on Base, especially during the spring and fall when there is an influx of migrant species. Some of the common raptors using the grasslands of March ARB include the American kestrel (*Falco sparverius*), northern harrier (*Circus cyaneus*), prairie falcon (*Falco mexicanus*), ferruginous hawk (*Buteo regalis*), and golden eagle. The burrowing owl (*Athene cunicularia*), listed by CDFW as SSC, also occurs on March ARB (MARB 2012).

Figure 2-10 is a photograph of American kestrels, and Figure 2-11 is a photograph of a mountain bluebird on March ARB.

Figure 2-10. Photograph of American Kestrels on March ARB

Figure 2-11. Photograph of Mountain Bluebird Perching on March ARB

2.3.3.2 Mammals

Much of the native vegetation at March ARB has been disturbed or replaced with managed landscapes, but a variety of mammals inhabit or use the habitat that is provided.

Carnivorous species are an important component of local ecosystems. Carnivorous species prey on rodents, rabbits, and insects, providing a natural means of controlling potential pest populations. Coyote (*Canis latrans*) are visitors at March ARB. The long-tailed weasel (*Mustela frenata*) has been documented on the Base. Figure 2-12 is a photograph of a coyote on March ARB.

Typical small grassland mammals that are present or have the potential to inhabit March ARB include the California ground squirrel (*Otospermophilus beecheyi*), Botta's pocket gopher (*Thomomys bottae*), and Audubon's cottontail (*Sylvilagus audubonii*). Figure 2-13 is a photograph of a California ground squirrel near its burrow on March ARB.

Figure 2-12. Photograph of a Coyote on March ARB

Figure 2-13. Photograph of a California Ground Squirrel at its Burrow on March ARB

2.3.3.3 Reptiles and Amphibians

The most common of the several reptile species on Base is the side-blotched lizard (*Uta stansburiana*). Other common reptiles observed on March ARB include the western fence lizard (*Sceloporus occidentalis*), granite spiny lizard (*Sceloporus orcutti*), southern alligator lizard (*Elgaria multicarinata*), gopher snake (*Pituophis catenifer*), and southern Pacific rattlesnake (*Crotalus viridis helleri*).

2.3.3.4 Invertebrates

Non-listed versatile fairy shrimp (*Branchinecta lindahli*) occur in the vernal pools on March ARB. Cysts belonging to the Riverside fairy shrimp (*Streptocephalus woottoni*), which is federally listed as endangered, have been documented at March ARB, but no live Riverside fairy shrimp have been identified. *Branchinecta* that could not be identified to the species level have been observed in some vernal pools on Base, so presence of vernal pool fairy shrimp (*Branchinecta lynchi*), which is federally listed as threatened, at March ARB cannot be ruled out (CH2M 2020a).

2.3.3.5 Fish

Perennial aquatic habitat suitable for fish does not occur on March ARB; however, there is potential for fish occurring at ponds offsite to wash through the installation in the drainage connection.

2.3.3.6 Wildlife and Fisheries Habitat

Most of the habitat on March ARB has a marginal-to-moderate value in relation to its ability to support native species richness of birds, mammals, reptiles, and amphibians (MARB 2012; Ecology and Environment 2000). Foraging habitat on Base is of marginal quality.

Habitats that could be considered to support native species components include the grasslands that consist of introduced species but also have an array of native plants (refer to Section 2.3.2.2), and components of coastal sage scrub in some locations on the Base, including California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum*), and spreading goldenbush (*Isocoma menziesii*) in peripheral areas where mowing takes place. In several locations, depressions in the soil have created vernal pool habitats (refer to Section 2.3.2.2). These vernal pool habitats are characterized by dwarf woolly marbles and a few other specialized plants, and they support specialized wildlife such as the versatile fairy shrimp.

Grassland communities, the predominant habitat on Base, have the potential to support ground-nesting birds such as the western meadowlark and burrowing owl. In addition, the grassland habitat also supports large populations of the California ground squirrel, which provides an abundant food supply for foraging raptors and mammalian predators.

Potential fisheries habitat on March ARB is limited to intermittent stormwater channels and vernal pools. There is insufficient viable perennial aquatic habitat within the installation boundaries to support a sustained freshwater fishery. In addition, there are no data on the types of fish species inhabiting the Base's aquatic habitats.

March ARB supports habitat and land use features that provide opportunities for wildlife to inhabit the Base. However, fencing and other land use features, as well as the amount of industrial and agricultural activities immediately surrounding March ARB, limit these opportunities.

2.3.3.7 Wildlife and Climate Change

In California, warming temperatures and precipitation shifts associated with climate change may cause species to experience physiological and/or reproductive stress and could impact the abundance of forage and prey. Regional wildlife population sizes could decline during extended droughts or with local extreme warming events. Increased precipitation could increase plant productivity and food availability, resulting in wildlife species becoming more abundant. Changes in the timing of the seasons could disrupt the life cycle of some species. In response to these stressors, species may decline or shift their geographic ranges.

Migratory birds in California, for example, are wintering farther north and closer to the coast than historically recorded (Bedsworth et al. 2018).

Although it is unknown exactly how climate change will affect listed fairy shrimp or the seasonal pools on March ARB, drought years or years with limited ponding duration (due to lack of rain, a shorter wet season, or increased temperatures) could induce hatching but not support ponded habitat for a sufficient time for the sexual maturation of fairy shrimp. Repeated years of unsuccessful reproduction could deplete the cyst banks for listed species, as well as the seed banks for endemic vernal pool plants. On the other extreme, very wet years could cause flooding on March ARB. Scouring events could wash away cyst and seed banks and may change the hydrology of the existing pool complexes. This could result in a reduction in the amount of water the pools can hold and create an opportunity for invasive plants (CH2M 2020a).

2.3.4 Threatened and Endangered Species and Species of Concern

Under the Endangered Species Act (ESA) (16 U.S.C. § 1531 et. seq.), an "endangered species" is defined as any species in danger of extinction throughout all or a significant portion of its range. A "threatened species" is defined as any species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The USFWS maintains a list of species that are regarded as candidates for possible listing under the ESA (61 FR 7596). Even though candidate species receive no statutory protection under the ESA, the USFWS believes it is important to advise government agencies, industry, and the public that these species are at risk and may warrant protection under the ESA. Additionally, AFMAN 32-7003, paragraph 3.38.2, requires that all Air Force installations provide "similar conservation measures for species protected by state law when such protection is not in direct conflict with the military mission."

California implements an endangered species law that covers native species and subspecies of plants and animals (California Fish and Game Code § 2050 et seq.). Listings require recovery plans and designation of critical habitat, although critical habitat has never been designated. State agency consultation on projects affecting species listed under the California Endangered Species Act (CESA) is required. The CESA defines an "endangered species" as a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to loss of habitat, change in habitat, overexploitation, predation, competition, or disease. A "threatened species" is a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by Chapter 1.5 of the California Fish and Game Code.

2.3.4.1 Special-Status Wildlife Species

March ARB supports habitat for several federally and state-listed wildlife species. Multiple surveys have been conducted at March ARB to verify and document the presence or absence of federally and state-listed threatened, endangered, and candidate species, as well as California SSC on Base (MARB 2012; CH2M 2020a, 2020b; ECORP 2020).

Queries of CDFW's California Natural Diversity Database (CNDDB) (CDFW 2020b) and the USFWS Environmental Conservation System Online (ECOS; USFWS 2020b) for special-status wildlife identified 11 species federally listed as threatened or endangered; 9 species state listed as threatened, endangered, or candidate species; and 38 state-designated or other special-status species with potential to occur within the main cantonment of March ARB. Descriptions of species that are known to occur, or with potential to occur, at March ARB are provided in Table 2-5. This information is not all-inclusive, but it is meant to supplement information kept in the NRM's T&E species database.

Table 2-5. Special-Status Wildlife Species and Their Potential to Occur within March ARB

Species	Status	General habitat description	Potential to Occur
INVERTEBRATES			
Crotch bumble bee *Bombus crotchii*	State: SC	Found in open grassland and scrub habitats. Example food plants include *Asclepias*, *Chaenactis*, *Lupinus*, *Medicago*, *Phacelia*, and *Salvia*.	**Moderate**. Habitat for this species occurs on March ARB.
Riverside fairy shrimp *Streptocephalus woottoni*	Fed: FE	Occurs in deeper tectonic swales/earth slump basins in grassland and coastal sage scrub habitats where the water pools for extended periods of time.	**Low**. Although surveys in 1997 and 2009 documented cysts of fairy shrimp of the genus *Streptocephalus* on March ARB, an emerged fairy shrimp of this species has not been detected. March ARB is unlikely to support the life cycle of this species due to existing habitat disturbance and the limited inundation time of the ponded areas on Base.
Vernal pool fairy shrimp *Branchinecta lynchi*	Fed: FT	Inhabits small, clear-water sandstone-depression pools and grassed swale, earth slump, or basalt-flow depression pools.	**May be present**. Habitat for this species occurs on March ARB and fairy shrimp of the genus *Branchinecta* have been documented on Base. Although, this species has not been identified onsite during focused surveys, its absence has not been able to be confirmed through surveys.
Quino checkerspot butterfly *Euphydryas editha quino*	Fed: FE	Sunny openings within chaparral and coastal sage shrublands in parts of Riverside and San Diego counties.	**Low**. Minimal suitable habitat for this species occurs on March ARB. There are anecdotal observations of transient use, but no documentation of reproduction on March ARB.
AMPHIBIANS			
Arroyo toad *Anaxyrus californicus*	Fed: FE State: SSC	Rivers with sandy banks, willows, cottonwoods, and sycamores; loose, gravelly areas of streams in drier parts of range.	**None.** Habitat for this species does not exist on March ARB.
California red-legged frog *Rana draytonii*	Fed: FT State: SSC	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby, or emergent riparian vegetation.	**None.** Habitat for this species does not exist on March ARB.

Species	Status	General habitat description	Potential to Occur
Western spadefoot toad *Spea hammondii*	State: SSC	Occurs primarily in grassland habitats, but can be found in valley-foothill hardwood woodlands. Vernal pools are essential for breeding and egg-laying.	**Moderate**. Habitat for this species exists on March ARB. However, this species has not been observed onsite.
REPTILES			
California glossy snake *Arizona elegans occidentalis*	State: SCC	Occurs in arid scrub, rocky washes, grasslands, and chaparral habitats, often with loose or sandy soils.	**Low**. Potentially suitable habitat for this species exists on March ARB. However, this species has not been observed onsite.
Coastal whiptail *Aspidoscelis tigris stejnegeri*	State: SSC	Found in deserts and semi-arid areas with sparse vegetation and open areas. Also found in woodland & riparian areas.	**Observed**. Habitat for this species exists on March ARB, and the species has been previously documented on March ARB property.
Coast horned lizard *Phrynosoma blainvillii*	State: SSC	Found in a wide variety of habitats, including coastal sage, annual grassland, chaparral, oak woodland, riparian woodland, and coniferous forest. Key habitat elements are loose, fine soils with a high sand fraction; an abundance of native ants or other insects; and open areas with limited overstory for basking and low, but relatively dense shrubs for refuge.	**None**. Habitat for this species does not exist on March ARB.
Coast patch-nosed snake *Salvadora hexalepis virgultea*	State: SSC	Brushy or shrubby vegetation in coastal scrub habitat. Requires small mammal burrows for refuge and overwintering sites.	**None**. Habitat for this species does not exist on March ARB.
Orange-throated Whiptail *Aspidoscelis hyperythra*	State: WL	Occurs in sandy washes and other sandy areas with patches of brush and rocks in low-elevation coastal scrub, chaparral, and valley-foothill hardwood habitats.	**None**. Habitat for this species does not exist on March ARB.
Red-diamond rattlesnake *Crotalus ruber*	State: SSC	Occurs in rocky areas and dense vegetation. Needs rodent burrows, cracks in rocks, or surface cover objects.	**None**. Habitat for this species does not exist on March ARB.
Southern California legless lizard *Anniella stebbinsi*	State: SSC	Occurs in sandy or loose loamy soils under sparse vegetation in broadleaved upland forest, chaparral, coastal dunes, and coastal scrub habitats.	**None**. Habitat for this species does not exist on March ARB.

Species	Status	General habitat description	Potential to Occur
Western pond turtle *Actinemys pallida*	State: SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams, and irrigation ditches, usually with aquatic vegetation, below 6,000 ft elevation. Needs basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 kilometers from water for egg-laying.	**None**. No habitat for this species occurs on March ARB and it has not been observed on March ARB.
BIRDS			
Bald eagle *Haliaeetus leucocephalus*	State: SE, FP Other: BGEPA, MBTA, BCC (nesting & nonbreeding/wintering)	Occurs in areas with large, isolated trees (free from human disturbances) near open water bodies that support an adequate food supply, such as fish, birds, or small mammals.	**Observed**; rare transient.
Bell's sage sparrow *Amphispiza belli*	State: WL Other: BCC (nesting)	Occurs in dry chaparral, coastal sage scrub, chamise chaparral, and big sagebrush habitats.	**None**. Habitat for this species does not exist on March ARB.
Burrowing owl *Athene cunicularia*	State: SSC Other: MBTA, BCC (burrow sites and some wintering sites)	Year-round resident. Suitable habitat consists of open, dry grassland and flat desert areas with available foraging habitat and abandoned small mammal burrows that can be inhabited. Prefers habitats that are open with limited vegetation.	**Present**.
California brown pelican *Pelecanus occidentalis californicus*	Fed: Delisted State: Delisted (nesting colony and communal roosts)	Occurs in estuarine, marine subtidal, and marine pelagic waters along the California coast. Nests on undisturbed islands on low, brushy slopes.	**Observed**; rare transient.
California horned lark *Eremophila alpestris actia*	State: WL	Year-round resident. Occurs in open terrain in a variety of habitats, which is often sparsely vegetated and devoid of trees or large shrubs. Found from grasslands along the coast and deserts near sea level to alpine dwarf-shrub habitat above treeline.	**Present**.
Coastal California gnatcatcher *Polioptila californica californica*	Fed: FT State: SSC	Local, uncommon, obligate resident of arid coastal sage scrub vegetation on mesas and hillsides and in washes. Nests almost exclusively in California sagebrush.	**None**. Habitat for this species does not exist on March ARB.
Cooper's hawk *Accipiter cooperii*	State: WL Other: MBTA (nesting)	Year-round resident. Inhabits broken woodlands and streamside groves, especially deciduous woodlands. Can be found in residential areas as well.	**Present**.

Species	Status	General habitat description	Potential to Occur
Ferruginous hawk *Buteo regalis*	State: WL Other: MBTA, BCC (nonbreeding/ wintering)	Winter resident. Occurs in open grasslands, sagebrush flats, desert scrub, low foothills surrounding valleys, and fringes of pinyon-juniper habitats.	**Present**.
Golden eagle *Aquila chrysaetos*	State: FP Other: BGEPA, MBTA, BCC (nesting & nonbreeding/wintering)	Year-round resident. Occurs in open deserts, grasslands, or oak savannas found within mountainous regions and canyons, and to a lesser extent oak woodlands and open shrublands.	**Present**.
Least Bell's vireo *Vireo bellii pusillus*	Fed: FE State: SE (nesting)	Spring and summer resident. Resides in low riparian areas close to the water or dry riverbeds. Nests are usually constructed in bushes or within the branches of mesquite (*Prosopis* spp.), willows, and mule fat. Found below 2,000 ft elevation.	**Low**. Minimal suitable habitat exists on Base.
Loggerhead shrike *Lanius ludovicianus*	State: SSC Other: MBTA, BCC (nesting)	Year-round resident. Prefers open country for hunting, with perches for scanning, and fairly dense shrubs and brush for nesting.	**Present**.
Long-eared owl *Asio otus*	State: SSC Other: MBTA (nesting)	Uncommon yearlong resident throughout California, except for the Central Valley and southern California deserts, where it is an uncommon winter resident. Occurs in riparian bottomlands grown to tall willows and cottonwoods; also, belts of live oak paralleling stream courses.	**None**. Habitat for this species does not exist on March ARB.
Mountain plover *Charadrius montanus*	State: SSC Other: MBTA, BCC (nonbreeding/ wintering)	Winter resident. Occurs in short grasslands and plowed and burned fields, often in areas of surface disturbance, such as rodent burrows and areas with concentrated cattle; uses the ground depressions for roosting.	**Observed**; transient.
Northern harrier *Circus hudsonius*	State: SSC Other: MBTA (nesting)	Winter resident and less common year-round resident. Occurs in open areas dominated by herbaceous cover, including deserts, coastal dunes, pasture-lands/grasslands, estuaries, and salt- and freshwater marshes.	**Present**.
Peregrine falcon *Falco peregrinus anatum*	State: SE, FP Other: MBTA, BCC (nesting)	Found in a variety of habitats, including woodlands, forests, and coastal habitats. Occurs mostly in areas with cliffs for nesting and open areas for foraging. Frequents bodies of water in open areas.	**Present**; migrates through March ARB.

Species	Status	General habitat description	Potential to Occur
Prairie falcon *Falco mexicanus*	State: WL Other: MBTA, BCC	Both summer and winter use in Southern California. Found in a variety of habitats, particularly open grassland and desert areas.	**Present**
Southern California rufous-crowned sparrow *Aimophila ruficeps canescens*	State: WL	Year-round resident. Found along rocky hillsides and steep brushy or grassy slopes. Prefers coastal sage scrub that is dominated by California sagebrush, but also occurs in coastal bluff scrub, low-growing serpentine chaparral, and along the edges of tall chaparral habitats.	**None**. Habitat for this species does not exist on March ARB.
Southwestern willow flycatcher *Empidonax traillii*	Fed: FE State: SE Other: MBTA (nesting)	Spring and summer resident. Restricted to willow thickets and shrubby areas found in moist riparian zones, broad valleys, canyon bottoms, around mountain-side seepages, or at the margins of ponds and lakes.	**None**. This species has not been observed on March ARB and no habitat exists on Base.
Tricolored blackbird *Agelaius tricolor*	State: ST Other: MBTA, BCC (nesting colony)	Year-round resident. Found in herbaceous wetland, cropland/ hedgerow, and grassland/herbaceous habitats.	**Present**.
Western yellow-billed cuckoo *Coccyzus americanus occidentalis*	Fed: FT State: SE Other: BCC (nesting)	Spring and summer resident. Inhabits extensive deciduous riparian thickets or forests with dense, low-level or understory foliage, near slow-moving watercourses, backwaters, or seeps. Willow species (*Salix* spp.) are almost always a dominant component of the vegetation.	**None**. Habitat for this species does not exist on March ARB.
White-tailed kite *Elanus leucurus*	State: FP Other: MBTA (nesting)	Common to uncommon year-round resident. Occurs in coastal and valley lowlands in herbaceous and open stages of most habitats, including savanna, open woodlands, marshes, desert grassland, partially cleared lands, and cultivated fields.	**Present**.
Yellow-breasted chat *Icteria virens*	State: SSC Other: MBTA (nesting)	Spring and summer resident. Inhabits dense thickets, brush, and secondary growth. Nests in dense shrubs.	**None**. Habitat for this species does not exist on March ARB.
MAMMALS			
American badger *Taxidea taxus*	State: SSC	Uncommon, permanent resident found throughout most of the state. Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Extirpated from many areas in southern California.	**None**. Habitat for this species does not exist on March ARB.

Species	Status	General habitat description	Potential to Occur
California leaf-nosed bat *Macrotus californicus*	State: SSC WBWG: H	Occurs in lowland desert scrub associations in the Lower Sonoran life zone in the deserts of California, southern Nevada, and Arizona, and south into Baja California and Sonora, Mexico. Roosts in caves, mines, and buildings with adequate ceiling surface and flying space.	**None**. Habitat for this species does not exist on March ARB.
Dulzura pocket mouse *Chaetodipus californicus femoralis*	State: SSC	Occurs in coastal scrub, chaparral, and grassland habitats, with a preference for grass-chaparral edges.	**Low.** This species has not been observed on March ARB and minimal suitable habitat exists on Base.
Los Angeles pocket mouse *Perognathus longimembris brevinasus*	State: SSC	Found in coastal sage, shrub-steppe, and open grasslands of deserts and other arid areas.	**Low**. This species has not been observed on March ARB and minimal suitable habitat exists on Base.
Northwestern San Diego pocket mouse *Chaetodipus fallax fallax*	State: SSC	Found in sparse, low desert shrublands up to dense, high coastal sage-scrub vegetation.	**None**. Habitat for this species does not exist on March ARB.
Pallid bat *Antrozous pallidus*	State: SSC WBWG: H	Occurs in deserts, grasslands, shrublands, woodlands, and forests. Most common in open, dry habitat with rocky areas for roosting. Roost alone or in colonies (small and large) in crevices in rock outcrops and cliffs, caves, mines, trees, and human structures. Very sensitive to disturbance of roosting sites.	**Low**. Minimal suitable habitat for this species exists on March ARB and activities on Base would likely deter this species from roosting in the area.
Pocketed free-tailed bat *Nyctinomops femorosaccus*	State: SSC WBWG: M	Found near large, open water sources in a variety of habitats, including desert shrub and pine-oak forest. Roosts in colonies in crevices of rugged cliffs, high rocky outcrops, slopes, and buildings.	**None**. Habitat for this species does not exist on March ARB.
San Bernardino kangaroo rat *Dipodomys merriami parvus*	Fed: FE State: SC, SSC	Occurs in alluvial floodplains and adjacent upland habitats within the San Bernardino, Menifee, and San Jacinto valleys in Riversidean alluvial fan sage scrub. Soils type appears to be more important in distribution than habitat conditions.	**None**. Habitat for this species does not exist on March ARB.
San Diego black-tailed jackrabbit *Lepus californicus bennettii*	State: SSC	Occurs in coastal sage scrub and grassland habitats.	**Present**.

Species	Status	General habitat description	Potential to Occur
San Diego desert woodrat *Neotoma lepida intermedia*	State: SSC	Typically found in the coastal scrub of southern California from San Diego County to San Luis Obispo County. Prefers moderate to dense vegetation canopies. They are particularly abundant in rock outcrops and rocky cliffs and slopes.	**None**. Habitat for this species does not exist on March ARB.
Southern grasshopper mouse *Onychomys torridus ramona*	State: SSC	Inhabits flat, sandy, valley floor open and semi-open scrub habitats, including coastal sage scrub, mixed chaparral, low sagebrush, riparian scrub, and annual grassland with scattered shrubs.	**Low**. Minimal suitable habitat for this species exists on March ARB.
Spotted bat *Euderma macalatum*	State: SSC WBWG: H	Occurs in arid desert, grassland, and conifer forest habitats; however, the availability of rock cliff faces, which are used for roosting habitat, seems to be the limiting factor. In addition, permanent water supplies are typically present near resident populations.	**None**. Habitat for this species does not exist on March ARB.
Stephens' kangaroo rat *Dipodomys stephensi*	Fed: FE State: ST	Occurs in sparsely vegetated annual grassland and sage-scrub communities.	**Present.** Occupied habitat is present on the small arms range west of I-215. Presumed absent on the main March ARB property.
Townsend's big-eared bat *Corynorhinus townsendii*	State: SSC WBWG: H	Occurs throughout California in a wide variety of habitats. Most common in mesic sites. Roosts in the open, hanging from walls and ceilings. Extremely sensitive to human disturbance.	**None**. Habitat for this species does not exist on March ARB.
Western mastiff bat *Eumops perotis californicus*	State: SSC WBWG: H	Forages in dry desert washes, floodplains, chaparral, oak woodland, open ponderosa pine forest, grassland, and agricultural areas. Roosts in colonies under exfoliating rock slabs (e.g., granite, sandstone, or columnar basalt) and in similar crevices in large boulders and buildings; generally high above ground. The availability of roosting habitat seems to be a limiting factor.	**Low**. Minimal suitable habitat for this species exists on March ARB.
Western yellow bat *Lasiurus xanthinus*	State: SSC WBWG: H	Found in valley foothill riparian, desert riparian, desert wash, and palm oasis habitats. Roosts in trees, particularly palms. Forages over water and among trees.	**None**. Habitat for this species does not exist on March ARB.

Species	Status	General habitat description	Potential to Occur

Sources: CDFW 2020b; USFWS 2020b

Status Codes:

Federal (Fed)
FE = Federal Endangered
FT = Federal Threatened

State of California
SE = State Endangered
ST = State Threatened
SC = State Candidate
SSC = Species of Special Concern
WL = Watch List
FP = Fully Protected

Western Bat Working Group
H = High priority
M = Medium priority

Other
BGEPA = Bald and Golden Eagle Protection Act
MBTA = Migratory Bird Treaty Act
BCC = Bird of Conservation Concern

Special-Status Invertebrates

Crotch Bumble Bee (State Candidate Endangered)

The Crotch bumble bee is a state candidate endangered species that occurs in coastal California east to the Sierra-Cascade crest and south into Mexico (CDFW 2020b). In California, this species inhabits open grassland and scrub habitats and primarily nests underground. The Crotch bumble bee has a short tongue and is best suited to forage at open flowers with short corollas. Plant families most commonly associated with this species include *Fabaceae*, *Apocynaceae*, *Asteraceae*, *Lamiaceae*, and *Boraginaceae*. Examples of food plants are *Asclepias*, *Chaenactis*, *Lupinus*, *Medicago*, *Phacelia*, and *Salvia*. The flight period for Crotch bumble bee queens in California is between late February and late October, with peaks in April and July. The flight period for workers and males in California is from late March through September, with peak abundance in early July (Xerces 2018).

The Crotch bumble bee has declined an average of 68 percent over the last 10 years. Declines in southern California are likely a result of rapid urbanization in the area (Xerces 2018).

Presence or absence of the Crotch bumble bee has not been studied on March ARB; however, habitat for this species does exist on the installation. The nearest recorded occurrence is 2.7 miles southwest of March ARB, in the general vicinity of Motte Rimrock Reserve (CDFW 2020b).

Quino Checkerspot Butterfly (Federally Listed as Endangered)

The Quino Checkerspot Butterfly (QCB; *Euphydryas editha quino*), federally listed as endangered, has bands of black, white, and dark red coloration arranged concentrically around the center of the thorax. Its wingspan reaches 3 inches, with forewings that are disproportionately short and rounded. The QCB inhabits grassland and open areas in sage scrub, chaparral, and sparse native woodlands. QCB populations have been located in San Diego and western Riverside counties, northwestern Baja California, and Mexico.

The QCB has two distinctive life phases: the egg/larval/pupa stage and the adult stage. Each stage requires different habitat elements for growth and sustainment. During the early stages of its life cycle, the QCB requires its larval host and food plants, which it feeds upon immediately after hatching. California plantain and woolly plantain (*Plantago patagonica*), small, often inconspicuous annual plants, are two of QCB's primary host plants (USFWS 2002). The female QCB often selects lone plants on bare soil or in open areas for depositing her eggs. Patches of host plants or nectar sources; ridgelines and hilltops; bare or sparsely vegetated areas between shrubs; and areas of cryptobiotic soil crusts have an especially high potential for QCB use (USFWS 2002). Field observations indicate that females may deposit eggs on California plantain, woolly plantain, Coulter's snapdragon (*Antirrhinum coulterianum*), rigid bird's beak (*Cordylanthus rigidus*), and/or owl's clover (*Castilleja exserta*). Nectar plants most likely to be visited by QCB include, but are not limited to, members of the *Asteraceae* (e.g., *Lasthenia* spp., *Layia* spp., *Ericameria* spp.), *Cryptantha* spp., and *Allium* spp. (USFWS 2002). In addition to food requirements, the QCB uses locations containing diverse topography, such as areas with a mixture of north, south, east, and west facing slopes. Adult males exhibit a behavior called hilltopping, in which males form territories on hilltops and other prominent geographic features.

The decline of QCB has been attributed to habitat degradation and destruction (USFWS 2009).

During the 1996 survey, several California plantain plants were identified scattered throughout the Base. Each plant encountered was investigated for larval, pupating, and adult forms of this species. No QCB were observed during the survey of March ARB and minimal suitable habitat occurs on Base (MARB 2012).

Riverside Fairy Shrimp (Federally Listed as Endangered)

The Riverside fairy shrimp is a small (0.5 to 1 inch), aquatic crustacean that occurs in vernal pools and within human-modified depressions that provide suitable ponding durations from coastal Southern California to northwestern Baja California. Historically, this species was widespread within the vernal pools of Riverside, Orange, and San Diego counties. However, factors such as the loss of habitat, off-road vehicle use, and changing hydrologic conditions have eliminated this species from many areas. This species typically occurs within large pools, some exceeding 750 square meters (8,073 square ft), with depths of 12 inches or more. Because of their depth, many of these pools are long-lived and can persist into April or May. These vernal pools are typically dry for several months during the summer, but they may fill with rainwater by late fall, winter, or spring. This species deposits "resting" eggs (cysts) in the soil of these pools that can be transported through airborne dust or tracking mud. The cysts can withstand heat, cold, and prolonged drying within the pools. When the pools refill with water, the cysts will hatch and develop rapidly into adult fairy shrimp. The Riverside fairy shrimp will hatch within 7 to 21 days after the pool refills, depending on the water temperature, and will mature between 48 and 56 days, depending on the habitat conditions. This species has been known to occur with other branchiopod species, including versatile fairy shrimp (CH2M 2020a).

Cysts belonging to the endangered Riverside fairy shrimp (*Streptocephalus* genus) have been documented at March ARB, but the only live branchiopod identified at March ARB is the non-listed versatile fairy shrimp. In 1997, eight pools at March ARB were sampled for cysts in the dry season and two pools were found to have Riverside fairy shrimp cysts. The same pools, plus two more pools, were surveyed in the 1997–1998 wet season following the 1996 protocol. During the wet season, five of the pools contained live versatile fairy shrimp, but no Riverside fairy shrimp were found. In October 2006, another dry season survey following the 1996 protocol was conducted at March ARB on 10 seasonally ponded depressions, but no *Streptocephalus* cysts were found; only *Branchinecta* cysts were observed. A single intact cyst belonging to the Riverside fairy shrimp was observed in the soil collected from one habitat at March ARB during 2009 dry season sampling. Dry- and wet-season surveys for large branchiopods were conducted in 2018–2019 at March ARB. No cysts belonging to the genus *Streptocephalus* were detected in any of the processed soil samples. In addition, no listed large branchiopods were observed during the 2018–2019 wet season survey, and locations where *Streptocephalus* cysts were found in 1997 were determined to be unsuitable habitat (CH2M 2020a).

Although the absence of Riverside fairy shrimp is not ruled out at March ARB, it is unlikely that this species could live and reproduce in the current vernal pool habitat at March ARB. Although the pools were inundated for most of the 2018-2019 wet season (an above-average rainfall season), the pools were not very deep and dried quickly once the rain events stopped. Riverside fairy shrimp habitat is characterized as at least 30 centimeters (cm) deep and long lived (persisting into spring – April, May, or even June). All the pools surveyed at March ARB dried in early April 2019, and no pools sustained a depth over 30 cm after early to mid-March. In addition, even though Riverside fairy shrimp cysts have been identified in the past during dry season surveys, reproductive adults have never been documented. Cysts could land at March ARB during the dry season; however, March ARB does not currently have the appropriate habitat to support the reproduction and persistence of the species.

Other than the Riverside fairy shrimp cysts documented at March ARB historically, the nearest occurrence of Riverside fairy shrimp was documented in 2010 approximately 13 miles from March ARB near Winchester, California. Twenty-seven observations were recorded from 2 to 37 years ago within 30 miles south of March ARB in Lake Elsinore, Winchester, Wildomar, Murrieta, Temecula, and the Pechanga Reservation. These occurrences were a combination of wet season observations and dry season findings. The most recent wet season observation was recorded at the Clayton Ranch Mitigation Site in Murrieta in 2017 (CH2M 2020a).

Vernal Pool Fairy Shrimp (Federally Listed as Threatened)

The vernal pool fairy shrimp is a small (0.4 to 1.0 inch), aquatic crustacean that occurs in vernal pools throughout northern and southern California. In southern California, it has been found primarily on the Santa Rosa Plateau and Rancho California in Riverside County. However, factors such as the loss of habitat, off-road vehicle use, and changing hydrologic conditions have eliminated this species from many areas. The vernal pool fairy shrimp can occur in a variety of sites and the depressions can vary dramatically in size, from a 100,000-square-meter depression to a 0.56-square-meter pool. The more common habitat is a grassy or mud-bottomed swale within an unplowed grassland. These vernal pools are typically dry for several months during the summer, but they may fill with rainwater by late fall, winter, or spring. This species deposits “resting” eggs (cysts) in the soil of these pools. The cysts can withstand heat, cold, and prolonged drying within the pools. When the pools refill with water, the cysts will hatch and develop rapidly into adult fairy shrimp. The vernal pool fairy shrimp has been known to hatch soon after the water temperature drops to 50°F or less, and it reaches maturity in as few as 18 days when water temperatures rise to 68°F. However, it has the shortest life span (approximately 139 days) of the branchiopods. The vernal pool fairy shrimp has been known to occur with other branchiopod species, including versatile fairy shrimp; however, it is usually observed in small numbers (CH2M 2020a).

The nearest occurrence of vernal pool fairy shrimp was recorded in 2005 approximately 15 miles south of March ARB near Winchester, California. Five observations were recorded within 25 miles south of March ARB in Winchester, Murrieta, and the Elsinore Mountains. These occurrences were wet season observations, with the most recent observation occurring in 2011 east of Murrieta, California (CH2M 2020a).

Dry- and wet-season surveys for large branchiopods were conducted in 2018–2019 at March ARB (CH2M 2020a). Cysts belonging to the genera *Branchinecta* were observed during dry-season soil sampling. Listed large branchiopods were not observed during the 2018–2019 wet season survey; however, the non-listed versatile fairy shrimp was observed in 37 ponded areas throughout March ARB and immature fairy shrimp, which could be identified only to the *Branchinecta* genus, were observed in 15 ponded areas. Therefore, the absence of the threatened vernal pool fairy shrimp could not be confirmed by this survey (CH2M 2020a).

Special-Status Amphibians

Western Spadefoot Toad (State Species of Special Concern)

The western spadefoot toad (*Spea hammondii*), a state SSC, is distinguished from true toads by its cat-like eyes (due to vertically elliptical pupils); single, black, sharp-edged "spades" on its hind feet; teeth in its upper jaws; and rather smooth skin. Adults are dusky green or gray above, often with four irregular light-colored stripes on the back; a dark, hourglass-shaped area sometimes distinguishes the central pair of stripes. The western spadefoot toad occurs in lowland areas, frequenting washes, floodplains of rivers, alluvial fans, playas, and alkali flats, but also it ranges into foothills and mountains. This species prefers areas with open vegetation and short grasses with sandy or gravelly soil (Stebbins 2003). Breeding habitat includes quiet streams and temporary pools; water temperatures in pools must be between 48°F and 86°F. The western spadefoot toad ranges throughout the California Central Valley and adjacent foothills south into northwestern Baja California and is usually common where it occurs. Breeding calls are audible at great distances, which serve to bring individuals together at suitable breeding sites. Females deposit their eggs in numerous small irregularly cylindrical clusters of 10 to 42 eggs and may lay more than 500 eggs in one season. Eggs are deposited on plant stems or pieces of detritus in seasonal pools. Eggs hatch anywhere from a little over half a day to 6 days later depending on temperature. Larval development can be completed in 3 to 11 weeks and must be finished before pools dry (USFWS 2005).

Threats to this species include habitat loss, degradation, and fragmentation due to urban and agricultural development; the introduction of predatory mosquito fish and bullfrogs to vernal pools; and vehicle-related mortality on roads near vernal pools (USFWS 2005).

The western spadefoot toad has not been observed within March ARB (MARB 2012); however, habitat to support this species occurs on Base.

Special-Status Reptiles

Coastal Whiptail (State Species of Special Concern)

The coastal whiptail (*Aspidoscelis tigris stejnegeri*), also referred to as the San Diegan tiger whiptail, is a state SSC subspecies of whiptail found in coastal Southern California. This slim-bodied lizard has a long slender tail (up to two times the length of the body), pointed snout, and large symmetrical head plates. Scales are small and granular on the back and keeled on the tail. The belly consists of large, smooth, rectangular scales in eight lengthwise rows. Coastal whiptails are primarily grey, tan, or brown on the back and sides, marked by sharply defined dark spots, bars, or mottling. The throat is pale with large black spots and the belly is often marked by reddish patches. A wary and active diurnal species, they often move with abrupt stops and starts, side-to-side head movement, and tongue flicking. Individuals are often seen digging rapidly when foraging for small invertebrates and lizards, but they are difficult to approach and are capable of quick bursts of speed into cover. Unlike some species of whiptails (all female), male and female coastal whiptails typically begin mating in May, with eggs hatching from May to August (Nafis 2019a).

The coastal whiptail has not been observed within March ARB and minimal suitable habitat occurs within the main cantonment area.

California Glossy Snake (State Species of Special Concern)

The California glossy snake (*Arizona elegans occidentalis*), a state SSC subspecies of glossy snake, is a generalist reported from a range of scrub and grassland habitats patchily distributed throughout coastal southwestern California. The glossy snake is medium-sized with smooth, glossy scales, and a short tail. This particular subspecies is generally darker than others, with tan or light brown ground color marked by dark-edged dark brown blotches on the back and sides, and a pale, unmarked underside. It inhabits arid scrub, rocky washes, grasslands, and chaparral and prefers microhabitats of open areas with soil loose enough for burrowing. A nocturnal predator, individuals hide underground in daytime under rocks, existing burrows, or in its own burrow. They are typically active from late February until November, with most activity in May and less during summer. California glossy snakes hunt diurnal lizards, small snakes, terrestrial birds, and nocturnally active mammals by waiting in ambush and killing their prey by direct swallowing or constriction (Nafis 2019b).

The species has not been observed within March ARB and minimal suitable habitat occurs within the main cantonment area.

Special-Status Birds

Bald Eagle (State Listed as Endangered, State Fully Protected)

The bald eagle (*Haliaeetus leucocephalus*), a state-endangered and state fully protected (FP) species that is protected under the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. § 668-668c), is a large, dark brown bird of prey with yellow eyes, beak, and feet and a wingspan that can reach up to 7 or 8 ft. Adults have a white head and tail, which is fully developed at about 5 years of age (CDFG 2005). Bald eagles occur in various woodland, forest, grassland, and wetland habitats. This species occurs throughout North America and winters throughout most of California at lakes, reservoirs, rivers, and some rangelands and coastal wetlands. The breeding range is mainly in mountainous habitats near reservoirs, lakes, and rivers. Nesting territories occur mostly in the northern half of the State and also in the southern Sierra Nevada, Central Coast Range, inland southern California south to Riverside County, and on Santa Catalina Island. Large nests are normally built in the upper canopy of large trees, typically conifers.

Bald eagles have been state listed as endangered and FP species due to habitat loss from forest clearing; decline in reproduction due to poisoning from the widespread use of organochlorine pesticides, especially dichlorodiphenyltrichloroethane (DDT), from the 1950s into the 1970s; shooting by farmers because they were believed to threaten livestock; and loss of prey species due to overhunting (USFWS 2019). Bald eagle numbers have increased as a result of recovery actions, including banning the use of DDT and habitat protection, which led to the species being delisted from the federal endangered species list in 2007 (USFWS 2019).

The bald eagle is a rare transient on March ARB (MARB 2012), but suitable nesting and foraging habitat to support this species does not occur on Base.

Burrowing Owl (State Species of Special Concern)

The burrowing owl (*Athene cunicularia*), a state SSC, is a small, ground-dwelling owl. Adults are boldly spotted and barred with a rounded head, no ear tufts, yellow eyes with whitish eyebrows, a white chin stripe, and a short tail. The burrowing owl is a yearlong resident and occurs throughout California in a variety of habitats that include dry, open areas with mammal burrows. Burrowing owls require low vegetative cover and adequate perch sites on level to gently sloping ground to forage from and to act as lookout points for predators. Burrow availability is a major factor in defining suitable burrowing owl habitat. Most importantly, western burrowing owls require the presence of a mammal burrow or cavity (natural or man-made) that is the appropriate size for a nest burrow. Although western burrowing owls can excavate holes where burrowing mammals are absent, they rarely do so. Throughout California, western burrowing owls primarily use California ground squirrel burrows. Burrowing owls also use man-made cavities for nest burrows, such as pipes, culverts, rock piles, concrete debris, and artificial burrows. Burrowing owls are opportunistic feeders. Much of their diet consists of arthropods (moths, spiders, beetles, grasshoppers, crickets, earwigs, crustaceans) in addition to small mammals (voles, mice, pocket mice) and birds (blackbirds, horned larks, mourning doves) and to a lesser extent reptiles and amphibians. However, the consumption of small mammals (mice, pocket mice, kangaroo rats) is believed to be essential for burrowing owls to avoid calcium deficits that inhibit eggshell production. Although burrowing owls are active day and night, they primarily forage at night when they are less vulnerable to diurnal predators such as hawks and falcons. Burrowing owls are vulnerable to a wide range of predators, including raptors (including kestrels), crows, ravens, loggerhead shrikes, foxes, coyotes, feral cats and dogs, snakes, and mustelids (e.g., weasels and badgers). In California, nesting season for burrowing owls occurs between February 1 and August 31, with the peak of breeding activity between April 15 and July 15. Clutch size is typically from 2 to 10 eggs. Young owls can be seen at the burrow entrance approximately 2 weeks after hatching and fledge after approximately 6 weeks (CH2M 2020b).

In California, threat factors affecting burrowing owl populations include habitat loss, habitat degradation, and habitat modification. Habitat degradation includes the eradication of ground squirrels resulting in a loss of suitable burrows required by burrowing owls for nesting, protection from predators, and shelter (CH2M 2020b), as well as the suppression of populations of mice and pocket mice through poisoning and/or soil disturbances.

The burrowing owl is known to occur on March ARB. Figure 2-14 is a photograph of a burrowing owl on March ARB. The population of burrowing owls at March ARB has fluctuated since its first reference from a 1991 survey. Originally, 14 adults were observed utilizing 6 burrows around the base. In 1999, only 6 observations of owls were made around burrows, although the specific number of owls is unclear. The number increased in 2002 to 11 observations at burrows and further increased to 51 individuals in 2003, including at least 14 adults and 20 juveniles. In 2007, these numbers declined again to only 6 adults and 2 juveniles observed on base. In 2019, a habitat assessment and focused point-count surveys were conducted for burrowing owl between November and August. A total of 26 burrowing owl observations were made during these surveys (15 during the habitat assessment, 9 during the point-count surveys, and 2 incidental observations). Although it is unknown whether the same individuals were observed on multiple occasions, the observations show that burrowing owls likely inhabit March ARB year-round. The 2019 burrowing owl habitat assessment identified 917 potential burrow locations and 11 occupied burrows on March ARB. The 9 owls observed during the focused point-count surveys consisted of three adult pairs: one pair with two observed owlets, one pair with a single observed owlet, and one pair with no observed young. The two pairs with young were moderately close together in the southeastern portion of the airfield, and the pair with no young was occupying artificial constructed burrows in the Burrowing Owl Relocation Area. There were four burrows observed as occupied during the breeding season, two of which were occupied by the same pair of owls. Observations from the 2019 burrowing owl surveys also suggest that the Burrowing Owl Relocation Area, adjacent to and south of the airfield, is used year-round by burrowing owls (CH2M 2020b). The current and historical locations of burrowing owls at March ARB are presented on Figure 2-15.

Figure 2-14. Photograph of a Burrowing Owl on March ARB

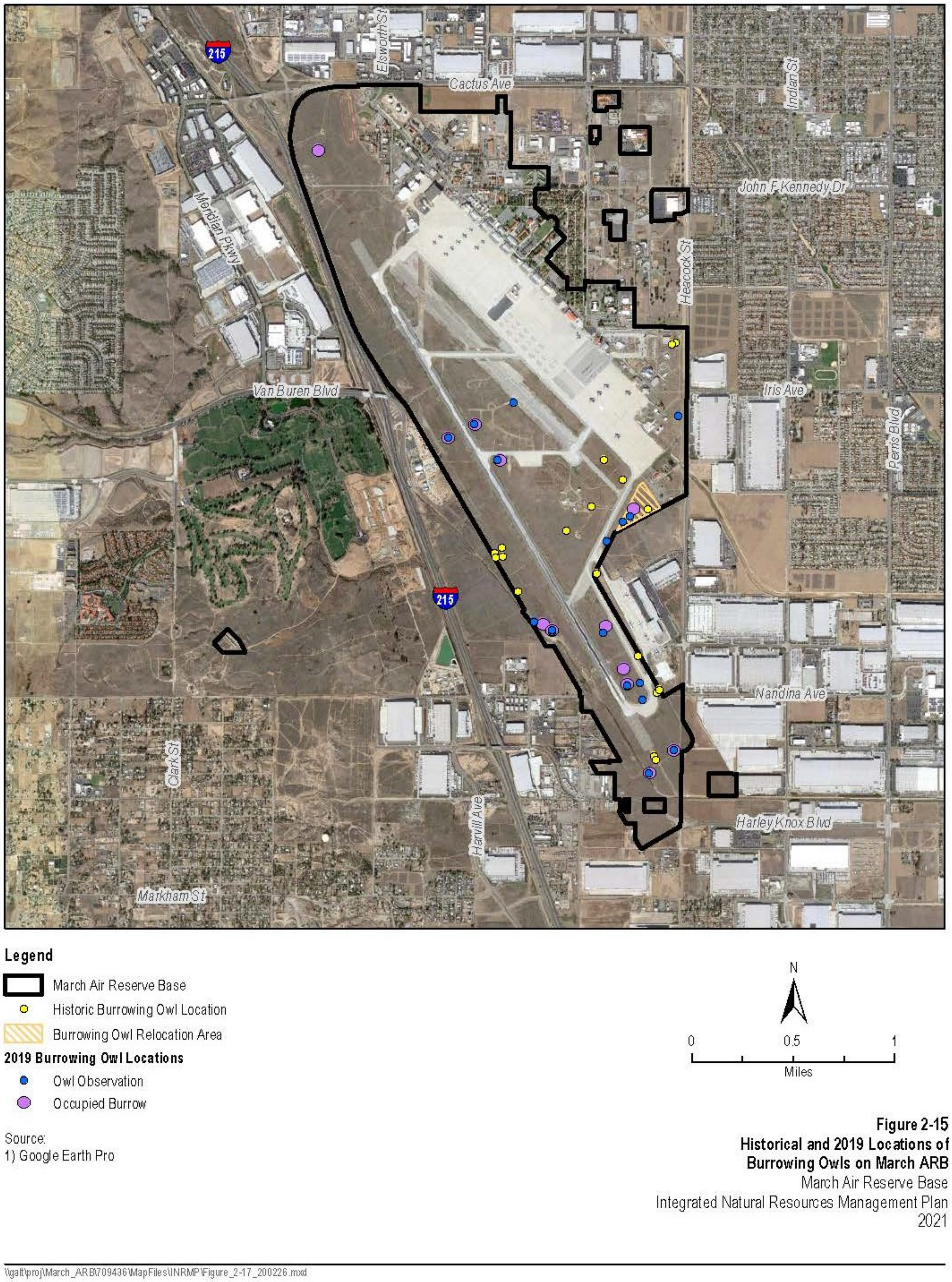


Figure 2-15. Locations of Burrowing Owls on March ARB

California Brown Pelican (State Fully Protected)

The California brown pelican (*Pelecanus occidentalis californicus*) is a state FP species that occurs in estuarine, marine subtidal, and marine pelagic waters along the California coast. This species is rare to uncommon on the Salton Sea from July to September. The California brown pelican feeds almost exclusively on fish that are caught by plunge diving and breeds on undisturbed islands (CDFW, n.d.).

The California brown pelican is a rare transient visitor at March ARB. No breeding or foraging habitat occurs on Base.

California Horned Lark (State Watch List)

The California horned lark (*Eremophila alpestris actia*), a state WL species, is a ground-inhabiting bird with black sideburn markings, two small black horns, and a black breast mark. This species walks along the ground foraging on seeds, caterpillars, ants, grasshoppers, spiders, and other insects. The California horned lark nests in southern California. Built by the females, the nests are placed in shallow depressions on the ground and are lined with grasses, feathers, and hair. Two to four gray-white, brown-speckled eggs are laid during spring and early summer, between February and July (MARB 2012).

Threats to this species include habitat destruction and fragmentation.

The California horned lark is a common fall and winter migratory species on March ARB and foraging habitat occurs on Base (MARB 2012).

Cooper's Hawk (State Watch List)

Cooper's hawk (*Accipiter cooperii*), a state WL species, is a medium-sized hawk with broad, rounded wings, a long tail, and a relatively large head. Adults are blue-gray above, with reddish bars on the underparts and thick dark bands on the tail. Juveniles are brown above and crisply streaked with brown on the upper breast. Cooper's hawk occurs in woodland habitats, particularly live oak, riparian deciduous, and other forest habitats near water; this species occasionally occurs in residential areas, although it is seldom found in areas without dense tree stands or patchy woodland habitat. Cooper's hawk ranges throughout North America and is a breeding resident in most wooded areas of California (CDFW 2020c). This species' numbers declined in California from the 1950s to 1970s as a result of poisoning from the widespread use of organochlorine pesticides, especially DDT, and shooting (Rosenfield et al. 2019).

Current threats to this species include habitat loss and degradation, particularly in oak woodlands and savannahs, vehicle collisions, and disturbance of nesting sites by human activity (Rosenfield et al. 2019).

Cooper's hawk has been observed on March ARB (MARB 2012), although minimal suitable habitat to support this species occurs on Base.

Ferruginous Hawk (State Watch List)

The ferruginous hawk (*Buteo regalis*), a state WL species, is a large broad-winged hawk with a large head and chest. The ferruginous hawk has at least two color morphs, light and dark, with variations in between. The adult light morph has a white or gray tail and mostly white underparts. A few spots of rufous or gray are on the belly and on the undersides of the wings. The adult dark morph of the ferruginous hawk has a dark body with a light-colored tail and light areas on the upper and lower surfaces of the wings. This species is a wintering resident in California and inhabits open habitats, such as grasslands, shrub-steppes, sagebrush, deserts, saltbush-greasewood shrub lands, and outer edges of pinyon-pine and other forests. Generally, it avoids high elevations, narrow canyons, and interior regions of forests. Perching substrates used by this species include trees, utility poles and towers, fence posts, rocky outcrops, cliffs, and the ground. Ferruginous hawks depend on only a few prey species, including cottontails, black-tailed jackrabbits, ground squirrels, and pocket gophers.

Agricultural development is considered to be the most serious threat to this species. Other threats include the effects of grazing, poisoning and controlling of small mammals, mining, and fire in the nesting habitats. Although it is not as significant a problem in the breeding range, shooting may still be a problem in this species' wintering range, including California (CSUS n.d.).

Ferruginous hawks have been observed at March ARB and wintering foraging habitat occurs on Base (Figure 2-16; MARB 2012).

Figure 2-16. Photograph of a Ferruginous Hawk on March ARB

Golden Eagle (State Watch List, State Fully Protected)

The golden eagle (*Aquila chrysaetos*), a state WL and FP species protected under the BGEPA (16 U.S.C. § 668-668c), is a large, heavy, dark brown eagle. Adult eagles have golden feathering on the nape of the neck, almost entirely dark brown plumage with white underwings, two pale brown median tail bands, and golden bands on the upper wings. This species nests primarily on cliffs and forages in nearby open areas, including grasslands, deserts, savannahs, and early successional stages of forest and shrub habitats. Golden eagles forage on rodents, small mammals, birds, reptiles, and even carrion (CDFW 2018). In the western United States, golden eagles are mostly year-round residents.

Threats to this species include loss of foraging areas and nesting habitat, pesticide and lead poisoning, and collision with manmade structures such as wind turbines (CDFW 2018).

Golden eagles have been observed foraging and riding thermals on March ARB. These eagles are thought to reside in the foothills of the San Jacinto Mountains, several miles east of the Base, and occasionally use March ARB as foraging grounds (MARB 2012).

Least Bell's Vireo (Federally Listed as Endangered, State Listed as Endangered)

The least Bell's vireo (*Vireo bellii pusillus*), federally and state listed as endangered, is a very small bird with a long, narrow tail. Adult birds have grayish upper parts, an indistinct white spectacled head pattern, and a whitish breast. Its wings include two faint whitish wing bars. This species is a summer resident of riparian areas in southern California, with a preference for dense willow-dominated riparian habitat with a well-developed understory. Most least Bell's vireo nest sites are located near the edge of thickets. Its current breeding range is limited to eight California counties: Kern, San Diego, San Bernardino, Riverside, Ventura, Los Angeles, Santa Barbara, and Imperial (CDFG 2005). Least Bell's vireo are insectivorous migratory birds that winter in southern Baja California. They arrive at breeding sites in southern California starting in mid- to late-March and depart by September. Nest initiations peak during April but can continue through the first week of July. Nests are typically placed in dense foliage within 3.3 ft of the ground (Kus 2002).

The least Bell's vireo has been federally and state-listed as endangered due to loss and degradation of its habitat through human and human-induced activities and by nest parasitism of the brown-headed cowbird (*Molothrus ater*) (CDFG 2005).

There is potential for incidental traverse of least Bell's vireo through March ARB; however, there is no suitable breeding habitat for least Bell's vireo on or immediately adjacent to March ARB. The last remnant of potential habitat, riparian vegetation along the Heacock drainage just outside the March ARB perimeter fence, was removed when the earthen Heacock Channel was converted to a fully concrete-lined channel in 2018.

Loggerhead Shrike (State Species of Special Concern)

The loggerhead shrike (*Lanius ludovicianus*), a state SSC, is a predatory songbird that inhabits agricultural lands and other open areas throughout most of North America. This species is superficially the size of the northern mockingbird (*Mimus polyglottos*), but it is a stockier bird with a bold black mask, black tail, and a short, heavy, hooked bill. Nests are often in open-growing shrubs or small trees and are constructed of twigs, feathers, rootlets, and other plant fibers (MARB 2012). The loggerhead shrike nests from early March through June, and lays five light-gray, brown-spotted eggs. Shrikes are often perched on telephone wires and fences while hunting for small rodents, lizards, birds, grasshoppers, caterpillars, and other insects. Shrikes are incapable of grasping prey with their small feet, but they frequently impale food items on barbed wire or long thorns (MARB 2012).

Primary threats to this species include habitat loss, increasing urbanization, agricultural conversion, exotic grass invasion, and altered fire regimes. Other threats include poisoning from pesticide use in agricultural areas and collisions with vehicles (Shuford and Gardali, eds. 2008).

The loggerhead shrike is a common, permanent resident species on March ARB (MARB 2012). Figure 2-17 is a photograph of a loggerhead shrike perched on bird spikes on March ARB.

Figure 2-17. Photograph of a Loggerhead Shrike Perching on Bird Spikes on March ARB

Mountain Plover (State Species of Special Concern)

The mountain plover (*Charadrius montanus*), a state SSC, occupies areas throughout the western United States during periods of migration and in the winter months. This species forages on insects in grassland areas. Mountain plovers are gray with a white wing stripe and have a dark tail-band bordered by white feathers. Plovers are often distinguished by their characteristic style of running along the ground, taking short steps, and frequently pausing. The breeding season for the mountain plover occurs in May in the short-grass prairies and shrub-steppe landscapes of the western Great Plains and Rocky Mountain states from the Canadian border to northern Mexico (USFWS 2015). Approximately three olive-spotted eggs are laid in bare ground depression nests with little to no lining. "Broken wing displays" are performed by adults to lure nest intruders away from vulnerable nest locations (MARB 2012).

Mountain plovers were proposed for listing due to a combination of factors, including native grasslands being replaced by agriculture and urban development, early spring plowing and planting on dry land nesting sites, grazing practices that encourage taller grasses and forbs, and loss of prairie dogs and other burrowing rodents (USFWS 2013a).

Mountain plover has been observed as a transient species on March ARB (MARB 2012). Foraging habitat on Base is of marginal quality and, as a result, it is unlikely this species would winter at March ARB.

Northern Harrier (State Species of Special Concern)

The northern harrier (*Circus hudsonius*), a state SSC, is a slim-bodied hawk with long wings and tail. All ages and both sexes have a white rump and an owl-like facial disk. The adult male is grayish above and mostly white below, with variable chestnut spotting, and has black on the wing tips and tips of the secondaries. The adult female is brown above and whitish below, with heavy brown streaking on the breast and flanks and lighter streaking and spotting on the belly. The juveniles resemble the females but are cinnamon below and on the wing linings. The northern harrier occurs in open areas dominated by herbaceous cover, including wetlands, pastures, meadows, grasslands, prairies, croplands, deserts, and coastal dunes. This species ranges throughout North America and is a winter resident and less common year-round resident in California.

Threats to this species include the loss of wetlands, native grassland, and moist meadow habitats; burning and plowing of nesting areas during the early stages of the breeding cycle; and changes in farming practices (CDFW 2020c).

The northern harrier has been observed on March ARB (MARB 2012) and foraging habitat for this species occurs on Base.

Peregrine Falcon (State Watch List)

The peregrine falcon (*Falco peregrinus*), a state WL species, is blue-gray above, with light breast feathers, barred flanks, and a dark head with thick sideburns. In California, peregrine breeding habitats include a variety of locations, including cliffs in uninhabited areas and tall buildings or bridges within urban landscapes. Peregrine falcons typically prey on small- to medium-sized birds, small reptiles, mammals, and occasionally bats (CDFW 2020d).

The primary cause for decline of this species was the use of DDT (CDFW 2020d). The peregrine falcon migrates through March ARB.

Prairie Falcon (State Watch List)

The prairie falcon (*Falco mexicanus*) is a state WL species. The prairie falcon was previously a state SSC; however, more recent assessments have shown positive trends for the species. Prairie falcons are large falcons with pointed wings and relatively long tails. They are brown above and pale with brown spots on the undersides. Their face is light in color with a dark mustache stripe and a brown patch over the ear area. Prairie falcons pursue prey by flying close to the ground. The species inhabits open landscapes and occurs throughout the western United States and Mexico.

The prairie falcon forages on March ARB, but nesting habitat does not exist on Base.

Tricolored Blackbird (State Listed as Threatened)

The tricolored blackbird (*Agelaius tricolor*), state listed as threatened, is black with a red shoulder patch, bordered by white, somewhat like the red-winged blackbird, which has a red shoulder patch, bordered by yellow. The tricolored blackbird forages and roosts in flocks, and it nests in colonies of thousands along thickets and marshes. This species occupies California year-round and breeds from April to June. Nests are constructed of dried grasses and mud and are placed in marshes, willow, and blackberry thickets or on the ground (MARB 2012).

The primary threat to this species is human-related disturbances, including degradation and loss of habitat, decrease in food sources due to pollutants and biocides, and direct human disturbances of colonies (Beedy et al. 2018).

The tricolored blackbird is a common year-round resident in the area and has been observed foraging in groups with red-winged blackbird on March ARB (MARB 2012). Figure 2-18 is a photograph of a tricolored blackbird perched on the March ARB perimeter fence.

Figure 2-18. Photograph of a Tricolored Blackbird Perched on the Perimeter Fence at March ARB

White-Tailed Kite (State Fully Protected)

The white-tailed kite (*Elanus leucurus*), a state FP species, is a medium-sized hawk with long, pointed wings and a long, white tail. Adults have red eyes, gray back and wings, a white face and underside, and a black spot on the inner portion of the wings. Juveniles are similar to adults but with yellow eyes, gray with white-tipped feathers on the back, and buffy streaks on the breast and head. White-tailed kites occur in open habitats, including savanna, open woodlands, marshes, desert grassland, partially cleared lands, and cultivated fields. This species ranges year-round along the West Coast and Gulf Coast, and in California, it inhabits coastal and valley lowlands in herbaceous and open stages of most habitats, primarily in cismontane (CDFW 2020c).

Threats to this species include loss of habitat, illegal shooting, and poisoning.

A white-tailed kite has been observed on March ARB (MARB 2012), and foraging habitat for this species occurs on Base.

Special-status Mammals

Dulzura Pocket Mouse (State Species of Special Concern)

The Dulzura pocket mouse (*Chaetodipus californicus femoralis*) is a state SSC that occurs in a variety of habitats, including coastal scrub, dense chaparral, and grasslands. This nocturnal species forages primarily on seeds but may consume leafy vegetation and insects found along grass-chaparral edges. Observations of Dulzura pocket mouse are more common in San Diego County (abutting to the south) but the species was observed in Riverside County in 2005 (CDFW 2020c).

Minimal suitable habitat occurs to support this species, and it has not been captured during trapping surveys on March ARB. Dulzura pocket mouse is extremely rare or possibly absent on March ARB lands west of I-215 (ECORP 2020).

Los Angeles Pocket Mouse (State Species of Special Concern)

The Los Angeles pocket mouse (*Perognathus longimembris brevinasus*), a state SSC, is a small rodent in the family Heteromyidae, which includes kangaroo rats and pocket mice. It is one of eight subspecies of the little pocket mouse (*P. longimembris*) in California. Its coat is buff above and white below, with black-tipped dorsal hairs, giving the pelage a “salt and pepper” appearance. It has a small white spot at the anterior base of the ear and an indistinct larger buff spot behind the ear. The plantar surfaces of the hindfeet are naked or lightly haired and the lateral hairs of the hind toes project anteriorly and laterally, resulting in a “fringed-toed” effect (Bolster 1998). The Los Angeles pocket mouse occurs in lower elevation grasslands, alluvial sage scrub, and coastal sage scrub in open areas with fine soils. The geographic range of this species is restricted to coastal basins of southern California, from San Fernando and Burbank in the San Fernando Valley east to Cabazon, south through the San Jacinto and Temecula Valleys to Aguanga, Warner Pass, Vail, and Temecula (Bolster 1998).

The primary threat to this species is habitat loss due to agricultural, suburban, and urban development in Los Angeles, San Bernardino, and Riverside counties (Bolster 1998).

The Los Angeles pocket mouse has not been observed on March ARB, and minimal suitable habitat occurs to support this species (MARB 2012).

Southern Grasshopper Mouse (State Species of Special Concern)

The southern grasshopper mouse (*Onychomys torridus ramona*), a state SSC, is a short-tailed, stocky mouse. It has a sharply bicolored pelage and tail, which has a white tip, and large hind feet with four tubercles and densely furred soles (Bolster 1998). It is the darkest colored race of grasshopper mouse found in the United States. Little is known about the habitat requirements of southern grasshopper mouse; it is believed to occur in flat, sandy, valley floor, open and semi-open scrub habitats, including coastal sage scrub, mixed chaparral, low sagebrush, riparian scrub, and annual grassland with scattered shrubs. It ranges southward from Los Angeles County to the Mexican border, generally west of the desert (Bolster 1998).

The primary threats to this species include habitat loss and fragmentation.

The southern grasshopper mouse has not been observed on March ARB and minimal suitable habitat occurs to support this species (MARB 2012).

Stephens’ Kangaroo Rat (Federally Listed as Endangered, State Listed as Threatened)

The SKR (*Dipodomys stephensi*), is federally listed as endangered and state listed as threatened. However, on August 19, 2020, the USFWS proposed to reclassify this species to federally list it as threatened (USFWS 2020c). The SKR is a medium-sized kangaroo rat with long hind legs, small front legs and feet, with a white belly. This nocturnal species has dark cinnamon-brown fur and a black and white tail. SKR typically occupy lands described as disturbed annual grassland and characterized by a relatively sparse cover of both shrubs and herbaceous vegetation; however, they occasionally occur in lands exhibiting moderately dense shrub cover. Occupied SKR habitat commonly exhibits an abundance of bare (unvegetated) ground during much of the year. Soils in habitats harboring SKR are typically loamy in nature, while soils dominated by clay or sand rarely support this species. The SKR is known to occur widely in Riverside County, was historically known from a few localities in southwestern San Bernardino County, and occurs in several regions of San Diego County (ECORP 2020).

The species has been listed because of its rarity; declining population; and the continuing loss, fragmentation, and degradation of open grassland habitat as a result of urban and suburban development, agriculture, water projects, military activities, wildland or prescribed fires, off-highway vehicles, and invasion of non-native plant species (CDFG 2005). Over the last half century, most of the SKR's historical habitat has been lost, with more than half its former colony sites destroyed. Being a nocturnal species, the SKR is vulnerable to predation primarily from large owls (e.g., barn owl [*Tyto alba*], great-horned owl [*Bubo virginianus*]) and other common nocturnal hunters, such as coyotes and foxes. They also may be preyed upon by such smaller mammalian predators as weasels, as well as by a variety of snakes that may visit subterranean burrows during the day or at night. Although it is possible that burrowing owls may occasionally prey on SKR, the small size of these birds in relation to the average adult size of a kangaroo rat likely reduces the frequency of their predation on SKR. Diurnal predators such as hawks and other raptors are unlikely to present any noteworthy threat to SKR due to differences in activity patterns.

During a general survey in 1996, a species-specific survey was performed for the SKR, which concluded that no SKR occupied the main cantonment area of March ARB. A survey performed in December 1996 determined the presence of SKR in former areas of March ARB west of I-215, which is now part of the SKR preserve. Surveys for the SKR within the main cantonment area of March ARB west of the runway and east of the perimeter fence were conducted in 2000, 2001, 2002, and 2004. One adult male SKR was documented in December 2000 several hundred feet to the west of the runway, immediately east of the March ARB west perimeter fence, and several hundred feet southward of the southern edge of the March Field Air Museum. Subsequent surveys of this location and the land north and south of this location failed to find signs of kangaroo rats. Other surveys to the east and north of the March Air Field Museum also failed to find signs of kangaroo rats. A survey of the area west of the runway was conducted in spring 2004, and no SKR or evidence of their presence was observed. Additional surveys conducted in 2006 and 2007 along the west side of the runway confirmed that the SKR was absent from this area. Habitat assessments, pedestrian transect surveys, and confirmation trapping were conducted at March ARB and adjacent areas during a SKR field study in 2019. No definitive signs of SKR were detected, and no SKR were captured on the main March ARB property or the lands immediately surrounding March ARB east of I-215. The 2019 surveys reconfirmed that SKR occupy the grasslands west of I-215 and south of Van Buren Boulevard. One female SKR was captured at the March ARB small arms range located west of I-215 (ECORP 2020).

The consistent absence of signs of SKR or positive trap results in the area of March ARB between the runway and the west perimeter fence (I-215) following the capture of the single SKR in 2000, as well as the high level of disturbance that has occurred in the area as a result of highway, military activities, industrial development southeast of the Base where open habitat land previously existed, and urban development to the east, all strongly suggest that the SKR no longer inhabits the main March ARB or adjacent lands east of I-215. The potential for any future unassisted colonization of the main March ARB property by SKR residing in immediately adjacent lands is very unlikely. There is very little to no potential for any SKR currently residing on the western side of I-215 to move across the freeway and into lands on, or adjacent to, the main March ARB property (ECORP 2020).

Pallid Bat (State Species of Special Concern)

The pallid bat (*Antrozus pallidus*), a state SSC and Western Bat Working Group (WBWG) High priority species, is a large, long-eared bat. It can be readily distinguished from all other California bat species by a combination of large size, large eyes, large ears, light tan coloration, a pig-like snout, and a distinctive skunk-like odor (Bolster 1998). Pallid bat occurs in deserts, grasslands, shrublands, woodlands, and forests where it feeds on the ground. It is most common in open, dry habitat with rocky areas for roosting. This species roosts alone or in colonies in crevices in rock outcrops and cliffs, caves, mines, trees, and human structures. This species is very susceptible to disturbance of roosting sites (WBWG 2017). Pallid bat ranges from Cuba, Mexico, and Baja California, through the southwestern and western United States, and into southern British Columbia. It occurs as far east as Kansas, Oklahoma, and Texas and throughout much of the United States west of the Rocky Mountains (Bolster 1998). In California, the species occurs throughout the state in a variety of habitats, extending up to 10,000 ft elevation in the Sierra Nevada.

Threats to pallid bat include loss of habitat, exclusion of roost sites in buildings, urbanization, bridge modifications and/or replacements, inappropriate mine and cave closures, and human-induced alterations of rock features (Bolster 1998).

Pallid bat has not been observed on March ARB (MARB 2012). Minimal habitat for this species occurs onsite, and activities on the Base would likely deter it from roosting in the area.

Western Mastiff Bat (State Species of Special Concern)

The western mastiff bat (*Eumpos perotis californicus*), a state SSC and WBWG High priority species, is a large, free-tailed bat with a short and velvety pelage. The coat has a brown or grayish brown upperpart and paler underpart, with hairs that are whitish at the base. This species has large feet and large ears, which are united across the forehead and project about 0.4 inch beyond the snout. Males have a peculiar glandular pouch on the throat. The western mastiff bat generally seeks diurnal refuge in rock crevices along vertical or nearly vertical cliffs. The roost entrances are typically horizontally oriented, with moderately large openings, and face downward so that they can be entered from below. Colony size varies from two or three individuals to several dozen. Twenty individuals would be considered a large colony for this species, although colonies of up to 70 are known. Western mastiff bats leave their day roosts late in the evening to forage on moths, crickets, grasshoppers, bees, dragonflies, leafbugs, beetles, and cicadas; insects carried aloft by thermal currents probably furnish an important portion of their diet. This species is not believed to use night roosts, but instead soars at great altitudes throughout the night to feed over a wide area. Observations indicate that males and females remain together throughout the year, even during the period when young are born. Normally only one young is produced per pregnancy, although twins occasionally occur.

Threats to this species include loss of large, open-water drinking sites, urban/suburban expansion, activities that disturb or destroy cliff habitat (e.g., water impoundments, highway construction, quarry operations, and recreational climbing), and impacts to foraging habitat from grazing and pesticide applications in agricultural areas (Bolster 1998).

Western mastiff bat has not been observed within March ARB and minimal suitable habitat for this species occurs within the main cantonment area (MARB 2012).

San Diego Black-Tailed Jackrabbit (State Species of Special Concern)

The San Diego black-tailed jackrabbit (*Lepus californicus bennettii*), a state SSC, is a subspecies of the black-tailed jackrabbit. This subspecies is restricted to the western coast of southern California. Black-tailed jackrabbits can be distinguished from other hares by their large, black-tipped ears and the black streak located on the top of the tail. This species is associated with grasslands and shrub areas, but it is highly adaptable to disturbed areas. The black-tailed jackrabbit feeds on many herbs and grasses and may breed any time of the year depending on the food supply. Litters consist of approximately three to four young placed in shallow nest depressions in the ground (MARB 2012).

The primary threats to the San Diego black-tailed jackrabbit are development, hunting, pest control, and agricultural land conversion (SDMMP 2010).

This species has been observed in several areas in the main cantonment area; however, no active burrows have been located on March ARB (MARB 2012).

2.3.4.2 Special-Status Plant Species

March ARB has the potential to support several special-status plant species. Numerous biological surveys, including plant surveys, have been conducted at March ARB.

Queries of CDFW's CNDDB (CDFW 2020b), the California Native Plant Society's (CNPS) Inventory of Rare and Endangered Plants of California (CNPS 2020), and the USFWS ECOS (USFWS 2020b) identified 10 species federally listed as threatened or endangered, 7 species state listed as threatened or endangered, 12 CNPS California Rare Plant Rank (CRPR) 1 or 2 listed species, and 1 CRPR 3 listed species that have potential to occur in the area defined by the U.S. Geological Survey (USGS) 7.5-minute quadrangles (Riverside East, Sunnymead, Steele Peak, Perris) on which March ARB occurs (Table 2-6).

Table 2-6. Special-Status Plant Species and Their Potential to Occur within March Air Reserve Base

Species	Status	General Habitat Description	Blooming Period	Potential to Occur
Chaparral sand-verbena *Abronia villosa* var. *aurita*	CRPR: 1B.1	Annual herb. Occurs on sandy soils in chaparral, coastal scrub, and desert dunes habitats. Elevation range 246 to 5,249 ft.	(Jan)Mar-Sep	**None.** Habitat for this species does not occur on March ARB.
Munz's onion *Allium munzii*	Fed: FE State: ST CRPR: 1B.1	Perennial bulbiferous herb. Occurs on mesic, clay soils in chaparral, cismontane woodland, coastal scrub, pinyon and juniper woodland, and valley and foothill grassland habitats. Elevation range 974 to 3,510 ft.	Mar-May	**None.** Suitable soils for this species do not occur on March ARB.
San Diego ambrosia *Ambrosia pumila*	Fed: FE CRPR: 1B.1	Rhizomatous herb. Occurs in chaparral, coastal scrub, valley and foothill grassland, and vernal pools; often in disturbed areas, sometimes alkaline. Elevation range 66 to 1,968 ft.	Apr-Oct	**Low.** This species has not been observed on March ARB; however, potentially suitable habitat for this species occurs on Base.
Marsh sandwort *Arenaria paludicola*	Fed: FE State: SE CRPR: 1B.1	Perennial stoloniferous herb. Occurs in sandy soils and openings in marshes and swamps. Elevation range 10 to 558 ft.	May-Aug	**None.** Habitat for this species does not occur on March ARB.
San Jacinto Valley crownscale *Atriplex coronata* var. *notatior*	Fed: FE CRPR: 1B.1	Annual herb. Occurs on alkaline soils in playas, valley and foothill grassland, and vernal pools. This species is restricted to highly alkaline and silty-clay soils. Elevation range 456 to 1,640 ft.	Apr-Aug	**Low.** This species has not been observed on March ARB; however, potentially suitable habitat for this species occurs on Base.

Species	Status	General Habitat Description	Blooming Period	Potential to Occur
Parish’s brittlescale *Atriplex parishii*	CRPR: 1B.1	Annual herb. Occurs in chenopod scrub, playas, and vernal pools in alkaline soils. Elevation range 82 to 6,234 ft.	Jun-Oct	**Low.** This species has not been observed on March ARB; however, potentially suitable habitat for this species occurs on Base.
Davidson's saltscale *Atriplex serenana* var. *davidsonii*	CRPR: 1B.2	Annual herb. In Riverside County, occurs in vernal pools, playas, wetland meadows, and chenopod scrub on alkaline soils. Along the coast, occurs on alkaline soils in coastal bluff scrub and coastal scrub habitats. Elevation range 32 to 656 ft.	Apr-Oct	**Low.** This species has not been observed on March ARB; however, potentially suitable habitat for this species occurs on Base.
Nevin's barberry *Berberis nevinii*	Fed: FE State: SE CRPR: 1B.1	Evergreen shrub. Occurs in chaparral, coastal and riparian scrub communities, and cismontane woodland in gravelly or sandy soils; associated with steep slopes and low grade sandy washes. Elevation range 900 to 2,707 ft.	Mar-Jun	**None.** Habitat for this species does not occur on March ARB.
Thread-leaved brodiaea *Brodiaea filifolia*	Fed: FT State: SE CRPR: 1B.1	Perennial bulbiferous herb. Occurs on clay soils in openings in chaparral, cismontane woodlands, coastal scrub, playas, valley and foothill grasslands, and vernal pools. Elevation range 82 to 4,000 ft.	Mar-Jun	**None.** Suitable soils for this species do not occur on March ARB.
Smooth tarplant *Centromadia pungens* ssp. *laevis*	CRPR: 1B.1	Annual herb. Occurs in chenopod scrub, meadows and seeps, playas, riparian woodland, and valley and foothill grasslands in somewhat alkaline soils. Elevation range 0 to 2,100 ft.	Apr-Sep	**Low.** This species has not been observed on March ARB; however, potentially suitable habitat for this species occurs on Base.
Salt marsh bird's-beak *Chloropyron maritimum* ssp. *maritimum*	Fed: FE State: SE CRPR: 1B.2	Hemiparasitic annual herb. Occurs in coastal dunes and coastal salt marshes and swamps. Elevation range 0 to 98 ft.	May-Oct	**None.** Habitat for this species does not exist on March ARB, and the Base is outside the known elevation range for this species.
Parry's spineflower *Chorizanthe parryi* var. *parryi*	CRPR: 1B.1	Annual herb. Occurs in chaparral, coastal scrub, cismontane woodland, and valley and foothill grasslands in openings, slopes, and flats on dry, sandy, or rocky soil. Elevation range 902 to 4,003 ft.	Apr-Jun	**Low.** This species has not been observed on March ARB; however, potentially suitable habitat for this species occurs on Base.

Species	Status	General Habitat Description	Blooming Period	Potential to Occur
Long-spined spineflower *Chorizanthe polygonoides* var. *longispina*	CRPR: 1B.2	Annual herb. Occurs in chaparral, coastal scrub, meadows and seeps, valley and foothill grasslands, and vernal pools; often in clay soils. Elevation range 98 to 5,020 ft.	Apr-Jul	**None.** Suitable soils for this species do not occur on March ARB.
Santa Ana River woolly-star *Eriastrum densifolium* ssp. *sanctorum*	Fed: FE State: SE CRPR: 1B.1	Perennial herb. Occurs on sandy or gravelly soils in chaparral, alluvial fans, and coastal scrub habitats. Elevation range 298 to 2,001 ft.	Apr-Sep	**None.** Habitat for this species does not occur on March ARB.
Campbell's liverwort *Geothallus tuberosus*	CRPR: 1B.1	Ephemeral liverwort. Occurs in soil in mesic coastal scrub and vernal pool habitats. Elevation range 32 to 1,968 ft.	None specified	**Low.** Potential habitat occurs on Base, however; nearest known occurrence is approximately 24 miles southeast of the Base.
Coulter's goldfields *Lasthenia glabrata* ssp. *coulteri*	CRPR: 1B.1	Annual herb. Occurs in coastal salt marshes and swamps, playas, alkaline marshes, and vernal pools; saline places. Elevation range 3 to 4,003 ft.	Feb-Jun	**Low.** This species has not been observed on March ARB; however, potentially suitable habitat for this species occurs on Base.
Spreading navarretia *Navarretia fossalis*	Fed: FT CRPR: 1B.1	Annual herb. Occurs in chenopod scrub, assorted shallow freshwater marshes and swamps, alkali playas, and undisturbed and moderately disturbed vernal pools. In Riverside County, associated with alkali soils and alkali vernal pool plain habitat. Elevation range 98 to 2,149 ft.	Apr-Jun	**High.** This species has not been observed on March ARB; however, potentially suitable habitat for this species occurs on Base.
California Orcutt grass *Orcuttia californica*	Fed: FE State: SE CRPR: 1B.1	Annual herb. Occurs in vernal pools. Elevation range 49 to 2,165 ft.	Apr-Aug	**Low.** This species has not been observed on March ARB; however, potentially suitable habitat for this species occurs on Base.
Chaparral ragwort *Senecio aphanactis*	CRPR: 2B.2	Annual herb. Occurs in chaparral, cismontane woodland, and coastal scrub habitats. Elevation range 49 to 2,624 ft.	Jan-Apr (May)	**Low.** This species has not been observed on March ARB; however, potentially suitable habitat for this species occurs on Base.

Species	Status	General Habitat Description	Blooming Period	Potential to Occur
Bottle liverwort *Sphaerocarpos drewei*	CRPR: 1B.1	Ephemeral liverwort. Occurs in soil in openings of chaparral and coastal scrub habitats. Elevation range 295 to 1,968 ft.	None specified	**Low.** Potential habitat occurs on Base, however; nearest known occurrence is approximately 22 miles southeast of the Base.
San Bernardino aster *Symphyotrichum defoliatum*	CRPR: 1B.2	Rhizomatous herb. Occurs in meadows and seeps, marshes and swamps, coastal scrub, cismontane woodland, lower montane coniferous forest, and valley and foothill grasslands; often near ditches, streams, and springs or in disturbed places. Elevation range 7 to 6,693 ft.	Jul-Nov	**Low.** This species has not been observed on March ARB; however, potentially suitable habitat for this species occurs on Base.
Woven-spored lichen *Texosporium sancti-jacobi*	CRPR: 3	Crustose lichen. Occurs on soil, small mammal pellets, dead twigs, and on *Selaginella* spp. in openings of chaparral habitat. Elevation range 196 to 2,165 ft.	None specified	**Moderate.** Potential habitat occurs on Base, however; no surveys have been conducted for this species.
California screw-moss *Tortula californica*	CRPR: 1B.2	Moss. Occurs on sandy soil in chenopod scrub and valley and foothill grasslands. Elevation range 10 to 4,790 ft.	None specified	**Moderate.** Nearest documented occurrence is 8.6 miles southeast of Base. No surveys have been conducted on Base for this species.
Wright's trichocoronis *Trichocoronis wrightii* var. *wrightii*	CRPR: 2B.1	Annual herb. Occurs in meadows and seeps, marshes and swamps, riparian forest, and vernal pools in alkaline soils. Elevation less than 1,640 ft.	May-Sep	**Low.** This species has not been observed on March ARB; however, potentially suitable habitat for this species occurs on Base.
Parish's Flatsedge *Cyperus parishii*	None	Annual graminoid. Occurs in wet meadows, seasonal pools, and ephemeral stream channels.	Jul-Oct	**Present.** This species has been observed on March ARB.
Vernal Barley *Hordeum intercedens*	CRPR 3.2	Short-statured annual grass found in vernal pools and vernal wet meadows (wetland meadows).	Apr-May	**Moderate.** This species has not been observed on March ARB; however, suitable habitat occurs on March ARB and there are several occurrences of this species within 5 to 8 miles of the Base.

Species	Status	General Habitat Description	Blooming Period	Potential to Occur
Lemmon's Canarygrass *Phalaris lemmonii*	None	Annual grass found in vernal pools and vernal wet meadows (wetland meadows).	Apr-May	**Low.** This species has not been observed on March ARB. Suitable habitat occurs on Base; however, there are no recent documented occurrences in the vicinity of March ARB.
Southwestern Dock *Rumex violascens*	None	Perennial or facultative annual herb associated with vernal pools, wet meadows, ditches, canal banks, ephemeral drainage channels, and ephemeral lake beds.	Apr-Sep	**Low.** This species has not been observed on March ARB; however, potentially suitable habitat occurs on Base. Nearest documented occurrences are within 6 to 8 miles of the Base.

Sources: CDFW 2020b, CNPS 2020, Jepson Flora Project, 2020
Status Codes
Federal (Fed)
FE = Federal Endangered
FT = Federal Threatened
State of California
SE = State Endangered
ST = State Threatened

CNPS CRPR Classifications
1B = Plants rare, threatened, or endangered in California and elsewhere
2B = Plants rare, threatened, or endangered in California but more common elsewhere
01. = Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
0.2 = Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)

None of the 10 potentially occurring federally protected plant species have been documented as occurring within March ARB; however, full surveys following established protocols have not been conducted for all of the species with potential habitat on the Base. To aid in the identification of potentially occurring special-status plant species, a brief natural history description of species that have a potential to occur on March ARB are provided below. This information is not all-inclusive and is meant to supplement information kept in the NRM's T&E species database.

Special-Status Vascular Plants

San Diego Ambrosia (Federally Listed as Endangered, CRPR 1B.1)

San Diego ambrosia (*Ambrosia pumila*), a federally listed as endangered and CNPS CRPR 1B.1 listed species, is a perennial rhizomatous herb and is a member of the sunflower family (Asteraceae). This species has blue-grey foliage with deeply incised leaves and small, light yellow flowers in raceme-like clusters (Hickman, ed. 1993). The blooming period for San Diego ambrosia is from April to October. This species occurs in habitats that are often disturbed, with sandy loam or clay soils (sometimes alkaline), including chaparral, coastal scrub, valley and foothill grassland, and vernal pools at elevations of 65 to 1,968 ft (CNPS 2020; Keil 2012). San Diego ambrosia is native to California and Baja California.

The primary threats to this species include habitat loss and fragmentation from development and habitat degradation from invasive non-native plants, road maintenance, and foot traffic (CNPS 2020).

San Diego ambrosia has not been observed on March ARB; however, habitat and suitable soils for this species occur on Base. The nearest occurrence of this species is documented approximately 8.3 miles southwest of March ARB in Temescal Valley (CCH 2020).

San Jacinto Valley Crownscale (Federally Listed as Endangered, CRPR 1B.1)

San Jacinto valley crownscale (*Atriplex coronata* var. *notatior*), federally listed as endangered and CNPS CRPR 1B.1 listed species, is an annual herb in the goosefoot family (Chenopodiaceae) that is endemic to California. This species is a bushy, erect plant, 4 to 12 inches tall and endemic to western Riverside County, California. The plant has small leaves that appear grayish and scaly during the growing season and become straw-colored as they mature. The blooming period for San Jacinto valley crownscale is from April to August. This species occurs on alkaline soils in playas, mesic valley and foothill grassland, and vernal pool habitats at elevations of 456 to 1,640 ft (CNPS 2020; USFWS 2013b).

The primary threats to San Jacinto Valley crownscale are flood control, agriculture, non-native plants, urbanization, vehicles, road maintenance, and pipeline construction (CNPS 2020).

San Jacinto valley crownscale has not been observed on March ARB; however, potentially suitable habitat occurs on Base. The nearest documented occurrence of this species is approximately 6 miles southeast of March ARB in the vicinity of the San Jacinto River (CDFW 2020b).

Davidson's Saltscale (CRPR 1B.2)

Davidson's saltscale (*Atriplex serenana* var. *davidsonii*) is a CNPS CRPR 1B.2 listed annual herb in the goosefoot family (Chenopodiaceae) that is native to California and Baja California. This species is an erect or decumbent plant that often forms tangled mats 19 to 78 inches across. The blooming period for Davidson's saltscale is from April to October. In Riverside County, this species occurs on alkaline soils in vernal pools, playas, wetland meadows, and chenopod scrub habitat at elevations from 32 to 656 ft (CNPS 2020).

Davidson's saltscale has not been observed on March ARB; however, habitat occurs on Base. The nearest documented occurrence of this species is approximately 6.3 miles southeast of March ARB in the vicinity of the San Jacinto River (CDFW 2020b).

Parish's Brittlescale (CRPR 1B.1)

Parish's brittlescale (*Atriplex parishii*), a CNPS CRPR 1B.1 listed annual herb, is a member of the goosefoot family (Chenopodiaceae). This species is 7.5 inches and is prostrate to decumbent, with generally flexible, white, scaly stems, which can be densely woolly near the tips. The leaves are opposite, ovate to cordate with an acute tip, and are densely white-scaly. This species has a pistillate inflorescence. The blooming period for Parish's brittlescale is from June to October. This species occurs in alkaline soils in chenopod scrub, playas, and vernal pools at elevations of 80 to 6,235 ft (CNPS 2020). Parish's brittlescale is native to California and Baja California.

The primary threats to this species are development, agricultural conversion, and grazing.

Parish's brittlescale has not been observed on March ARB; however, habitat and suitable soils for this species occur on portions of March ARB. The nearest occurrence of this species was documented along the San Jacinto River, approximately 6.3 miles southwest of March ARB (CCH 2020).

Smooth Tarplant (CRPR 1B.1)

Smooth tarplant (*Centromadia pungens* ssp. *laevis*), a CNPS CRPR 1B.1 listed annual herb, is a member of the sunflower family (Asteraceae). This species is 4 to 47 inches tall and has simple, spine-tipped basal and cauline leaves that are linear to lanceolate. It has yellow flowers that are 0.2 to 0.3 inch in diameter and are either solitary or a few in loose clusters, with more than 20 ray flowers, which have 2 teeth, and more than 100 disk flowers. The single-seeded achenes from the disk flowers lack a pappus (Hickman, ed. 1993; Clarke et al. 2007). The blooming period for Smooth tarplant is from April to September. This species occurs in somewhat alkaline soils in chenopod scrub, meadows and seeps, playas, riparian woodland, and valley and foothill grassland at elevations of 0 to 2,100 ft (Clarke et al. 2007; CNPS 2020). Smooth tarplant is endemic to California.

The primary threats to this species are agriculture, road maintenance, urbanization, and flood control projects (CNPS 2020).

Smooth tarplant has not been observed on March ARB; however, habitat and suitable soils for this species occur on portions of March ARB. The nearest occurrence of this species was documented in Sycamore Canyon Park, approximately 0.6 mile east of March ARB (CDFW 2020b). The related common spikeweed (*Centromadia pungens* ssp. *pungens*) has been found on the Base.

Parry's Spineflower (CRPR 1B.1)

Parry's spineflower (*Chorizanthe parryi* var. *parryi*), a CNPS CRPR 1B.1 listed annual herb, is a member of the buckwheat family (Polygonaceae). This species is prostrate to ascending, with strigose hairs on the stems. The involucral tube is urn-shaped and has awns that are hooked, with white, sparsely hairy flowers (Hickman, ed. 1993). The blooming period for Parry's spineflower is from April to June. This species occurs in sandy or rocky openings in chaparral, cismontane woodland, coastal scrub, and valley and foothill grassland habitats at elevations of 900 to 4,000 ft (CNPS 2020). Parry's spineflower is a California endemic.

The primary threats to this species include habitat loss, fragmentation, and degradation from altered flood regimes, development, mining, invasive non-native plants, and off-road vehicles.

Parry's spineflower has not been observed on March ARB; however, habitat and suitable soils for this species occur on Base. The nearest occurrence of this species was documented south of Box Springs Road, approximately 2.7 miles northwest of March ARB (CCH 2020).

Coulter's Goldfields (CRPR 1B.1)

Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri*), a CNPS CRPR 1B.1 listed species, is an annual herb in the aster family (Asteraceae) that is native to California and Baja California. This species has yellow flowers, reaches up to 2 feet in height, and has fruit covered with rusty or yellow wart-like papillae. The blooming period for Coulter's goldfields is February to June. This species occurs in coastal salt marshes and swamps, playas, and vernal pools at elevations from 3 to 4,003 ft (CNPS, 2020).

The primary threats to Coulter's goldfields species are urbanization, agricultural development, and road maintenance. Foot traffic and drought are also potential threats (CNPS 2020).

Coulter's goldfields has not been observed on March ARB; however, potentially suitable habitat for this species occurs on Base. The nearest occurrence of Coulter's goldfields is approximately 6 miles southeast of March ARB, just southeast of the Ramona Expressway and Martin Road Intersection (CDFW 2020b).

Spreading Navarretia (Federally Listed as Threatened; CRPR 1B.1)

Spreading navarretia (*Navarretia fossalis*), a federally listed as threatened and CNPS CRPR 1B.1 listed species, is an annual herb in the phlox family (Polemoniaceae) that is native to California and Baja California. This species resembles a pincushion, grows to 6 inches high, has pinnately-lobbed leaves, and has small, white to purple flowers. The blooming period for spreading navarretia is April to June. This species occurs in chenopod scrub, freshwater marshes and swamps, playas, and vernal pools at elevations from 98 to 2,149 feet (CNPS 2020).

The primary threats to spreading navarretia are urbanization, agriculture, road construction, grazing, flood control, non-native plants, illegal dumping, foot traffic, and vehicles. This species is also potentially threatened by hydrological alterations (CNPS 2020).

Spreading navarretia has not been observed on March ARB; however, habitat for this species occurs on Base. The nearest occurrence of spreading navarretia is approximately 5.9 miles southeast of March ARB at the ends of 12th and 13th Streets along the San Jacinto River flood channel (CDFW 2020b).

California Orcutt Grass (CRPR 1B.1)

California Orcutt grass (*Orcuttia californica*), a federally and state listed as endangered and CNPS CRPR 1B.1 listed species, is a small annual herb in the grass family (Poaceae) that reaches about 4 inches in height, is bright gray-green, and secretes sticky droplets (USFWS 1998). Inflorescences consist of seven spikelets arranged in two ranks, with the upper spikelets overlapping on a somewhat twisted axis (USFWS 1998). The blooming period for California Orcutt grass is from April through August. This species almost always occurs under natural conditions in wetland communities, primarily vernal pools, in valley grassland, freshwater wetlands, and wetland-riparian at elevations of 50 to 2,165 ft. California Orcutt grass is native to California and Baja California. This species is seriously threatened and is known from fewer than 20 occurrences (CNPS 2020). The species only germinates and reaches a detectable condition in favorable years; the exact conditions that trigger germination in the wild are poorly understood, but USFWS has noticed that periods as long as 20+ years may pass between years in which this species appears in pools in which it is known to occur. The species presumably has a long-lived seed bank.

The primary threats to this species include habitat loss and fragmentation from urban and agricultural development and habitat degradation from invasive non-native plant species, livestock grazing, and off-road vehicles (CNPS 2020).

California Orcutt grass has not been observed on March ARB; however, habitat for this species occurs on Base. The nearest occurrence of this species is documented just west of the San Jacinto River, approximately 5.6 miles southwest of March ARB (CCH 2020).

Chaparral Ragwort (CRPR 2B.2)

Chaparral ragwort (*Senecio aphanactis*), a CNPS CRPR 2B.2 listed annual herb, is a member of the aster family (Asteraceae) that grows 2 to 8 inches high. The leaves are 0.8 to 1.6 inches long with an oblanceolate to linear shape and lobed edges. Flower heads are urn-shaped with yellow ray flowers emerging from the tip. The blooming period for chaparral ragwort is January to April. This species occurs in chaparral, cismontane woodland, and coastal scrub at elevations from 45 to 2,625 ft.

The primary threat to the species is development (CNPS 2020; Trock 2012).

Chaparral ragwort has not been observed on March ARB; however, potentially suitable habitat for this species occurs on Base. The nearest documented population of this species is in San Timoteo Canyon, approximately 10.2 miles northeast of March ARB (CCH 2020).

San Bernardino Aster (CRPR 1B.2)

San Bernardino aster (*Symphyotrichum defoliatum*), a CNPS CRPR 1B.2 listed perennial rhizomatous herb, is a member of the sunflower family (Asteraceae). This species grows to a height of 1.3 ft and has basal and cauline leaves that are narrowly oblong to oblanceolate, with the largest ones near the base of the stem reaching up to 4.7 inches long. The stem and leaves are roughly hairy. The inflorescence is a narrow cyme-like cluster, with many white to pale violet ray florets (Hickman, ed. 1993). The blooming period for San Bernardino aster is from July to November. This species occurs in disturbed areas and near ditches, streams, and springs in cismontane woodland, coastal scrub, lower montane coniferous forest, meadows and seeps, marshes and swamps, and vernally mesic valley and foothill grassland habitats at elevations of 5 to 6,690 ft (CNPS 2020; Hickman, ed. 1993). San Bernardino aster is endemic to California.

The primary threats to this species are unknown.

San Bernardino aster has not been observed on March ARB; however, habitat for this species occurs on Base. The nearest occurrence of this species was documented in San Timoteo Canyon, approximately 10 miles northeast of March ARB (CCH 2020).

Wright's Trichocoronis (CRPR 2.1)

Wright's trichocoronis (*Trichocoronis wrightii* var. *wrightii*), a CNPS CRPR 2.1 listed annual herb, is a member of the sunflower family (Asteraceae). This species is less than 12 inches in height and ascending, with sessile, opposite leaves that are oblong and serrated. The inflorescence is hemispheric to bell-shaped, with flowers that have white throats above and maroon below with white lobes (Hickman, ed. 1993). The blooming period for Wright's trichocoronis is from May to September. This species occurs in alkaline soils in meadows and seeps, marshes and swamps, riparian forest, and vernal pools at elevations of less than 1,640 ft (CNPS 2020; Keil and Powell 2012). Wright's trichocoronis is native to California and Texas. This species only grows during the warm months of the year and requires wet soils or shallow inundation through at least early summer to grow. It has never been observed before June in Riverside County.

The primary threats to this species are habitat loss, fragmentation, and degradation due to agricultural and urban development.

Wright's trichocoronis has not been observed on March ARB, and March ARB is higher than the maximum elevation at which this species has been recorded; however, habitat and suitable soils for this species occur on portions of March ARB. The nearest documented population of this species is within the San Jacinto Wildlife area, approximately 5.7 miles southwest of March ARB (CCH 2020).

Parish's Flatsedge

Parish's Flatsedge (*Cyperus parishii*) is an annual species of flatsedge that grows in wet meadows, pools, stream banks, and the beds of ephemeral drainages. Although not listed as endangered and not ranked by the State of California, USFWS has evaluated this species and determined that it is rare and declining. Only 60 historical occurrences are known for this species across its range, 22 of them in Southern California, and several of the historical occurrences in California have been eliminated by urban and agricultural development.

This species has been observed on March ARB. USFWS recommends that March ARB make continuing efforts to relocate this species on the Base (especially during years with prolonged vernal ponding, or with repeated major rain events during the spring months, or ponding occurring subsequent to rare summer thunderstorms), collect seed from it, and re-distribute the collected seed to potentially suitable sites on Base as a hedge against potential impacts from future development projects on the Base.

Vernal Barley (CRPR 3.2)

Vernal Barley (*Hordeum intercedens*) is a short-statured native species of barley restricted to vernal pools, wet meadows, ephemeral drainages, and ephemeral or intermittent lake beds. Its current distribution and abundance is unclear, since the species appears virtually identical to its more common sister species Dwarf Barley (*Hordeum depressum*) and *Hordeum pusillum*; it is virtually impossible to distinguish these three species from each other while in the field. In Riverside County, Vernal Barley was formerly distributed from the Hemet Valley north and west to Lakeview, Perris, and the Lake Elsinore area. It was formerly a dominant component of wetland prairies on the San Jacinto Wildlife Area and the downstream vernal floodplains of the San Jacinto River. At present, the Riverside County occurrences of this species have been largely eliminated by a combination of agricultural development and local drainage projects.

Lemmon's Canarygrass

Lemmon's Canarygrass (*Phalaris lemmonii*) is a native species of canarygrass found in vernal pools, wet meadows, ephemeral drainages, and ephemeral or intermittent lake beds. While formerly widespread in vernal wetlands across Southern California and the Central Valley, anecdotal reports from professional botanical surveyors suggest that the species has mostly disappeared from Riverside County and perhaps from other parts of California as well. In Riverside County, Lemmon's Canarygrass was formerly distributed from the Hemet Valley north and west to Lakeview, Perris, and the Lake Elsinore area, as well as at the vernal pools on the Santa Rosa Plateau. At present, the Riverside County occurrences of this species have been largely eliminated by a combination of agricultural development and local drainage projects. It is also suspected that remnant populations of this species may be disappearing partially as a result of hybridization with several weedy non-native species of canarygrass (*Phalaris* species) that have been accidentally introduced from the Mediterranean Basin and are now widely distributed as weeds in agricultural fields and roadside ditches.

Southwestern Dock

Southwestern Dock (*Rumex violascens*) is a native species of dock that grows in wet meadows, vernal pools, stream banks, and the beds of ephemeral drainages. Although not listed as endangered and not ranked by the California Native Plant Society, USFWS has evaluated this species and determined that it is rare and declining. Only approximately 35 historical occurrences are known for this species in California, and several of the historical occurrences in California may have been eliminated by urban and agricultural development.

This species can be easily mistaken for any of several weedy non-native species of docks (*Rumex* species) that have been accidentally introduced to Riverside County from Europe. Because of extensive overlap in leaf characteristics among many species of docks, definitive identification of most docks depends on examining minute features of their seeds (the tubercules) under a magnifying scope.

Palmer Goldenbush (CRPR 1B.1 ?)

The shrub species *Ericameria palmeri* is present on March ARB. However, it is not clear which subspecies is/are present on the Base. March ARB is located in an area of range overlap between both of the species' subspecies, *Ericameria palmeri* ssp. *palmeri* and *E. palmeri* ssp. *pachylepis*. Subspecies *pachylepis* is not considered rare; however, subspecies *palmeri* is classified as Rare and Endangered by CNPS (List 1B.1). It is possible that either or both of the subspecies are present on the Base.

USFWS recommends that March ARB collect samples (flowering twigs) from this species at all locations where it occurs on the Base and request a definitive identification of the specimens to the subspecies level from either the Herbarium at the University of California at Riverside, and/or the Botany Curator at the San Diego Natural History Museum. Should the endangered subspecies *E. p. palmeri* prove to be present on the Base, USFWS recommends that the Base develop a management plan to avoid extirpating the endangered subspecies from the Base and to allow a reasonable level of reproduction to take place, consistent with the needs of the military mission.

Special-Status Non-Vascular Plants

Campbell's Liverwort (CRPR 1B.1)

Campbell's liverwort (*Geothallus tuberosus*), a CNPS CRPR 1B.1 listed species, is a small and ephemeral liverwort that has small, round fruiting bodies on its green thallus. It is typically found in openings in chaparral and sage scrub. It could occur in mowed areas if there is not a build-up of thatch material from the mowing. It grows on flat mesas and habitat that is somewhat similar to the portions of the Base that support low stature native shrubs. The nearest documented occurrence of Campbell's liverwort is approximately 24 miles southeast of the Base in the Elsinore Mountains (CDFW 2020b).

Bottle Liverwort (CRPR 1B.1)

Bottle liverwort (*Sphaerocarpos drewei*), a CNPS CRPR 1B.1 listed species, is a small liverwort that occurs in sage scrub or chaparral habitat on the eastern foothills of the Santa Ana Mountains (CNPS 2020). It has also been collected in La Jolla, San Diego County, which supports sage scrub habitat as well as chaparral on the slopes. It typically grows on soils that hold moisture longer and is associated with other liverworts, particularly *Riccia* spp. Black crystalwort (*Riccia nigrella*) has been documented on Base, which shows that habitat does exist for bottle liverwort. There is potential for bottle liverwort to occur in the areas of the Base that are mowed but that do not support a dense layer of vegetative thatch from the mowing debris. The nearest documented occurrence of bottle liverwort is approximately 22 miles southeast of the Base in the Santa Rosa Plateau Ecological Reserve (CDFW 2020b).

Woven-spored Lichen (CRPR 3)

Woven-spored lichen (*Texosporium sancti-jacobi*), a CNPS CRPR 3 listed species, is a small whitish colored lichen with distinctive green color apothecia (fruiting bodies) that grows on soil crusts and rabbit droppings and has been found not far from the Base (CNPS 2020). It occurs on mesas and habitat that may exist on the Base where there is not a build-up of grass and vegetation clippings from periodic mowing. The nearest documented occurrence of woven-spored lichen is approximately 7 miles southwest of the Base in the Gavilan Hills (CDFW 2020b).

California Screw Moss (CRPR 1B.2)

California screw moss (*Tortula californica*), a CNPS CRPR 1B.2 listed species, occurs on thin soil over rock in chenopod scrub and valley and foothill grassland habitats (CNPS 2020). There generally does not seem to be habitat for this species on the Base, but there is a moderate potential that it could occur there. The nearest documented occurrence of California screw moss is approximately 8.6 miles southeast of the Base in the Lakeview Mountains (CDFW 2020b).

2.3.4.3 Climate Change and Threatened and Endangered Species

T&E plant and animal species could decline on March ARB due to climate change. Declines at March ARB could result from geographic shifts in species' ranges. Birds, for example, shifted northward between 0.1 and 0.5 miles per year in the United States from 1975 to 2004 (USGCRP 2018). Although available habitats at March ARB are not expected to change significantly in the future, species that are threatened by habitat loss and are decreasing in numbers across their ranges could experience reduced numbers or frequency at March ARB. Although it is unknown how climate change will affect listed fairy shrimp, drought years or years with limited ponding duration (due to lack of rain or increased temperatures) could induce hatching but not support ponded habitat for sufficient time for sexual maturation. Repeated years of unsuccessful reproduction could deplete the cyst banks for listed species (CH2M 2020a). Based on ecological niche modeling, the SKR is not expected to face much physiological threat from climate change, but their ideal habitat will likely shift westward in the future (Wilkening et al. 2019). In the vicinity of March ARB, SKR would not be expected to shift much, however, because of constraints from urbanized development. The potential for protected plant species to occur on March ARB would remain relatively consistent given that minimal changes to the habitats at March ARB are anticipated.

2.3.5 Wetlands and Floodplains

2.3.5.1 Wetlands

Wetlands are protected under Section 404 as a subset of the "waters of the United States" of the CWA, as well as EO 11990, *Protection of Wetlands*. Federal agencies are required to take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the beneficial values of wetlands. USACE defines wetlands as:

> *"those areas that are inundated or saturated with ground or surface water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR 328)."*

Section 401 of the CWA gives the state board and regional boards the authority to regulate, through water quality certification, any proposed federally permitted activity that may result in a discharge to water bodies, including wetlands.

In general, wetlands at March ARB are limited in their distribution on Base because of the Base's low-rainfall Mediterranean climate. A USACE Jurisdictional Determination conducted in 2009 resulted in a Preliminary Jurisdictional Determination finding for 19,200 linear ft of drainages and 28 seasonally ponded features on Base subject to CWA regulation. In addition, four seasonally ponded features that are not under USACE jurisdiction, but which may be regulated by other federal, state, or local laws (e.g., protected under ESA as fairy shrimp habitat), were determined to occur (SAIC 2010). Jurisdictional determinations by the USACE in 2014 and 2015 identified an additional 10,764 linear ft of jurisdictional stream and 0.57 acre of wetland in Heacock Channel and 3,990 linear ft of jurisdictional stream within the Perris Valley Storm Drain within the installation boundaries (Glenn Lukos 2014, 2015). Jurisdictional delineation reports for March ARB are included in Appendix D. A total of 76 seasonally ponded features were identified on Base during the 2019 wet season fairy shrimp surveys (CH2M 2020a).

Vernal pools/seasonal wetlands are temporary pools of water that form in areas with either bedrock or a hard clay layer in the soil. Although generally isolated, vernal pools/seasonal wetlands are sometimes connected to each other by small drainages known as vernal swales (EPA 2018a). The wetlands are filled with water during the rainy season and the water evaporates after the rain stops, eventually drying out in the spring or early summer. Changing climate conditions, such as rising air and surface water temperatures and alterations in precipitation patterns, may affect the timing and length of inundation of wetland features at March ARB.

2.3.5.2 Floodplains

The entire installation is categorized as either Zone D, indicating an area of undetermined but possible flood hazards, or Zone X, an area determined to be outside the 100- or 500-year floodplain. Although no portion of the Base is within a mapped floodplain, the FEMA Map Assistance Center indicated that the Base has not been mapped (MARB 2012). Areas of Zone A, which are inside a 100-year floodplain, lie parallel to the eastern boundary of the Base on the east side of 8th Street and in a small area north of Alessandro Boulevard and north of the Base. March ARB is not located in a coastal area and alterations to mapped floodplains on March ARB would not be expected as a result of climate change.

2.4 Mission and Natural Resources

2.4.1 Natural Resource Constraints to Mission and Mission Planning

Natural resource constraints could have an adverse impact on the Base's flying mission or future planning operations. The potential negative impacts could range from a delay in the construction of new buildings to loss of life as a result of severely damaged aircraft. These issues should be clearly identified, a schedule for their resolution should be prepared, and the standard environmental review process (i.e., USAF 332 Work Request Form) should be followed. The natural resources constraints to Base planning and mission are presented in the following list and included on the Composite Natural Resources Constraints Map in Appendix G.

- The large acreage of open grassland, seasonal flooding, and drainage ways provide adequate habitat for numerous species that pose a safety hazard to the flying mission. The adaptive management strategies established in this INRMP should be implemented to ensure the safety of the flying mission and to protect special-status species.
- The BASH Program should be continually implemented and coordinated with the INRMP to include habitat modification, active harassment, and bird/wildlife awareness education for all Base personnel, especially individuals involved with aircraft operations and grounds maintenance activities.
- Jurisdictional drainages have been identified and delineated on March ARB (see Section 2.3.5). It is necessary to ensure that inadvertent violations do not occur and that the appropriate permits are obtained prior to encroachments into the areas that cannot be avoided. The location and extent of floodplains on March ARB have not been determined.
- On-Base land-disturbing activities may result in erosion and sedimentation if the disturbed areas are not protected by adequate erosion and sedimentation controls. Furthermore, surface water discharges may be in violation of the total suspended solids effluent limitation requirements of the Base's stormwater permit (National Pollutant Discharge Elimination System [NPDES] No. CA 0111007).

2.4.2 Land Use

March ARB occupies approximately 2,162 acres in an urban/industrial environment. Land use at March ARB is managed to meet the needs of the operational missions. The majority of the grounds, approximately 1,170 acres, have been developed and either have an impervious surface (e.g., streets, sidewalks, buildings, airfields, runways) or lawns and landscape plantings that require intensive maintenance and upkeep. The remainder of the Base, approximately 980 acres, is undeveloped and consists of vegetated areas, most of which undergo regular grounds maintenance activities to decrease BASH threats and support safe flight conditions on Base.

The eastern portion of March ARB consists of base infrastructure, including administrative offices, industrial areas, and recreational facilities, including a fitness center, café, and lodging. The central portion of the Base consists of runways, aircraft parking aprons, and clear zones and is bordered on the north and west by undeveloped open areas.

A unique element of land use on March ARB is the presence of a National Register of Historic Places (NRHP) Historic District. The Historic District occupies portions of the administrative area and the flightline and consists of essentially all buildings and structures constructed between 1928 and 1943 and one extant building from the original 1918 March Field. In 1994, the March Field Historic District was listed on the NRHP with the concurrence of the California State Historical Preservation Officer (SHPO).

2.4.3 Current Major Mission Impacts on Natural Resources

This discussion focuses on the Base's existing conditions and current major impacts on the local environment related to hazardous materials (HAZMAT)/hazardous wastes (HAZWASTE), Environmental Restoration Program (ERP) sites, water quality, soil erosivity, noise, air pollution, and pest management.

2.4.3.1 Hazardous Materials and Hazardous Wastes

The operation of aircraft, vehicles, and equipment requires the use of various HAZMAT, including fuels, solvents, lubricants, and caustics. If released into the environment, these materials have the potential to cause harm by impacting air, soil, and/or water quality. The activity at the Base that poses the greatest potential threat to the local environment is the transfer and storage of petroleum, oil, and lubricant (POL) materials. The Base has implemented several environmental programs (e.g., spill control and response, HAZWASTE management, and stormwater pollution prevention) that have been successful in controlling HAZMAT and HAZWASTE released into the environment.

The *March ARB Spill Prevention, Control, and Countermeasure (SPCC) Plan* (Spill Plan; MARB 2015) specifies procedures to be followed when responding to releases, accidents, and spills involving petroleum products, including spill detection, reporting, containment, cleanup, and disposal procedures. The Spill Plan also describes preventive actions that are designed to reduce the potential for petroleum product spills and prevent them from entering the surrounding environment. Drainages and vernal pools are the most vulnerable to spills because they are natural recipients of drainage flows and runoff. The Spill Plan also presents response and required notification procedures that must be accomplished when releases occur.

In addition, March ARB has implemented a pharmacy distribution system for HAZMAT. The purpose of the pharmacy system is to minimize and organize the usage of HAZMAT, thus reducing HAZWASTE generation. Furthermore, all HAZMAT are evaluated to determine if less toxic alternative materials could be used during the industrial process. Materials are allocated from the pharmacy for use at the Base's industrial shops on an as-needed basis. Any unused portion of a material is returned to the pharmacy, where it can be made available for other users.

Industrial activities at March ARB fall into four general activities: (1) aircraft maintenance, (2) ground vehicle maintenance, (3) facility maintenance, and (4) POL operations and other tenant activities. Specific waste streams are associated with each activity.

Civil engineering (CE) is part of the support group responsible for the upkeep of the Base's facilities, roads, and fuel system. Shops under CE include welding, electrical, paint, liquid fuels maintenance, pest control, plumbing, and air conditioning and refrigeration. Typical wastes generated by the CE shops include paints, pesticides, degreasing solvent, fuel spill residues, and POLs.

POL operations include receiving, storing, and dispensing of jet fuel. The POL Complex consists of two 2-million-gallon jet fuel aboveground storage tanks (ASTs) and one 1-million-gallon jet fuel AST. These tanks are supplied by an off-Base fuel pipeline. Fuel is then delivered to the flightline via two hydrant systems. Each system consists of two 420,000-gallon jet fuel ASTs. All of the jet fuel ASTs are inside concrete secondary containment that discharges to oil/water separators. Wastes generated by POL operations include fuel-contaminated water and fuel-contaminated absorbent.

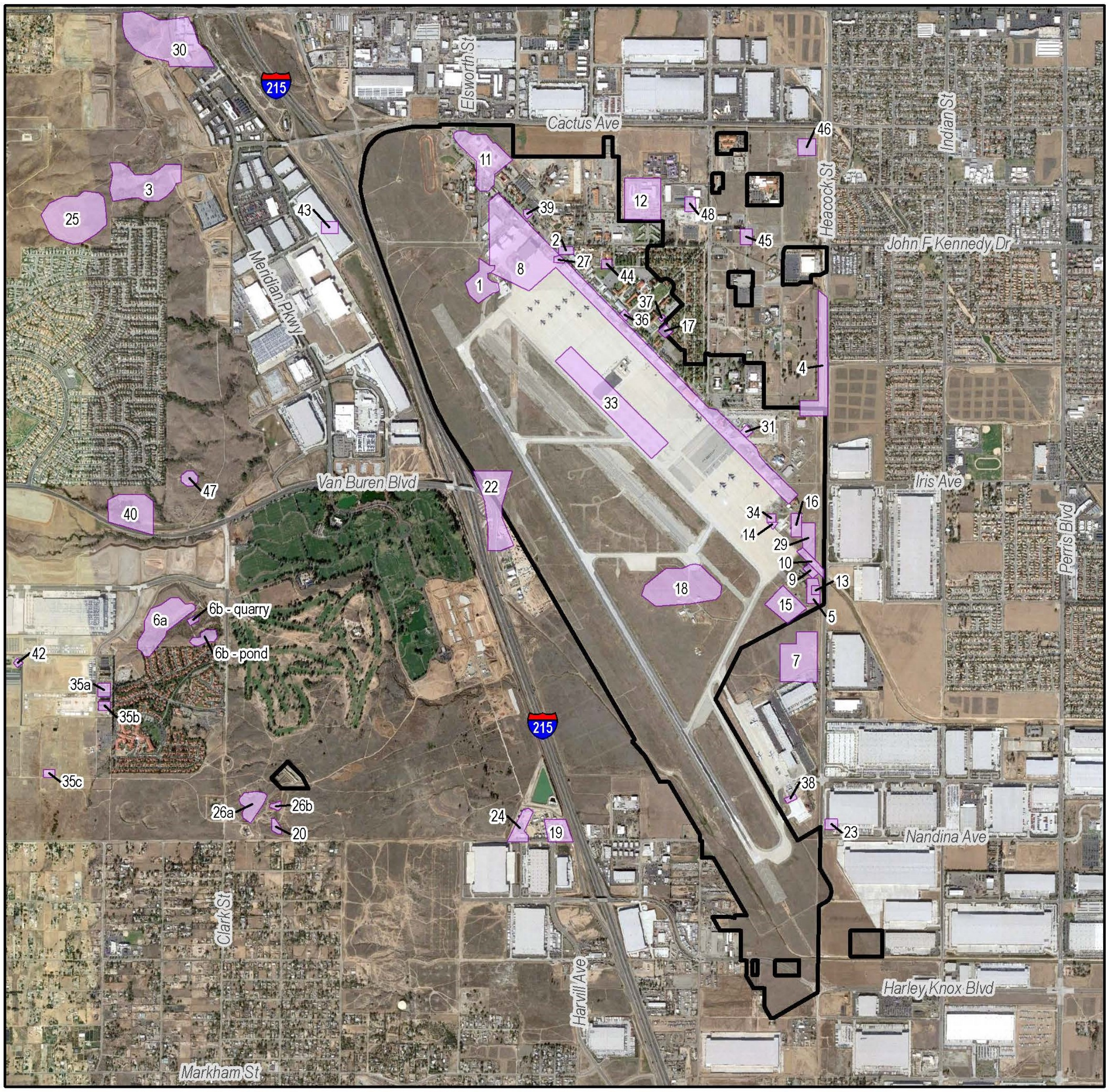
POL transfer and storage operations take place throughout the Base. Accidental jet fuel spills and leaks occurring at the POL Complex are protected from entering the storm sewer system by concrete secondary containment dikes and trenches. However, accidental POL spills that may occur in other parts of the Base that are not protected by secondary containment would flow directly to the stormwater drainage system.

The *Hazardous Waste Management Plan* (MARB 2019d) outlines procedures for the proper accumulation, collection, transportation, and disposal of HAZWASTE. It is designed to ensure that HAZWASTE are disposed of in a legal and timely manner. The Base generates more than a ton of HAZWASTE per month and, therefore, is a large quantity generator of HAZWASTE. The generating organization and the 452 Mission Support Group (MSG)/Civil Engineering Environmental Flight (CEV) are responsible for managing HAZWASTE. The 452 MSG/CEV complies with all pertinent federal, state, USAF, and local regulatory requirements. A U.S. Environmental Protection Agency (EPA) HAZWASTE generator number (CA4570024527) has been issued to March ARB for the use of tracking HAZWASTE.

Common activities conducted at March ARB that generate hazardous waste include aircraft maintenance, vehicle maintenance, and architectural and coating operations. The Base has one 90-day Hazardous Waste Accumulation Facility at Building 2333 for storing and staging hazardous waste for offsite shipment and several aboveground storage units (portable/stationary/tanks/containers) for the storage of hazardous waste for 90 days or less. March ARB wastes are disposed of through the Defense Logistics Agency Services at Camp Pendleton, California (MARB 2019d).

2.4.3.2 Environmental Restoration Programs

DoD established the ERP, formerly the Installation Restoration Program, to ensure that military installations identify and evaluate suspected problems associated with past waste disposal actions. March AFB was placed on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List on November 21, 1989. The Base currently conducts activities under ERP in accordance with the Federal Facility Agreement among the USAF, EPA Region 9, the Regional Water Quality Control Board (RWQCB) – Santa Ana Region, and the California Department of Health Services – Department of Toxic Substances Control, effective September 27, 1990. Currently, 22 ERP sites are assigned to March ARB; ERP sites outside the main cantonment area are managed by the Air Force Real Property Agency. Figure 2-19 illustrates the ERP sites summarized in Table 2-7.



Legend

March Air Reserve Base

Environmental Restoration Program (ERP) Site

Sites not on map:
Site 21 is approximately 1.5 miles south of the base
Site 28 is a group of monitoring wells spread across the base
Site 32 is construction debris no longer managed as a separate site
Site 41 is approximately 19 miles west of Barstow, California
Site 49 is basewide groundwater treatment

Source:
1) Google Earth Pro

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Figure 2-19
Location of Environmental
Restoration Program Sites
March Air Reserve Base
Integrated Natural Resources Management Plan
2021

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Figure 2-19. Location of Environmental Restoration Program (ERP) Sites at March ARB

Table 2-7. Summary of Environmental Restoration Program (ERP) Sites at March ARB

ERP Site No.	Location	Site Name and Description	Contaminants
1	Northwest end of aircraft parking apron	Aircraft Isolation Area – Area used to drain fuel from damaged aircraft. NFA required.	None above action levels
2	Northwest of Facility 420	Waste Oil Pit/Solvent Tanks – Location of seven former USTs and four ASTs containing fuel, waste oil, and spent solvents. Groundwater contamination being handled under Site 49.	TPH, TCE
5	Southeast of the flightline	Landfill 3 – Base landfill from the 1940s to approximately 1960 for domestic waste and construction rubble. NFA required.	None above action levels
8	Industrial shop area east of flightline	Flightline Shop Zone – Industrial shops along the flightline and operating since 1918. NFA for soil contamination. Groundwater contamination being handled under Site 49.	TCE, oil and grease
9	Southeast end of the flightline apron	Main Oil/Water Separator – Site constructed in 1974 and has received various waste fuels, oils, solvents, and other flightline wastes. NFA required.	None above action levels
10	Southeast end of the flightline apron and the industrial shop zone	Flightline Drainage Channel – Drainage channel installed prior to 1940, reportedly has received various waste POL, solvents, and battery acid; concrete lining installed in 1960; soil has been remediated. NFA required.	None above action levels
11	Northern boundary, east of the West Gate	Bulk Fuels Storage Area – A 10,000-gallon JP-4 fuel spill occurred in 1976 and periodic maintenance has released fuel to the ground at this site. Land use controls restricting residential land use in place.	PAHs
13	Within the northern portion of Site 5	Tank Truck Spill Site – In 1973, approximately 5,000 gallons of JP-4 spilled to the ground. NFA required.	None above action levels
14	Southeast of the flightline apron, 50 to 100 ft west of Site 16	Liquid Fuel Pump Station Overflow – In 1973, approximately 1,000 gallons of JP-4 spilled to the ground. NFA required.	None above action levels
15	Southeast of the end of the runway	Fire Protection Training Facility 3 – Fire training exercises included burning JP-4; effluent captured in unlined holding ponds from 1978 to 1991; site has been remediated. NFA required.	TPH, carbon tetrachloride
16	South end of the flightline apron	East March Sludge Drying Beds – Sludge drying beds used from 1938 to 1977 for the former East March Wastewater Treatment Plant. NFA required.	None above action levels
18	Center of the airfield near Taxiway 2	Engine Test Cell – Groundwater monitoring in progress, fuel removed from monitoring wells when found.	Benzene, xylenes, 1,2-dichloroethane
27	Facility 422, west of Site 2	Facility 422 Underground POL – Six 50,000-gallon USTs installed in 1941 that have stored various fuels, solvents, and waste POL; USTs have been removed. NFA required.	Oil and grease, organic solvents

ERP Site No.	Location	Site Name and Description	Contaminants
29	North of Site 9	Fire Training Area 1 – Fire training exercises were conducted here prior to 1951 by burning waste POL and solvents. NFA required.	None above action levels
31	East side of Facility 1211	Solvent Spill – Solvents were discharged to the ground from the mid-1950s to the mid-1970s, an oil/water separator on site has released effluent from an industrial facility. Groundwater contamination transferred to Site 49.	TCE
33	Central portion of the Base, on the aircraft parking apron	Panero Aircraft Fueling System – Extensive soil and groundwater contamination at this site of a former aircraft refueling facility, which includes a pumphouse, tank farm, and associated underground piping; approximately 15,000 cubic yards of soil have been remediated. Groundwater monitoring in progress, fuel removed from monitoring wells when found.	TPH
34	Southeast end of the flightline, next to Facility 1245	Pritchard Aircraft Fueling System – Contaminated soil at the site of a former aircraft refueling facility; in operation from 1962 to 1990; six 50,000-gallon USTs were removed in 1991.	PAH, TPH
36	Near the southwest corner of Facility 458	Solvent Disposal Area – A leach pit connected to solvent sinks may have been used to capture solvents; releases may have occurred. Groundwater contamination being handled under Site 49.	TCE, chlorobenzene
37	Central portion of the Base, near Facility 317	Transformer at Facility 317 – PCB-contaminated soil was discovered in 1984; soil has been excavated and removed. NFA required.	None above action levels
39	On Graeber Street, northwest of Meyer Drive at Facility 2406	Abandoned Gas Station – UST removed; remaining contamination cleaned up by bio-venting. NFA required.	TPH
44	Beneath Elevated Water Tower Facility 407	Mercury by Water Tower – Mercury from a water level control leaked into the soil; soil was removed in 1997. NFA required.	None above action levels
49	Basewide Groundwater	Groundwater contamination is being treated at the Base boundary.	PCE, TCE, carbon tetrachloride

Notes:
*Site 28, Zone Groundwater Monitoring Program 1, is being investigated by potential source areas such as Site 2 and Site 8. Required remedial action for these sources is provided under the site containing source.

AST = Aboveground Storage Tank
POL = petroleum, oil, and lubricant
NFA = No Further Action
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
PCE = Perchloroethene
TCE = trichloroethene
TPH = total petroleum hydrocarbons
UST = Underground Storage Tank

2.4.3.3 Water Quality

Surface water quality at March ARB can be detrimentally impacted by fuel or other HAZMAT spills or leaks, air pollution sources, seepage from ERP sites, and sediments from soil erosion. Several pollutants could be present in the stormwater at the Base and potentially enter waters of the State. These pollutants are detergents/soaps, glycols, oil and grease, miscellaneous solvents, and various hazardous constituents of fuels used at the Base (i.e., benzene, toluene, xylene, cyclohexane, ethylbenzene, and naphthalene). These contaminants can enter stormwater via spills during aircraft and vehicle fueling, and other spills and leaks. The potential for spills and leaks is avoided and/or minimized by using secondary containment where necessary.

The Water Quality Act of 1987 amended the CWA to include the regulation of stormwater discharges. In November 1990, EPA published its Phase I stormwater regulations (EPA 1990) that required large municipalities and specific industrial classes to be covered under a NPDES stormwater permit by October 1, 1993.

Facilities without an existing stormwater permit can obtain coverage from their NPDES control authority in one of three ways:

1. Filing a Notice of Intent for coverage under a "baseline" general permit.
2. Applying for an individual permit that is tailored to the specific facility.
3. Applying with a group of similar industries for coverage under a "multi-sector" general permit.

Multi-sector general permits allow industries with similar types of activities and operations to group together during the application process and receive coverage under a general permit tailored to their special requirements. Although the USAF submitted a group application request for coverage under a multi-sector general stormwater permit in 1991, March AFB and many other installations were not included under the application.

California is authorized to administer the NPDES program and is responsible for administering the state stormwater permit program. March ARB resides in the jurisdiction of the Santa Ana Region of the California RWQCB. March ARB is operating under NPDES General Permit for Storm Water Discharges Associated with Industrial Activities, Order NPDES No. CAS000001, also known as the California Statewide Storm Water Industrial General Permit Order 2014-0057-DWQ (MARB 2019c). The Base is divided into four localized watersheds, identified as Watershed No. 1, Watershed No. 2, Watershed No. 3, and Watershed No. 4, which represent the four areas of stormwater deposition from areas on and outside the Base. Each watershed discharges through one of four NPDES-permitted discharge areas (Discharge Serial Nos. 001, 002, 003, 004), as shown on Figure 2-3 (MARB 2019c).

Sedimentation resulting from erosion can impact water quality. The Base often has several land development projects occurring at any one time. Each project complies with NPDES through a project-specific stormwater pollution prevention plan (SWPPP) and best management practices (BMPs). These projects often require large surface areas to remain exposed for extended periods of time, which allows excessive erosion to occur. Erosion disturbs existing terrestrial plant systems and results in siltation of streams, which can degrade water quality, benthic habitat, and fish spawning grounds. The Base must implement soil erosion control BMPs at all of its land-disturbing sites.

2.4.3.4 Air Pollution

The release of air pollutants into the atmosphere can contribute to the degradation of natural resources on and off the Base. The release of air pollutants is regulated under both federal and state statutes, with which all federal installations must comply.

March ARB is located in the South Coast Air Basin (SCAB), which includes Los Angeles and Orange counties, and the non-desert portions of San Bernardino and Riverside counties. As of December 2018, the

SCAB is in nonattainment for the following National Ambient Air Quality Standards pollutants: 8-hour ozone, particulate matter below 2.5 microns, particulate matter below 10 microns (maintenance status), carbon monoxide (maintenance status), and lead (Los Angeles County only) (EPA 2018b).

Pollutants enter the surface layers and mix at any level below the inversion base of 2,500 to 3,500 ft. The pollutants cannot rise through the inversion layer, resulting in the pollutants becoming more concentrated unless the inversion layer breaks up or surface winds disperse the pollutant concentration horizontally.

March ARB has two separate sources of air pollution, referred to as stationary and mobile sources. The stationary sources comprise boilers, aircraft maintenance equipment, emergency generators, aircraft maintenance operations (painting, fuel cell repair, engine testing), and vehicle/aircraft fueling operations. Stationary sources are more stringently regulated by SCAB, the State of California, and EPA in an attempt to bring the region into attainment for all pollutants. Mobile emissions from vehicle and aircraft operations are the second source and are less regulated at the emissions point than stationary sources. The major source of air pollution at March ARB is aircraft operations (taxiing, runup, takeoff, and landing), which contribute approximately 80 percent of the total nitrogen oxide emissions on Base (USAF 2017). However, by comparison, the total amount of nitrogen oxide emitted from March ARB represents less than 0.1 percent of the SCAB estimated total nitrogen oxide emissions for 2020 (CARB 2019). Therefore, March ARB would not be considered a major contributor to air pollution in the SCAB.

2.4.3.5 Noise

Noise is perhaps the most identifiable environmental issue associated with aircraft operations. Although many other noise sources are common in today’s communities, aircraft noise is often singled out for special attention and criticism. Based military aircraft operating out of March ARB include the C-17, KC-135, F-16, and MQ-9 Reaper aircraft. Based government and Aero Club aircraft operating out of March ARB include the AS-350, Cessna 172, and Cessna 182 aircraft. Various transient aircraft use March ARB, the most frequent of which are the KC-135 and C-130 (AFRC 2018).

The significant noise source at March ARB is the result of aircraft warm-ups, maintenance and testing, taxiing, takeoffs, approaches, and landings. An AICUZ study was conducted for the Base in 2005 (MARB 2012). This study described three basic types of constraints that affect, or result from, flight operations, including height restrictions, noise contours, and aircraft accidents. General land use guidelines related to safety and noise associated with aircraft operations, including land uses that are compatible or incompatible with various combinations of noise exposure and accident potential, were analyzed and discussed in the report, including agricultural land, industrial/manufacturing, and residential (MARB 2012). March ARB updated its AICUZ study in 2018 (AFRC 2018) to document changes to the AICUZ since the release of the 2005 study. It is a re-evaluation of aircraft noise and accident potential related to USAF flying operations and is designed to aid in the development of local planning mechanisms that will protect the public safety and health, as well as preserve the operational capabilities of March ARB. The location of natural terrain features, such as rivers, lakes, mountains, and other features, and wildlife activity are incorporated into the AICUZ Study. The 2018 AICUZ report is provided in Appendix H (AFRC 2018).

Although the noise generated from low-altitude military overflights may be initially startling, habituation to jet aircraft noise occurs with most wildlife and domestic species. Species-specific responses to low-altitude overflights vary considerably and responses from individual animals may have the potential to cause injury. Variations in responses have also been documented among homogeneous species under similar environmental conditions (MARB 2012). However, animal responses to aircraft noise depend on numerous factors, such as the physical features of the environment and the animals’ own physiological attributes. Wildlife populations are usually affected when a variety of factors combine, including declines or fluctuations in the availability of a food source, habitat destruction or alteration, predation, hunting, trapping, poaching, disease, or inclement weather, instead of by noise alone. Normally, it would be unrealistic to predict or attribute any wildlife population declines to a single stressor, such as noise. In addition, no published scientific evidence was identified that indicated harm may occur to wildlife as a result of exposure to the levels of noise generated by military aircraft that would use March ARB.

2.4.3.6 Pest Management

Pest management programs at March ARB have the potential to impact natural resources. Pesticides (insecticides, herbicides, and rodenticides) may be used throughout the Base to control indigenous pest populations. These chemicals are inherently toxic to most biological systems and, as such, often have no natural degradation pathways and can persist for long periods in the environment. The presence of such compounds can degrade the quality of soil, surface water, and groundwater. Wildlife and plant life may be detrimentally affected by any inadvertent contact with pest management chemicals. Only chemicals approved for use by the DoD and NRM and in the State of California may be used. Additional information on pest management procedures is found in Section 7.11, Integrated Pest Management Program.

2.4.3.7 Soil Erosivity

The erosivity of local soils is an important factor of water and air quality. Highly erosive soils lack adequate organic topsoil and are easily transported by surface water or high winds. The USDA NRCS provides water and wind erosion information to each soil series.

The USDA NRCS provides "Erosion factor K" to describe water erosivity, indicating the susceptibility of a soil to sheet and rill erosion by water. Values range from 0.02 to 0.69 with higher values (all other factors equal) being more susceptible to sheet and rill erosion by water. The two variants, "Erosion factor Kw" and "Erosion factor Kf," indicate the erodibility of the whole soil and fine-earth fraction (rock free) respectively. The Erosion factor K for the twelve mapped soil units on March ARB range from 0.17 to 0.28 (NRCS 2020a). For the mapped March ARB soil units, there is no difference between Kw (whole soil) and Kf (rock free) values.

Wind erodibility for soil types is provided by the USDA NRCS as "wind erodibility group." Wind erodibility groups have similar properties affecting wind-erosive susceptibility and range from group 1 (most susceptible) to group 8 (least susceptible). All twelve mapped units on March ARB are rated as group 3 (NRCS 2020a).

2.4.4 Potential Future Mission Impacts on Natural Resources

In July 2019, the IDP for March ARB was endorsed that outlines future facility and infrastructure requirements to enhance mission support capability for the Base (MARB 2019a). The IDP addresses the short-term (0–7 years), mid-term (8–25 years), and long-term (26+ years), but it is a living document that will be annually updated as needed to reflect strategic vision. The March ARB IDP identifies the following five goals that support the continuation of March ARB as a preeminent global mobility center and model for diverse mission partnerships:

1. Modernize facilities and infrastructure to enhance current and emerging mission capabilities and capacities.
2. Develop Base facilities and infrastructure to promote conservation, sustainability, and environmental stewardship.
3. Develop quality of life facilities.

4. Enhance Base security and safety.
5. Seek opportunities to minimize encroachment impacts.

The IDP identifies challenges and opportunities for future development at March ARB. From an operational perspective, airfield clearance is a significant issue. Incompatible land uses outside the fence, Installation Restoration Program sites, antiterrorism regulations, air quality, BASH, the presence of a large NRHP historic district, and the periodic inundation of floodplains in the southern part of the installation are all noted as constraints to development.

The IDP notes that a key factor in future development is circulation. The installation boundary determined under BRAC has resulted in a series of dead-end roads and an over-reliance on the remaining arterials. The proposed creation of a perimeter road along the north end of the installation would fix some secondary route disconnections. Also, improved sidewalks, new sidewalks, pedestrian safety features, and bicycle routes are needed across the installation.

Several Component Plans such as this INRMP, the ICRMP, the AICUZ, the BASH Plan, the March ARB Land Use Compatibility Plan, and others support the IDP and ensure compliance with the USAF and DoD guidelines. The discrete and cumulative impacts on the local environment among these plans must continually be evaluated.

2.5 Natural Resources Needed to Support the Military Mission

March ARB has been active for just over a century and more than 50 percent of the available approximately 2,162 acres have been developed. Available natural resources are limited to vernal pools and remaining grasslands. None of these natural resources are necessary to support the military mission; however, they have the potential to affect the mission if not managed correctly.

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3.0 ENVIRONMENTAL MANAGEMENT SYSTEM

The USAF environmental program adheres to the Environmental Management System framework and its "Plan, Do, Check, Act" cycle for ensuring mission success. EO 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis*, DoDI 4715.17, *Environmental Management Systems*, AFI 32-7001, *Environmental Management*, and International Organization for Standardization 14001:2015, *Environmental management systems–Requirements with guidance for use*, provide guidance on how environmental programs should be established, implemented, and maintained to operate under the Environmental Management System framework.

The natural resources program employs Environmental Management System-based processes to achieve compliance with all legal obligations and current policy drivers, effectively manage associated risks, and instill a culture of continual improvement. The INRMP serves as an administrative operational control that defines compliance-related activities and processes.

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4.0 GENERAL ROLES AND RESPONSIBILITIES

General roles and responsibilities that are necessary to implement and support the natural resources program are listed in Table 4-1. Specific natural resource management-related roles and responsibilities are described in the appropriate sections of this Plan.

Table 4-1. General Roles and Responsibilities

Office/Organization/Job Title (Listing is not in order of hierarchical responsibility)	Installation Role/Responsibility Description
Installation Commander	Responsible for signing and approving the INRMP.
AFCEC Natural Resources Media Manager/Subject Matter Expert (SME)/Subject Matter Specialist (SMS)	SME/SMS are the natural resource program managers for the entire Air Force and/or West Region. They are responsible for providing technical assistance and guidance to Air Force NRMs on natural resource issues; advocating for resources required to implement approved INRMPs; and administer the reimbursable forestry, agricultural and grazing, and fish and wildlife account programs as well as dispersed outdoor recreation programs. Installation Support Section Media Manager provides and manages contracts, interagency agreements, and cooperative agreements for natural resources program management and provides technical assistance and guidance on managing natural resources.
Installation NRM/POC	Responsible for the management of the natural resources program. Ensures compliance with all-natural resources laws and regulations. Coordinates with installation components to assess the potential impacts of proposed activities on sensitive natural resources, and makes recommendations to reduce, avoid, or mitigate adverse effects to comply with applicable laws and regulations. Prepares, sustains, and implements installation INRMP pursuant to the Sikes Act, Section 101(a)(2).
Installation Security Forces	Provides enforcement of natural resource laws and regulations.
Installation Unit Environmental Coordinators; see AFI 32-7001, *Environmental Management*, for role description	
BASH Program Manager	Implements approved methods of wildlife control and dispersal to provide the safest air operations possible. Develops and maintains procedures to implement utilization of dispersal equipment (i.e., a step-by-step flow of increasing harassment techniques to reduce the risk of wildlife strikes). Provides integrated pest management recommendations on mitigating wildlife hazards to aircraft and human safety to include habitat, prey, and fencing recommendations. Provides the nonlethal and lethal control of wildlife using techniques including, but not limited to, trapping, hazing with pyrotechnics, and depredation. Also, provides training to airport staff in hazing, wildlife identification, and wildlife strike notification procedures.

Office/Organization/Job Title (Listing is not in order of hierarchical responsibility)	**Installation Role/Responsibility Description**
Pest Manager/Coordinator	Oversees the development of installation pest management plans, collects and reports data on all installation pesticide use, reviews contract specifications, and serves as the primary point of contact for all installation pesticide compliance in accordance with AFMAN 32-1053, *Integrated Pest Management Program* and DoDI 4150.07, *DoD Pest Management Program*. Ensures pest management programs and facilities comply with all applicable federal, state, and local laws, DoDIs, and Air Force requirements. Ensures that the IPMP and INRMP are mutually supportive and not in conflict.
Range Operating Agency	Responsible for management of ranges and ensuring compliance with AFMAN 13-212, Volume 1, *Range Planning and Operations*, and other directives applicable to range programs.
NEPA/EIAP Manager	Provides technical, execution, oversight, and program support for NEPA projects. Coordinates review of program managers.
USFWS	Signatory of the INRMP. Reviews and coordinates federally listed species management, helps ensure Sikes Act compliance, issues migratory bird depredation permits, and assists with INRMP preparation. Involved in wildlife control/depredation. Assists USAF with meeting its responsibilities regarding federally listed species under Section 7(a)(2) of the Endangered Species Act (*Federal Agency Actions and Consultations*). Issues Section 10(a)(1) Permits under the Endangered Species Act. Section 10(a)(1)A permits allow incidental take for scientific monitoring and collecting and can be issued to the USAF with named qualified staff who possess the necessary experience. USFWS also provides monitoring and management assistance as needed for species of special interest.
CDFW	Signatory of the INRMP.

Notes:

CDFW = California Department of Fish and Wildlife

EIAP = Environmental Impact Analysis Process

NEPA = National Environmental Policy Act

USFWS = U.S. Fish and Wildlife Service

5.0 TRAINING

USAF installation NRMs/POCs and other natural resources support personnel require specific education, training, and work experience to adequately perform their jobs. Section 107 of the Sikes Act requires that professionally trained personnel perform the tasks necessary to update and carry out certain actions required within this INRMP. Specific training and certification may be necessary to maintain a level of competence in relevant areas as installation needs change or to fulfill a permitting requirement.

Installation Supplement – Training

- NRMs at Category I installations must take the course DoD Natural Resources Compliance, endorsed by the DoD Interservice Environmental Education Review Board and offered for all DoD Components by the Naval Civil Engineer Corps Officers School. See https://www.netc.navy.mil/CECOS/ for course schedules and registration information. Other applicable environmental management courses are offered by the Air Force Institute of Technology (http://www.afit.edu), the National Conservation Training Center managed by the USFWS (https://training.fws.gov/), and the Bureau of Land Management Training Center (https://www.blm.gov/learn/national-training-center). Due to the existence of at least 76 seasonally ponded wetland features on March ARB supporting uncommon flora and potentially supporting listed species of fairy shrimp, the NRM at March ARB should have a strong educational background in general biology, to include Botany or Plant Sciences, with additional preference for prior experience in performing botanical inventories to correctly identify species of forbs and grasses in wetlands and/or grassland environments. Training in the identification of listed species of fairy shrimp should be encouraged by the Base, as well periodic attendance at botanical training workshops offered by the California Native Plant Society (statewide), the California Botanic Garden in Claremont, the San Diego Natural History Museum, the Theodore Payne Foundation for California Native Plants, the UC Berkeley Herbarium, the California Native Grass Association, and similar professional botanical organizations.
- Natural resource management personnel shall be encouraged to attain professional registration, certification, or licensing for their related fields, and may be allowed to attend appropriate national, regional, and state conferences and training courses.
- All individuals who will be enforcing fish, wildlife, and natural resources laws on USAF lands must receive specialized, professional training on the enforcement of fish, wildlife, and natural resources in compliance with the Sikes Act.
- Individuals participating in the capture and handling of sick, injured, or nuisance wildlife should receive appropriate training, to include training that is mandatory to attain any required permits.
- The BASH Program Manager should receive flightline drivers training, should possess significant prior experience in the identification of numerous species of birds occurring on airfields and grasslands, and specialized training in the use of firearms and pyrotechnics as appropriate for their expected level of involvement.
- The DoD-supported publication *Conserving Biodiversity on Military Lands -- A Handbook for Natural Resources Managers* (http://dodbiodiversity.org) provides guidance, case studies, and other information regarding the management of natural resources on DoD installations.

Natural resources management training is provided to ensure that installation personnel, contractors, and visitors are aware of their roles in the program and the importance of their participation to its success. Training records are maintained in accordance with the Record Keeping and Reporting section of this plan. Key natural resources management-related training requirements and programs include special-status species and their habitats, pest management, processes for proposed activities, etc.

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6.0 RECORD KEEPING AND REPORTING

6.1 Record Keeping

The installation maintains required records in accordance with AFI 33-322, *Records Management and Information Governance Program*, and disposes of records in accordance with the Air Force Records Management System records disposition schedule. Numerous types of records must be maintained to support implementation of the natural resources program. Specific records are identified in applicable sections of this plan, in the Natural Resources Playbook, and in the referenced documents.

Installation Supplement – Record keeping

March ARB follows the guidelines and recommendations in AFI 33-322, *Records Management and Information Governance Program*. Natural resources records, including historical information, all final documents, updated plans, project lists, and reports, are stored electronically on the 452 MSG/CEV shared drive.

6.2 Reporting

The installation NRM is responsible for responding to natural resources-related data calls and reporting requirements. The NRM and supporting Air Force Civil Engineer Center Natural Resources Media Manager and Subject Matter Specialist should refer to the Environmental Reporting Playbook for guidance on execution of data gathering, quality control/quality assurance, and report development.

Installation Supplement – Reporting

March ARB follows the guidelines and recommendations in the Environmental Reporting Playbook for execution of data gathering, quality control/quality assurance, and report development.

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7.0 NATURAL RESOURCES PROGRAM MANAGEMENT

This section describes the current status of the installation's natural resources management program and program areas of interest. Current management practices, including common day-to-day management practices and ongoing special initiatives, are described for each applicable program area used to manage existing resources. Program elements in this outline that do not exist on the installation are identified as not applicable and include a justification, as necessary.

Installation Supplement – Natural Resources Program Management

The goal of ecosystem management at March ARB is to conserve biodiversity by managing the ecosystem instead of focusing on a single biotic or abiotic component of the ecosystem. Ecosystem-focused management at March ARB encompasses both the function and the structure of the ecosystem and the processes that link them.

The guiding philosophy of this INRMP is to take an ecosystem approach to managing the natural resources present on March ARB. The interdisciplinary approach taken by this INRMP follows an ecosystems model, in which all appropriate components are integrated by their function. This section addresses March ARB's goal of being a leader in facility and natural resource management within the AFRC and the USAF. Ecosystem management is emphasized because it is recognized that the mission of the AFRC is inextricably linked to local, regional, and global ecological integrity. Sustaining ecosystem integrity is the best way to protect biodiversity, ensure sustainable use, and minimize the effort and cost of management. Native and natural communities and the processes that sustain them are unique expressions of the evolutionary and geological histories that are essential to sustaining current system function and resilience. Although habitat with the potential to dramatically alter ecosystem form and function is limited at March ARB, it is still a priority of this installation to manage according to this paradigm.

Ecosystem-based management also must consider human functions and needs within the foundation of establishing natural resources management actions. A useful perspective in modeling ecological and social needs together into this INRMP is through the application of an ecological economics (EE) perspective. EE is a departure from the traditional ways that ecologists, land managers, and economists have considered the economic and ecological needs of a particular system by thinking about economic and ecological theory together from an interdisciplinary perspective (Costanza et al. 1997). In the case of the AFRC, the EE perspective can be applied to better understand the operational, social, and ecological requirements at unit locations. This INRMP brings together some of the insight from economic thought and operational necessity with the insight of ecology to present a clearer perspective on the relationship among AFRC operations, crew morale, community responsibilities, and ecological functions and the interactions that bind them.

This EE perspective can be applied to merge the needs of the operational mission and the social environment of March ARB with the ecological functions of the Installation and the region. From this perspective, six central themes have been developed to guide the ecological management perspective used in formulating the goals, objectives, and management actions in this INRMP. EE themes included in the development of the natural resources management actions include sustainability, broad ecological values, uncertainty, multiple methodologies, cooperative efforts, and land ethic. These central themes are summarized in Table 7-1.

Table 7-1. Ecological Themes used to Integrate the Operational Mission and Social Environment of March ARB

Ecological Theme	Description
Sustainability	Traditional economic analysis focuses on the goals of efficiency and growth. The integrity and sustainability of the ecosystem are essential for future operational success. The criterion of sustainability should be built into all March ARB instructions and policies.
Broad Ecological Values	Economic value is limited to two narrow types: Value in exchange (market price) and value in use (willingness to pay or willingness to accept compensation). These types of values have often been applied when considering ecological functions. Instead, a broader set of values that include social, aesthetic, life support, intrinsic, and operational values must be associated with ecological functions.
Uncertainty	There are fundamental uncertainties and high levels of risk surrounding large-scale or irreversible changes in the environment.
Multiple Methodologies	Sole reliance on any one analytical framework or method would provide an incomplete picture of the relationships between ecosystems and the requirements of the operational mission.
Cooperative Efforts	Cooperation among shareholders in an ecosystem is necessary because of the fragmented ownership patterns throughout an ecosystem. Partnerships with landowners outside the Base boundary are necessary to manage the ecosystem in a way that incorporates the goals and mission requirements of the various landowners and communities.
Land Ethic	Traditional economics and natural resources planning relied heavily on utilitarian approaches in analyses. This INRMP uses a land ethic as one of the fundamental underpinnings of the management prescribed. "All ethics rest upon a single premise: that the individual is a member of a community of interdependent parts…the land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively, the land" (Leopold 1989).

7.1 Fish and Wildlife Management

Applicability Statement

This section applies to all USAF installations that maintain an INRMP. The installation **IS** required to implement this element.

Program Overview/Current Management Practices

For the purposes of this Plan, wildlife management is defined as manipulation of the environment and wildlife populations to produce desired objectives. Management may be performed in a manner that enhances biodiversity through the maintenance or re-establishment of native habitats and populations of native species. Conversely, habitat management may be required to decrease the abundance of certain wildlife species to reduce animal damage or BASH.

Non-consumptive fish and wildlife management opportunities exist in the non-industrial areas of March ARB. Management for the consumptive use of game species on March ARB is not an option because the Base is situated in a suburban/industrial area and lacks the habitat types that provide recreational game harvest opportunities. In addition, safety and security issues raised as a result of the proximity of game species' habitats to the runways and taxiways further contribute to the impracticality of consumptive use management.

The presence of predators and larger birds raises questions about the compatibility of wildlife at March ARB with the Base's mission, specifically the BASH threat. Therefore, habitat management needs to be evaluated carefully for its effect on the flying mission. Additional information specific to the BASH Program is found in Section 7.12, Bird/Wildlife Aircraft Strike Hazard (BASH), of this INRMP.

The effects of climate change on existing fish and wildlife management at March ARB are unknown until a climate assessment is conducted for the installation.

7.1.1 Migratory Birds

In accordance with the Migratory Bird Treaty Act (MBTA); EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*; and the *Memorandum of Understanding between the U.S. Department of Defense and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds*, January 10, 2001, the negative impact of Air Force actions on migratory birds shall be avoided or minimized. March ARB will notify the USFWS if unintentional take of migratory birds reasonably attributable to Air Force actions is having, or is likely to have, a measurable negative effect on migratory bird populations, and implement conservation measures as specified in EO 13186, Section 3(e)(9).

In accordance with Section 315 of the Bob Stump National Defense Authorization Act of 2003 (P.L. 107-314), MBTA requirements indicated in 16 U.S.C. § 703 do not apply to the incidental taking of a migratory bird by a member of the Armed Forces during a military readiness activity. March ARB will ensure that incidental takes during military readiness activities conform to the regulations in 50 CFR § 21.15, which authorizes incidental take of migratory birds for military readiness activities provided that a determination is made by means of the NEPA process (32 CFR Part 989) that the proposed readiness action does not have significant negative effects on a population of migratory birds. If it is determined that the readiness action has significant negative effects on a population of migratory birds, the installation will confer with the USFWS to develop and implement appropriate conservation measures to minimize and mitigate, to the extent practicable, adverse impacts of military readiness activities on migratory birds, and to monitor the impacts of such activities on affected migratory bird species.

7.1.2 Pollinators

Pollinators, such as bees and other insects, some bats, and some birds, play a crucial role in plant reproduction and are critical to maintaining diverse and healthy ecosystems. There have been significant declines in populations of pollinators, including non-native honey bees (*Apis mellifera*) and certain native bumble bees, butterflies, hummingbirds, and bats caused by habitat loss, fragmentation, and alteration; pathogen spillover; interspecific competition among bees; changes in plant community composition with the spread of invasive plants; genetically modified crops; non-synchronous changes in pollinator and plant phenology; and pesticide use (USFWS 2017).

In response to pollinator declines, a Presidential Memorandum "Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators" was issued in June 20, 2014, and the USAF developed the *U.S. Air Force Pollinator Conservation Strategy* (*Strategy*) and the *U.S. Air Force (Air Force) Pollinator Conservation Reference Guide* (Reference Guide; USFWS 2017). The vision of the Strategy is to "sustain the Air Force mission and ecological integrity on Air Force lands; implement pollinator conservation practices to enhance habitat; and broaden awareness among Air Force personnel." The five specific goals of the Strategy are as follows:

- Conserve pollinator species of conservation concern in cooperation with USFWS, the state fish and wildlife agencies, and other partners using INRMPs and other tools.

- Conserve and enhance pollinator habitat on Air Force installations where it is compatible with the mission using INRMPs and other tools.
- Reduce pesticide use and adverse impacts of pest control on pollinators through use of INRMPs and IPMPs.
- Promote pollinator conservation through education and outreach.
- Develop partnerships for pollinator conservation off-installation to lessen regulatory burdens by aiding the recovery of listed pollinators and preventing further pollinator declines.

According to the Reference Guide, March ARB is within the range of USFWS designated Birds of Conservation Concern (BCC) that are pollinators, including the Allen's hummingbird (*Selasphorus sasin*), calliope hummingbird (*Selasphorus calliope*), Costa's hummingbird (*Calypte costae*), and rufous hummingbird (*Selasphorus rufus*) (USFWS 2017).

7.1.3 Nuisance Wildlife

Installation pest management personnel have primary responsibility for the control of nuisance wildlife species, although the program can receive substantial support from natural resources management personnel for control of wildlife that requires specialized training and permits. Prior to killing or trapping of nuisance wildlife, the state fish and wildlife agency should be contacted. Wildlife control activities may require a state depredation permit. Activities that affect migratory birds may require a federal permit.

7.1.3.1 Wildlife on the Airfield

Management strategies should be implemented on an as-needed basis to reduce any roosting or refuge sites that may increase the numbers of nuisance species on Base. Roosting and refuge management strategies include the use and maintenance of bird spikes on structures that provide perching areas for birds, such as signs, posts, and utility poles (see Figure 7-1); the removal of sedimentation; the removal or application of exclusion measures for abandoned structures (i.e., filling, closing doors, sealing open areas); the removal of utility poles and the burying of utility lines underground; removal of debris piles; and repairing fence line to prevent access to nuisance species.

In addition to roosting and refuge site modification or removal within the airfield, the existing avian pyrotechnic or frightening device program should be continued to deter wildlife from occupying the area. When birds or other wildlife create a hazardous condition on the airfield, the following dispersal procedures may be employed:

Bioacoustics. Bioacoustics are recorded distress or alarm calls of actual birds. The equipment required to adequately project these calls includes a speaker mounted on the vehicle roof for sound projection. Special care must be taken to play the recordings in short intervals to prevent habituation by the birds. Play the recording for 20-30 seconds and then pause briefly. Repeat the procedures several times if necessary. The birds should respond by taking flight or becoming alert. These calls are effective for gulls, blackbirds, starlings, cowbirds, grackles, ravens, crows, and some shorebirds. Only bioacoustics for the species to be dispersed should be used, as calls are species-specific. Calls for all hazard species may not be commercially available and other methods must be used in such instances. Pyrotechnics should be used in conjunction with bioacoustics to enhance complete dispersal (MARB 2019b).

Pyrotechnics. Pyrotechnics include 15-millimeter (mm) or 12-gauge scare cartridges that produce a secondary explosion, or screamers that produce a loud whistle to scare birds from the area. The scare cartridges are launched from either a shotgun or a pyrotechnic pistol. A 15-mm hand-held launcher is available to fire 15-mm screamers and bangers (smaller versions of the 12-gauge cartridges). Pyrotechnics are effective for dispersing most bird species and can also be used for coyotes, foxes, and deer (MARB 2019b).

Depredation. When used judiciously, lethal shooting may reinforce non-lethal techniques and increase the efficacy of dispersal efforts. Depredation should be conducted in accordance with all applicable depredation permits (refer to Section 7.12.5.1). Rock pigeons, European starlings, and house sparrows, which are not covered by the MBTA, can be killed without a permit. Most other species require federal and state permits (MARB 2019b).

Other Devices. Falconry, dogs, bird diverters, or radio-controlled model aircraft may be considered based on availability and problem bird species.

Figure 7-1. Photograph of Bird Spikes on March ARB

7.1.3.2 Birds in Aircraft Hangars

Bird roosting and nesting is discouraged within the aircraft hangars to limit exposure of personnel to potential health risks and unsanitary conditions generated by an accumulation of bird feces and mites and to lower bird populations in the vicinity of the airfield. In accordance with AFI 91-212, keeping hangar doors and windows closed is the best preventive method for keeping birds from inhabiting hangars. If doors must remain open, then the installation of strip curtains or vertical blinds is recommended to limit access by birds. Brush weather seals should also be used on the edge of hangar doors to remove gaps and seal any open spaces. As needed, exclusion netting may be installed or rafters may be lined with polyvinyl chloride pipes to reduce the amount of surface area available for nesting or roosting inside hangars (USAF 2018). If all previous actions fail to prevent birds from roosting and nesting within aircraft hangars, the use of pellet guns and/or avicides may be implemented.

7.1.3.3 Nesting Swallows

Cliff swallows (*Petrochelidon pyrrhonota*) and barn swallows (*Hirundo rustica*) nest under structures such as buildings and hangars near the flightline and elsewhere in the surrounding area. Swallows are discouraged through persistent harassment that is initiated at the moment they begin to build mud nests under the eaves of buildings or under structures such as bridges and culverts. This is accomplished by hosing the surfaces with a high-pressure water stream, such as from a firetruck. Harassment activities must comply with federal and state permits. For a more permanent solution, clear plastic sheets can be screwed or glued to the perpendicular surfaces where they join to prevent nest building. Strips should be extended a minimum of 12 inches on each of the adjoining surfaces, preferably to the shade line at which sunlight reaches the highest point on the wall. Swallows will not place nests in locations directly exposed to sunlight. Swallow nests containing eggs or young cannot be removed unless a proper permit is obtained through the USFWS. Empty nests void of young and eggs can be removed at any time without a permit. The MBTA protects swallows and swallow nests with eggs.

7.1.3.4 Ground Squirrels

Due to the size and extent of the population of California ground squirrels using the main cantonment area, March ARB developed a ground squirrel management program that was first implemented as part of the 2006 March ARB IPMP to reduce the population and existing hazards to human health and operations safety from the squirrels. The program included the use of poisoned bait stations and the fumigation of burrows in areas where bait stations could not be used. Fumigants (i.e., Fumitoxin) are not currently used at March ARB. After an investigation in 2018, the Installation Pest Management Coordinator (IPMC) concluded that March ARB is unable to comply with the requirements of the proper use of Fumitoxin by label and is unable to comply with Fumitoxin use requirements included in a 2004 consultation letter from USFWS. The exorbitant costs and high manpower needs required for successful control using Fumitoxin were also deemed prohibitive. However, the option for fumigant use will remain available if the manpower, funds, and sufficient need are there (Wagner 2019). The plan of action for the ground squirrel management program going forward includes the following:

- Place modified T-shaped bait stations in the most active, dense populations and actively maintain them. Move bait stations to the next targeted high-density area once a population is eradicated.
- Control ground squirrels around equipment and vehicles to prevent damage.
- Place T-shaped bait stations along the perimeter of the Base property to target squirrels attempting to move onto the installation.
- Fill in burrows where they have the potential to damage structures, such as along the runways and running track.
- Conduct routine surveys and monitoring to determine the locations of California ground squirrel burrows on Base and evaluate whether management practices are effective at reducing ground squirrel population numbers on Base. Surveys began in 2019 and will be conducted every 2 months for the first 2 years. After 2 years, the survey schedule can be re-evaluated and reduced as needed.

The type of poison used in bait traps and priority areas may change in early spring to target breeding males. Additional details will be available in the revised IPMP. The modified T-shaped bait stations are designed such that the entrances to the station are 6 inches above ground level. This prevents smaller rodents, such as mice, from ingesting rodenticide and minimizes the potential for secondary poisoning of burrowing owls.

March ARB will continue to coordinate with USFWS on the ground squirrel management program, which may result in variations to the program. Prior to the placement of bait stations, all ground squirrel burrows should be assessed as required by USFWS consultation to determine whether a burrow is being used by burrowing owls. This assessment should be made by the NRM, biologist, or other qualified person within the Natural Resources Program who is familiar with the characteristics of burrows being used by burrowing owls, and/or the IPMC, or other qualified contracted person arranged by the Natural Resources Program.

Burrows occupied by burrowing owls should be clearly marked for avoidance prior to implementation of pest control methods that will affect burrows, unless otherwise directed by the NRM/IPMC.

7.1.3.5 Coyotes

Coyotes create a direct and indirect hazard to aviation. To manage coyote populations at March ARB, all fencing surrounding the Base should be surveyed and any openings eliminated to reduce the numbers of coyotes entering Base property. Chain-link perimeter fencing can also be flanged to discourage digging under fences. In areas where coyotes are most problematic, 3 to 4 ft of chain-link fencing can be placed flat along the surface of the ground on the exterior of the perimeter fencing to prevent coyotes from digging at the fence line. Also, all garbage disposal areas should be properly secured to reduce foraging access. Using propane cannons may frighten coyotes away. Varying locations, frequencies, appearances, and duration of the frightening devices will avoid coyote acclimation to these devices (Hygnstrom et al. 1994). If coyote numbers increase and begin to impede Base operations, then lethal control may be warranted.

7.1.3.6 Feral Animals

Capturing and removing nuisance stray animals from the Base should be accomplished through the animal removal plan established with the Moreno Valley Animal Control Services. Under no circumstances should untrained Base personnel attempt to capture and/or remove feral animals because of the potential for personal injury and the spread of disease. The presence of feral cats and dogs should be reported immediately to the tower and BASH safety. When notifying the Base Security Police, provide the following information: 1) name of the individual reporting the feral/nuisance animal; 2) description of the feral/nuisance animal; 3) location of the animal; 4) time the animal was observed; and 5) any additional pertinent information (i.e., behavior). Base Security Police will then notify Moreno Valley Animal Control Services at 951-413-3790. Moreno Valley Animal Control Services will capture the animal and remove it from Base property. In addition to reporting feral animals, habitat availability for feral dogs and cats can be reduced by eliminating potential sheltering areas in and around abandoned or limited-use buildings, culverts, brush piles, and storage facilities. Also, all garbage disposal areas should be properly secured to reduce foraging access, and feeding wildlife or stray animals is prohibited.

7.1.4 Carcass Disposal

The Base Operations contract is responsible for handling disposal of any animal carcasses on Base.

7.2 Outdoor Recreation and Public Access to Natural Resources

Applicability Statement

This section applies to all USAF installations that maintain an INRMP. The installation **IS** required to implement this element.

Program Overview/Current Management Practices

Outdoor recreation activities at March ARB are limited because of the amount of areas that are inaccessible or restricted for use by the military mission and the lack of trails, wildlands, or other recreational areas. Activities such as hunting and fishing do not occur on March ARB. Outdoor athletic facilities on March

ARB include a baseball field, tennis courts, and sand volleyball courts. Public access is restricted to the picnic area near the Base Exchange and to tour groups that visit the airfield facilities.

7.3 Conservation Law Enforcement

Applicability Statement

This section applies to all USAF installations that maintain an INRMP. The installation **IS** required to implement this element.

Program Overview/Current Management Practices

Per AFMAN 32-7003, Commanders are responsible for the enforcement of state and federal fish and game laws for the protection and management of natural resources on USAF installations. Due to lack of appropriate resources, March ARB does not have a Conservation Law Enforcement program.

7.4 Management of Threatened and Endangered Species, Special-Status Species, and Habitats

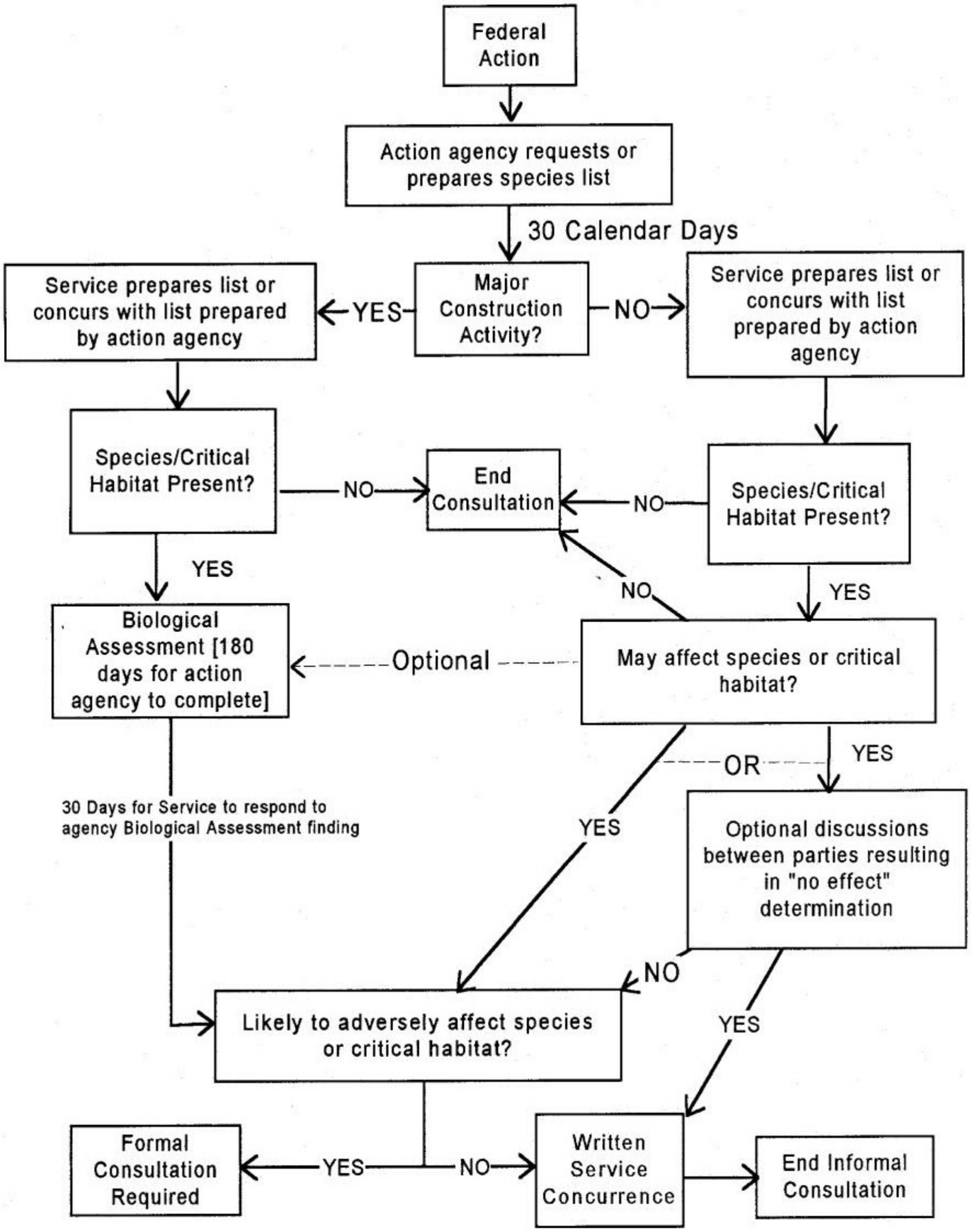
Applicability Statement

This section applies to USAF installations that have T&E species on USAF property. This section **IS** applicable to this installation.

Program Overview/Current Management Practices

The federal ESA (Title 16 U.S.C. §§ 1531–1544) requires military installations to protect and conserve federally listed T&E and special-status plants and animals and their habitats. T&E and special-status species on March ARB are managed using a regional ecosystem-based approach that manages special-status species while protecting the operational functionality of the mission. Although single species management is not promoted as a general philosophical management approach on the Base, specific controls are used to protect T&E and special-status species beyond management of the ecosystem. Other procedures in place for management of T&E and special-status species are modifying the ecosystem and human interactions within this environment.

As discussed in Section 2.3.4, March ARB potentially supports habitat for federally and state-listed species. Tables 2-5 and 2-6 list the special-status species that have been documented on, that migrate through, or have a potential to occur on March ARB. Figures 7-2a and 7-2b present the informal and formal consultation process that should be used as part of the planning process for projects that will impact known or potential future populations of T&E or special-status species on March ARB.



Source: USFWS and NMFS, 1998

Figure 7-2a. Informal Consultation

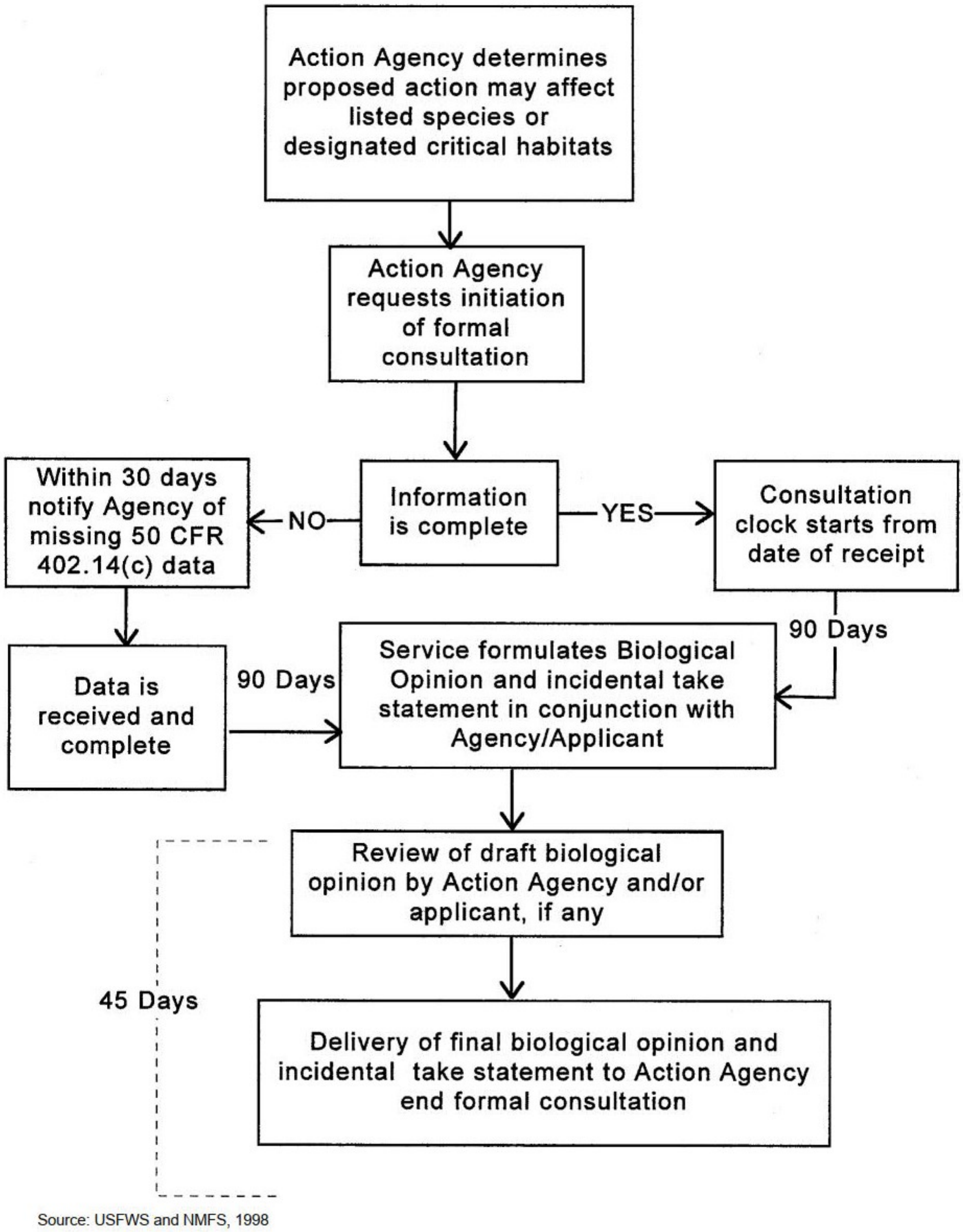


Figure 7-2b. Formal Consultation

7.4.1 Ongoing T&E and Species of Concern Management

7.4.1.1 Stephens' Kangaroo Rat – Federally Listed as Endangered

The Base supports habitat for SKR; however, results of past and recent SKR surveys strongly suggest that SKR do not currently inhabit the main March ARB property east of I-215 or the lands surrounding March ARB east of I-215. The potential for any future unassisted colonization of the main March ARB property by SKR residing in immediately adjacent lands is very unlikely due to isolation resulting from development in the surrounding areas. There is essentially no potential for any SKR currently residing on the western side of I-215 to move across the freeway and into lands on or adjacent to the main March ARB property. If SKR were present in the disturbed areas immediately west of I-215, the species could theoretically use the three drainage culverts to move under I-215 and into the lands at or adjacent to the main March ARB property. However, the likelihood that SKR would traverse these culverts across distances of 400 to 500 feet and access the east side of the freeway is so low as to be discountable. All of the undeveloped fields to the immediate west of I-215 where the three culverts begin are unoccupied by the species. Furthermore, although SKR are present farther west, the intense development along Meridian Parkway, Harvill Avenue, and the Riverside National Cemetery lands present a barrier to SKR movement into any of the potential grassland habitat areas remaining along the western edge of I-215 (ECORP 2020).

A 1,000-acre SKR Management Area and an additional 1,200 acres of Open Space were established on the former March AFB per the USFWS 1991 BO (1-6-91-F-33; USFWS 1991) regarding a proposed land use strategy and management of SKR of March AFB. After the Base realignment, the SKR Management Area west of the I-215 Freeway was traded for the acquired Potrero core reserve in 2003 and is no longer a part of March ARB. The Open Space area is defined as "the area west of the extended airfield runway centerline, extending to the Base boundary," as shown on the Composite Natural Resources Constraints Map in Appendix F. Project 3.3.1 in this INRMP outlines that March ARB will work with the USFWS to consider removal of the Open Space designation as the area no longer supports the SKR and may reinitiate consultation to address current conditions. All construction projects for which the 1991 and 1993 BOs were issued have been completed and no further incidental take of SKR is authorized under these opinions.

SKR occupy the March ARB small arms range west of I-215. SKR occur there with current ongoing training activities. As training is the base condition, we are proposing habitat management to benefit the SKR in this area and will address management of this area in the proposed SKR Management Plan through Project 3.4.1.

7.4.1.2 Listed Large Branchiopods – Riverside Fairy Shrimp (Federally Listed as Endangered) and Vernal Pool Fairy Shrimp (Federally Listed as Threatened)

Vernal pools and other seasonally ponded features at March ARB have the potential to contain listed large branchiopods; however, listed large branchiopods have not been positively identified on the installation since 2009 (CH2M 2020a). Surveys conducted in 2018–2019 identified 52 ponded areas at March ARB that support *Branchinecta* fairy shrimp, but the only adult branchiopods identified at March ARB were the non-listed versatile fairy shrimp (CH2M 2020a). Although the habitat for large branchiopods on the airfield is limited, as most of the features are connected to drainages, March ARB contains a range of habitats from road ruts to disturbed vernal pools that present opportunities for habitat enhancement.

The life cycle of fairy shrimp is highly dependent on habitat parameters such as pool size, length of inundation, temperature, and the amount and type of vegetation in and around the pool. Seasonally ponded habitats that support fairy shrimp are managed to avoid and/or minimize adverse impacts from habitat loss, changes in hydrology, erosion and sedimentation, and pest control.

To better guide the management of listed large branchiopods on March ARB, NRM will coordinate with USFWS to create a Vernal Pool Management Plan. The Vernal Pool Management Plan will guide protection efforts for the area and establish goals for vernal pool habitats on March ARB.

7.4.1.3 Burrowing Owl – California Species of Special Concern

The majority of undeveloped land on March ARB provides suitable habitat for burrowing owls, excluding areas with compacted soils and heavily disturbed areas. Suitable burrowing owl habitat is present in all grassland habitat and sparsely vegetated disturbed areas within and surrounding the runway and taxiway areas on March ARB. Signs should be posted where permitted along the perimeter of burrowing owl occupied areas that clearly identify the presence of the species and specify the area is off-limits for foot or vehicle traffic unless specifically authorized by the NRM. Figure 7-3 provides an example of appropriate signage for the protection of the burrowing owl.

A Burrowing Owl Relocation Area is located on March ARB outside the fenced portion of the airfield south of Runway 12-30, within the “clear zone” of the runway (shown on Figure 2-15). The relocation area was established in September 2010 to mitigate for impacts to burrowing owl from the construction of a new indoor firing range (AFRC 2010). Three burrow clusters were constructed in the relocation area using plastic totes to serve as nesting boxes and drainage pipes to create two 8-ft tunnels leading from each box. In November 2010, prior to groundbreaking for the new firing range, two owls were translocated to the relocation area (*The Beacon* 2010). No relocation of a burrowing owl to the Burrowing Owl Relocation Area has occurred since 2010. During the most recent burrowing owl surveys conducted in 2019, a pair of owls were observed occupying burrows in the relocation area. The Burrowing Owl Relocation Area contains informational signs and is restricted from unauthorized access. Regular maintenance of the artificial burrows is needed to promote continued burrowing owl use. If burrowing owl relocation is considered in the future at March ARB, March ARB would complete all necessary USFWS/CDFW consultation and permitting prior to any relocations.

Burrowing owls are burrow nesters that generally do not excavate their own burrows; as such, they are dependent upon burrowing mammals such as the California ground squirrel for their nesting sites. The majority of burrowing owls at March ARB occupy California ground squirrel burrows on or near the airfield. If ground squirrels were not allowed to persist and create a dynamic burrow system on the airfield, then there would be the potential for the owl population to decline. The elimination of burrowing rodents through control programs has been identified as the primary factor in the recent and historical declines of burrowing owl populations (Klute et al. 2003).

Figure 7-3. Example Signage for the Protection of the Burrowing Owl, a State Species of Special Concern Occupying March ARB

7.5 Water Resource Protection

Applicability Statement

This section applies to USAF installations that have water resources. This section **IS** applicable to this installation.

Program Overview/Current Management Practices

Watershed protection is important to natural resources management at March ARB because it directly affects both surface water and groundwater quality and is critical in maintaining valuable aquatic habitats.

March ARB protects its watershed through compliance with federal, state, local, and USAF environmental regulations that require the Base to have detailed spill control and response procedures and implement stormwater pollution prevention BMPs. These regulations help prevent pollutants, such as fuels, solvents, and sediment, from entering the watershed, thereby protecting surface waters. Specific watershed protection measures employed by the Base include having spill cleanup equipment at industrial locations, using integrated pest management, and reducing fertilizer and pesticide applications. The NRM ensures that environmental requirements are in place to prevent impacts to natural resources from water quality or contamination issues.

The Base complies with NPDES by providing water quality management plans, SWPPPs, and BMPs for each project. A SWPPP has been prepared for March ARB (MARB 2019c). The SWPPP provides guidance on stormwater management, the prevention of inadvertent discharges of pollutants, and the prevention of stormwater pollution from industrial activities.

The NRM manages all wildlife activities in and near drains to minimize impacts to water quality from animal wastes.

Impacts to water resources on March ARB as a result of climate change would be minimal and would not require adaptations to existing management practices.

7.6 Wetland Protection

Applicability Statement

This section applies to USAF installations that have existing wetlands on USAF property. This section **IS** applicable to this installation.

Program Overview/Current Management Practices

To meet the goals of wetland and floodplain management, the following topics of concern that compromise achieving particular goals are described. This section also presents objectives and management actions designed to meet these wetland and floodplain management goals. Section 404 of the CWA authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredged or fill materials into the “waters of the United States,” including wetlands. Therefore, even an inadvertent encroachment into wetlands or other “waters of the United States” that results in the displacement or movement of soil or fill materials has the potential to be viewed as a violation of the CWA if an appropriate permit has not been issued by the USACE. In California, the USACE has primary jurisdictional authority to regulate wetlands and “waters of the United States.” However, the California Porter-Cologne Water Quality Control (Porter-Cologne) Act (California Water Code § 13000) established the State Water Resources Control Board and nine RWQCBs as the principal state agencies with primary responsibility for coordinating and controlling water quality in California. The state and regional boards promulgate and enforce water quality standards to protect water quality. The Porter-Cologne Act applies to surface waters, including wetlands, groundwater, and point and non-point sources of pollution. Section 401 of the CWA gives the state and regional boards the authority to regulate, through water quality certification, any proposed federally permitted activity that may result in a discharge to water bodies, including wetlands. The State may issue, with or without conditions, or deny certification for activities that may result in a discharge to water bodies.

March ARB is within the jurisdiction of the Santa Ana RWQCB (Region 8). A Section 401 water quality certification application should be submitted to the Santa Ana RWQCB for any activities within wetlands and should include the following:

- Filing fee.
- Complete project description.
- Copy of the USACE Section 404 application (if applicable).

- Any final environmental document (i.e., environmental assessment) that has been prepared.
- Any other appropriate information required by the Santa Ana RWQCB.

Information pertaining to the Section 401 water quality certification process can be obtained by contacting:

Santa Ana Regional Water Quality Control Board (Region 8)
3737 Main Street, Suite 500
Riverside, CA 92501-3339
(951) 782-4130

Wetlands also are protected under EO 11990, *Protection of Wetlands* (43 FR 6030), the purpose of which is to reduce adverse impacts associated with the destruction or modification of wetlands. DoDI 4715.03, CWA Sections 401, 404 and 404(b)(1) guidelines, and provisions of EO 11990 prohibit agencies from undertaking or supporting any new construction or related activities located in wetlands unless the Secretary of the Air Force (SecAF) or an official duly delegated authority to act on his/her behalf finds that (1) there is no practicable alternative to such new construction or related activities, and (2) that the proposed action includes all practicable measures to minimize harm to the wetlands from such use. When there is no practicable alternative to taking action in a wetland, the SecAF (or an official who has been duly delegated the authority to act on the Secretary's behalf), must sign a Finding of No Practicable Alternative (FONPA) determination on the Finding of No Significant Impact (FONSI) or Record of Decision.

As a result of the above-mentioned federal and state regulations, the USAF is responsible for identifying and locating jurisdictional "waters of the United States," including wetlands, occurring on USAF installations where these resources have the potential to be impacted by Base activities. Such impacts could include construction of roads, buildings, runways, taxiways, navigation aids, and other appurtenant structures or activities as simple as culvert crossings of small intermittent streams, rip-rap placement in stream channels to curb accelerated erosion, and incidental fill and grading of wet depressions.

Jurisdictional wetlands have been identified and delineated on March ARB. A formal USACE Jurisdictional Determination conducted in 2009 resulted in a Preliminary Jurisdictional Determination finding for 19,200 linear ft of drainages and 28 seasonally ponded features on Base. In addition, four seasonally ponded features that are not under USACE jurisdiction but may be regulated by other federal, state, or local laws were determined to occur (SAIC 2010). Jurisdictional determinations by the USACE in 2014 and 2015 identified an additional 10,764 linear ft of jurisdictional stream and 0.57 acre of wetland in Heacock Channel and 3,990 linear ft of jurisdictional stream within the Perris Valley Storm Drain within the installation boundaries (Glenn Lukos 2014, 2015). A total of 76 seasonally ponded features were identified on Base during the 2019 wet season fairy shrimp surveys (CH2M 2020a). It is necessary to ensure that inadvertent violations do not occur. If wetland encroachments are found to be necessary, appropriate permits and certifications should be obtained prior to the initiation of any work within the jurisdictional areas. Figure 7-4 shows the locations of wetlands on March ARB. Figure 7-5 presents a flow diagram detailing the wetland permitting process.

The FEMA FIRMs covering March ARB indicate that lands along the north and east sides of the Base are located within the 100-year floodplain (FEMA 2008, 2014). Detailed floodplain studies have not been performed for March ARB. However, in conjunction with various channel improvement alternatives for the Heacock Storm Channel south of Cactus Avenue, the Riverside County Flood Control and Water Conservation District has made preliminary calculations and has mapped the preliminary boundaries of the 100-year floodplain that extend onto portions of March ARB (MARB 2012). Floodplains are defined as areas adjoining inland or coastal waters that are prone to flooding. These areas must be reserved to discharge the 100-year flood without cumulatively increasing the water surface elevation more than a designated height. Once a floodplain is established, no additional obstruction such as a building should be placed in the floodplain that will increase the 100-year flood water surface elevation.

EO 11988, *Floodplains Management*, requires all federal agencies to provide leadership and take action to reduce the risk of flood loss; minimize flood impacts on human safety, health, and welfare; and restore and preserve the natural and beneficial values of floodplains when acquiring, managing, or disposing of federal lands. The SecAF or other designated official must sign a FONPA before any action within a floodplain may proceed, as specified in SecAF Order 790.1. Once the practicality of alternatives has been fully assessed, only then should a statement regarding the FONPA be made into the associated FONSI and/or Record of Decision.

In addition, if action is taken that permits an encroachment within the floodplain that alters the flood hazards on a FIRM (i.e., changes to the floodplain boundary), March ARB must submit an analysis reflecting those changes to FEMA. FEMA HQ can be contacted at (202) 646-2500 to obtain booklet MT-2, *Revisions to National Flood Insurance Program Maps,* for further guidance.

Note: Although vernal pools and vernal wetland-meadows are true wetlands in the ecological and scientific meanings of "wetland," they rarely fall within the jurisdiction of the USACE or the RWQCB as being "Clean Water Act wetlands" because of the wording of the CWA and subsequent judicial and regulatory interpretations of the CWA. Nonetheless, vernal pools and vernal wetland-meadows often sustain rare and/or federally listed flora or fauna.

Trends indicate that impacts to wetland and floodplain resources on March ARB as a result of climate change would be minimal and would not require adaptations to existing management practices; however, further studies are required to verify this.

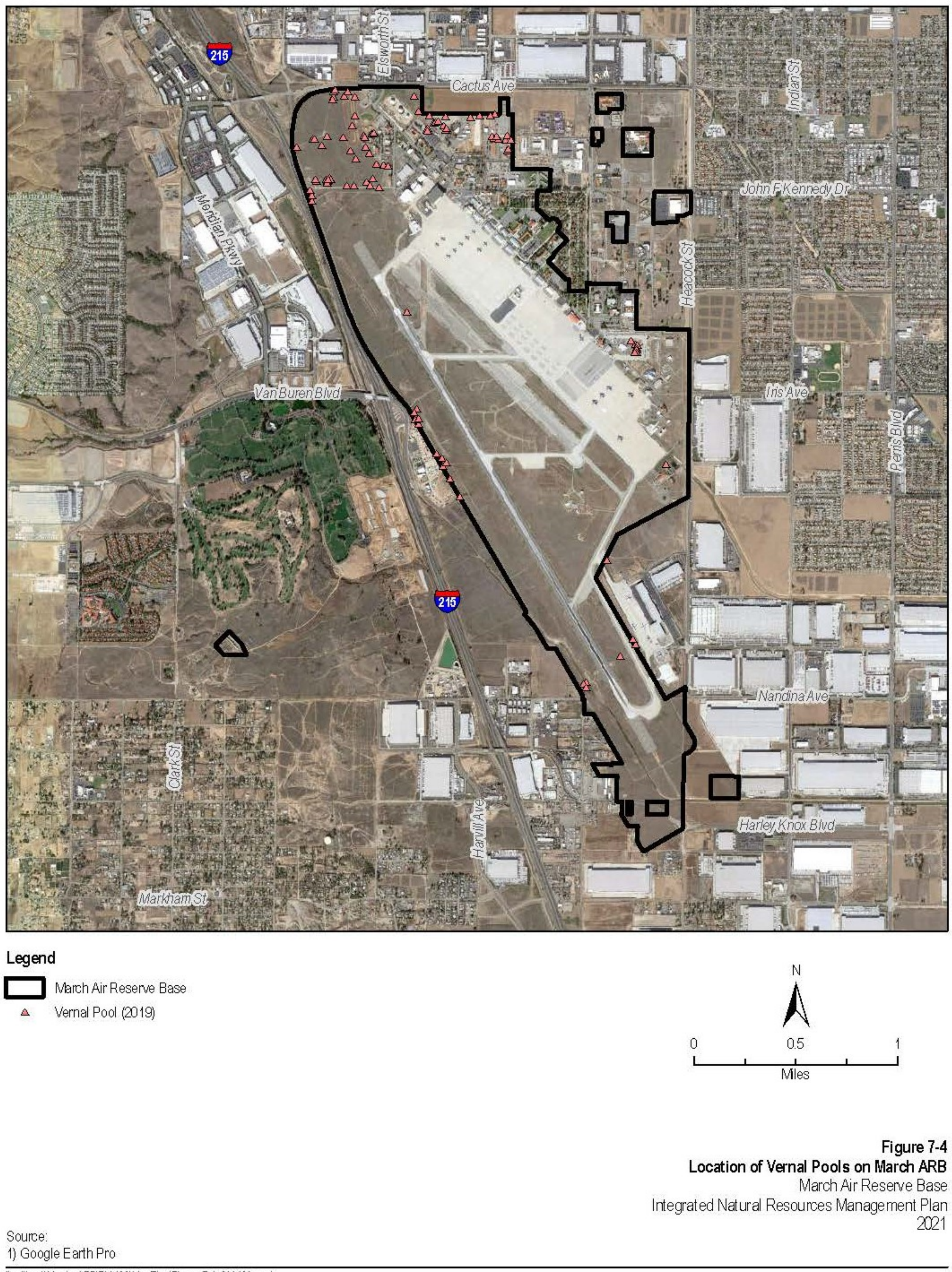


Figure 7-4. Locations of Vernal Pools at March ARB

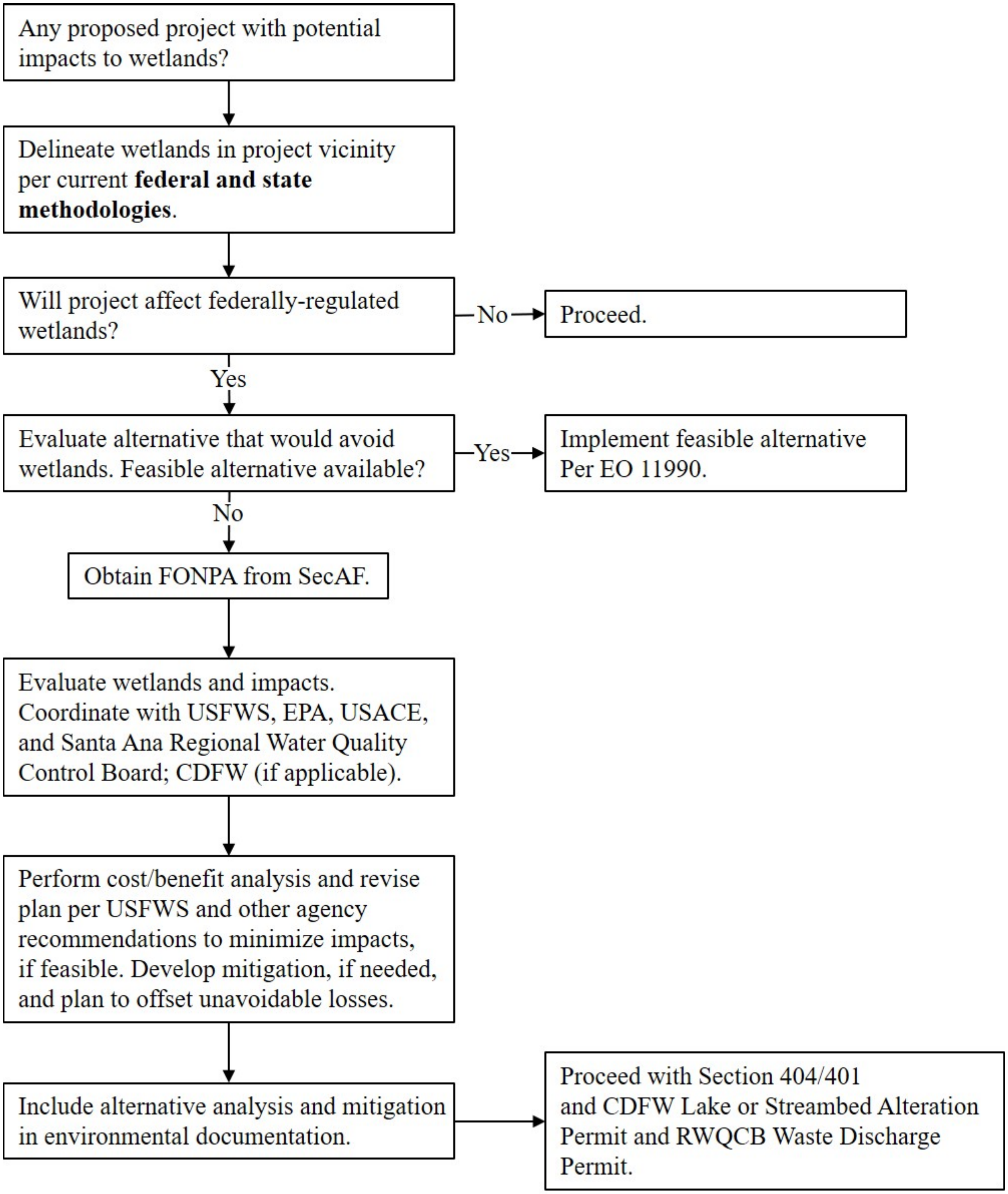


Figure 7-5. Wetland Permitting Process

7.7 Grounds Maintenance

Applicability Statement

This section applies to USAF installations that perform ground maintenance activities that could impact natural resources. This section **IS** applicable to this installation.

Program Overview/Current Management Practices

March ARB is required under AFMAN 32-7003 (paragraph 3.58.1) and the April 26, 1994 Presidential Memorandum "Environmentally and Economically Beneficial Practices on Federal Landscaped Grounds" to plan for the management of land and grounds in a way that conserves natural resources, as long as these management programs do not negatively interfere with the military mission. Specific parameters for landscape development, design, and maintenance are required to minimize irrigation, manpower, pollution, and equipment needs while providing for landscaping that is traditional in nature, simple and informal in design, compatible with surroundings, and complimentary to the natural setting of the area. The use of native vegetation is promoted where feasible. Pest management is also a component of land and grounds conditions (AFMAN 32-1053, *Integrated Pest Management Program*).

An outside contractor performs all grounds maintenance activities on March ARB. The Base Contracting Office administers the grounds maintenance contracts. Outside contractors are often issued 3- to 5-year contracts to perform a specific grounds maintenance task, such as mowing lawns, applying herbicides, mulching, and tree planting and pruning. In the past, the tasks performed by these contractors have been coordinated with the Base Civil Engineering and Environmental offices.

Rising temperatures and changes in precipitation patterns from climate change have the potential to impact grounds maintenance at March ARB. Increased precipitation could result in increased plant productivity and the need for more frequent maintenance of airfield vegetation. Soil erosion and encroachment of non-native species could increase during drought years and require additional management/maintenance.

7.8 Forest Management

Applicability Statement

This section applies to USAF installations that maintain forested land on USAF property. This section **IS NOT** applicable to this installation.

7.9 Wildland Fire Management

Applicability Statement

This section applies to USAF installations with unimproved lands that present a wildfire hazard and/or installations that utilize prescribed burns as a land management tool. This section **IS NOT** applicable to this installation.

7.10 Agricultural Outleasing

Applicability Statement

This section applies to USAF installations that lease eligible USAF land for agricultural purposes. This section **IS NOT** applicable to this installation

7.11 Integrated Pest Management Program

Applicability Statement

This section applies to USAF installations that perform pest management activities in support of natural resources management (e.g., invasive species, forest pests, etc.). This section **IS** applicable to this installation.

Program Overview/Current Management Practices

The March ARB IPMP (MARB 2013) is being revised and will incorporate the provisions of DoDI 4150.7, *DoD Pest Management Program*, and AFMAN 32-1053, *Integrated Pest Management Program*. The instruction states that it is DoD policy to establish and maintain safe, effective, and environmentally sound integrated pest management programs to prevent or control pests and disease vectors that may adversely impact readiness or military operations by affecting the health of personnel or damaging structures, material, or property. Integrated pest management should employ mechanical, physical, cultural, biological, and educational methods to maintain pests at populations low enough to prevent undesirable damage or annoyance. In addition, application of the least toxic chemical should be used as a last resort.

Target pests at March ARB include non-native, invasive, and noxious weeds; crawling insects; spiders; flying insects; rodents; birds; and other vertebrate pests.

Most pesticides/herbicides are used for grounds maintenance and pest management on an as-needed basis, such as pest management at military family housing; weed control on parking lots, sidewalks, aircraft parking aprons, and taxiways; and rodent control throughout the Base. Only chemicals approved for use by the DoD and NRM and in the State of California may be used. The 452 MSG/CEV manages the pest management program and manages and oversees the grounds maintenance contractor responsible for pesticide applications.

The incidence of invasive species and pests may increase as a result of climate change (USGCRP 2018); however, existing management practices would be sufficient to address any increases in invasive species and pests that may occur at March ARB.

7.11.1 Invasive Plants

The NRCS, USDA Animal and Plant Health Inspection Service (APHIS), California Department of Food and Agriculture (CDFA), and California Invasive Plant Council (Cal-IPC) have compiled lists of invasive, noxious weeds that require control or eradication (NRCS 2020b; APHIS 2010; CDFA 2020; Cal-IPC 2020). Non-native, invasive, and noxious plant species identified as natural resource pests at March ARB are presented in Table 7-2. Invasive plants are controlled in accordance with the IPMP (MARB 2013). On the airfield, the growth of vegetation is controlled on the airfield pavement and other pavements, around POL storage, and along fence lines. In improved areas of the Base, unwanted vegetation is controlled along fence lines, around light posts, and in landscaped areas. Control methods for weeds include hand/mechanical cutting and the application of herbicide to prevent regrowth.

Table 7-2. Non-native, Invasive, and Noxious Plant Species Known to Occur on March ARB

Common Name	Scientific Name	Weed Ratings (CDFA/NRCS/Cal- IPC)
Wild oats	*Avena fatua*	- / - / Moderate
Slender oats	*Avena barbata*	- / - / Moderate
Black mustard	*Brassica nigra*	- / - / Moderate
Field mustard	*Brassica rapa*	- / - / Limited
Ripgut grass	*Bromus diandrus*	/ - / Moderate
Soft chess	*Bromus hordeaceus*	/ - / Limited
Red brome	*Bromus madritensis* ssp. *rubens*	/ - / High
Cheat grass	*Bromus tectorum*	/ - / High
Tocalote	*Centaurea melitensis*	C / - / Moderate
Yellow star thistle	*Centaurea solstitialis*	B / CW / High
Bull thistle	*Cirsium vulgare*	C / - / Moderate
Milkflower lacteus	*Cotoneaster lacteus*	/ - / Moderate
Bermuda grass	*Cynodon dactylon*	C / CW / Moderate
Red-stemmed filaree	*Erodium cicutarium*	- / - / Limited
Blue gum	*Eucalyptus globulus*	/ - / Limited
Rattail fescue	*Festuca myuros*	/ - / Moderate
Edible fig	*Ficus carica*	- / - / Moderate
Gazania	*Gazania linearis*	- / - / Moderate
Short-pod mustard	*Hirschfeldia incana*	- / - / Moderate
Mediterranean barley	*Hordeum marinum*	- / - / Moderate
Smooth cat’s ear	*Hypochaeris glabra*	- / - / Limited
Hyssop loosestrife	*Lythrum hyssopifolia*	/ - / Moderate
Horehound	*Marrubium vulgare*	- / - / Limited
California burclover	*Medicago polymorpha*	- / - / Limited
Crystalline iceplant	*Mesembryanthemum crystallinum*	/ - / Moderate
Tree tobacco	*Nicotiana glauca*	- / - / Moderate
European olive	*Olea europaea*	- / - / Limited
English plantain	*Plantago lanceolata*	- / - / Limited
Kentucky bluegrass	*Poa pratensis*	- / - / Limited
Wild radish	*Raphanus sativus*	- / - / Limited
Castorbean	*Ricinus communis*	- / - / Limited
Russian thistle	*Salsola tragus*	C / CW / Limited
Peruvian pepper tree	*Schinus molle*	- / - / Limited

Common Name	Scientific Name	Weed Ratings (CDFA/NRCS/Cal- IPC)
Brazilian pepper tree	*Schinus terebinthifolius*	- / - / Moderate
Arabian schismus	*Schismus arabicus*	/ - / Limited
Mediterranean grass	*Schismus barbatus*	/ - / Limited
London rocket	*Sisymbrium irio*	- / - / Limited
White horse-nettle	*Solanum elaeagnifolium*	/ BW / -
Athel	*Tamarix aphylla*	/ - / Limited
Chinese tamarisk	*Tamarix chinensis*	/ - / High
Rose clover	*Trifolium hirtum*	- / - / Limited

Sources: NRCS 2020b; CDFA 2020; Cal-IPC 2020

Weed Rating Definitions:

CDFA Pest Rating:

Rating B = A pest of known economic or environmental detriment and, if present in California, it is of limited distribution. B-rated pests are eligible to enter the state if the receiving county has agreed to accept them. If found in the state, they are subject to state endorsed holding action and eradication only to provide for containment, as when found in a nursery. At the discretion of the individual county agricultural commissioner, they are subject to eradication, containment, suppression, control, or other holding action.

Rating C = A pest of known economic or environmental detriment and, if present in California, it is usually widespread. C-rated organisms are eligible to enter the state as long as the commodities with which they are associated conform to pest cleanliness standards when found in nursery stock shipments. If found in the state, they are subject to regulations designed to retard spread or to suppress at the discretion of the individual county agricultural commissioner. There is no state enforced action other than providing for pest cleanliness.

NRCS: CW = C list (noxious weeds); BW = B list (noxious weeds)

Cal-IPC:

High = These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.

Moderate = These species have substantial and apparent-but generally not severe-ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

Limited = These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

7.12 Bird/Wildlife Aircraft Strike Hazard (BASH)

Applicability Statement

This section applies to USAF installations that maintain a BASH Program to prevent and reduce wildlife-related hazards to aircraft operations. This section **IS** applicable to this installation.

Program Overview/Current Management Practices

Wildlife aircraft strike hazards exist at March ARB and its vicinity due to the presence of resident and migratory birds and other wildlife. The March ARB BASH Plan 91-212 (BASH Plan; MARB 2017, MARB 2019b) provides a local program for minimizing wildlife strikes to aircraft by providing the following:

- Establishment of a Wildlife Hazard Working Group.

- Procedures for reporting hazardous bird activity and altering or discontinuing flying operations.
- Provisions to disseminate information to all assigned and transient aircrews for specific bird hazards and procedures for avoidance.
- Procedures to eliminate or reduce environmental conditions that attract birds and other wildlife to the airfield.
- Procedures to disperse and remove wildlife from the airfield.

The installation BASH Plan and the INRMP were developed to be mutually supportive. The BASH Plan includes maintenance specifications for a grass mowing height on the airfield of between 7 and 14 inches; seasonal inspection requirements for grain-type grasses that attract high-threat avian species; and periodic inspection requirements for ponding and proper drainage on the airfield. The BASH Plan also established a Bird Hazard Warning System to provide a means for immediate exchange of information between the ground agencies and air crews concerning the existence of birds that pose a hazard. BASH reduction techniques listed in the BASH Plan include abating nuisance avian species, pyrotechnics, and depredation when necessary. These techniques are discussed further in this section.

7.12.1 Existing and Potential Hazards to Aircraft Operations posed by Wildlife

The USAF Avian Hazard Advisory System (AHAS) uses filtered Next Generation Weather Radar (NEXRAD) data, National Weather Service (NWS) forecasts, Migratory Bird and Soaring Bird Forecast Models, and the BAM to predict bird movements within the entire continental United States and Alaska. AHAS is an online tool where users can query information on current hour, less than 24 hours, more than 24 hours, or historical risk. Current hour risk is based on observations made by the NEXRAD system and data from the Migratory Bird and Soaring Bird Forecast Models. BAM data are used if no other inputs are available. Less than 24 hours risk is based on the Migratory Bird and Soaring Bird Forecast Models (with imbedded NWS data) or the BAM. More than 24 hours or historical risk information comes from the current version of the BAM (USAF 2014).

Table 7-3 shows the BAM data for March ARB generated by the USAF AHAS and Figure 7-6 presents the BAM data in a graph. The BAM data and graph predict the probability of a bird aircraft strike throughout an entire year within a 25 nautical mile radius of March ARB. It also shows the time of year with the highest probability of a strike. The BAM data were generated in an attempt to predict the number of strikes expected over 1 million nautical miles of the route for an aircraft with a frontal surface area of 100 square ft. The BAM graph identifies a variety of BASH activity for March ARB. During the dusk/dawn/midday period, there is Moderate 2 and 3 risk for raptors between October 8 and April 8. There is Moderate 1, Low 3, 2, and 1 risk between April 9 and October 7 for this same dusk/dawn/midday period. At night, there is Moderate 1 and 2 risk for waterfowl between September 24 and April 22. There is Low 2 and 1 risk at night between April 23 and September 23. March ARB is situated near a major duck migration corridor and lies between two major goose migration corridors (Bellrose 1980). The duck migration corridor predicts populations between 751,000 and 1,500,000 flying through the area. The goose migration corridor to the east of the Base predicts populations between 5,000 and 25,000, whereas the goose migration corridor to the west of the Base predicts between 76,000 and 150,000 flying though the area. Figures 7-7 and 7-8 show the location of March ARB in relation to these duck and goose migration routes, respectively (Bellrose 1980).

Table 7-3. Bird Avoidance Model (BAM) Data for March ARB

	Dawn	Day	Dusk	Night
January 1 – 14	Moderate 3	Moderate 3	Moderate 3	Moderate 2
January 15 – 28	Moderate 3	Moderate 3	Moderate 3	Moderate 2
January 29 – Feb 11	Moderate 3	Moderate 3	Moderate 3	Moderate 2
February 12 – 25	Moderate 3	Moderate 3	Moderate 3	No data
February 26 – March 11	Moderate 2	Moderate 2	Moderate 2	Moderate 2
March 12 – 25	Moderate 2	Moderate 2	Moderate 2	Moderate 2
March 26 – April 8	Moderate 2	Moderate 2	Moderate 2	Moderate 2
April 9 – 22	Moderate 1	Moderate 1	Moderate 1	Moderate 1
April 23 – May 6	Low 3	Low 3	Low 3	Low 1
May 7 – 20	Low 2	Low 3	Low 2	Low 1
May 21 – June 3	Low 2	Low 3	Low 2	Low 1
June 4 – June 17	Low 3	Low 3	Low 2	Low 1
June 18 – July 1	Low 2	Low 3	Low 2	Low 1
July 2 – 15	Low 2	Low 3	Low 2	Low 1
July 16 – 29	Low 2	Low 3	Low 2	Low 1
July 30 – August 12	Low 2	Low 3	Low 2	Low 1
August 13 – 26	Low 2	Low 3	Low 2	Low 1
August 27 – September 9	Low 3	Low 3	Low 3	Low 2
September 10 – 23	Low 3	Low 3	Low 3	Low 2
September 24 – October 7	Moderate 1	Moderate 1	Moderate 1	Moderate 1
October 8 – 21	Moderate 2	Moderate 2	Moderate 2	Moderate 2
October 22 – November 4	Moderate 2	Moderate 2	Moderate 2	Moderate 2
November 5 – 18	Moderate 2	Moderate 2	Moderate 2	Moderate 2
November 19 – December 2	Moderate 3	Moderate 3	Moderate 3	Moderate 2
December 3 – 16	Moderate 3	Moderate 3	Moderate 3	Moderate 2
December 17 – 31	Moderate 3	Moderate 3	Moderate 3	Moderate 2

Key to BASH Classifications:

Class:	Bird Mass (ounces per square kilometer)	Average Predicted Risk Ratio:
Low 1	0-140	-
Low 2	141-494	4.5 times the risk of Low 1
Low 3	495-1,748	16 times the risk of Low 1
Moderate 1	1,749-6,18 1	57 times the risk of Low 1
Moderate 2	6,182-21,854	200 times the risk of Low 1
Moderate 3	21,855-77,269	708 times the risk of Low 1

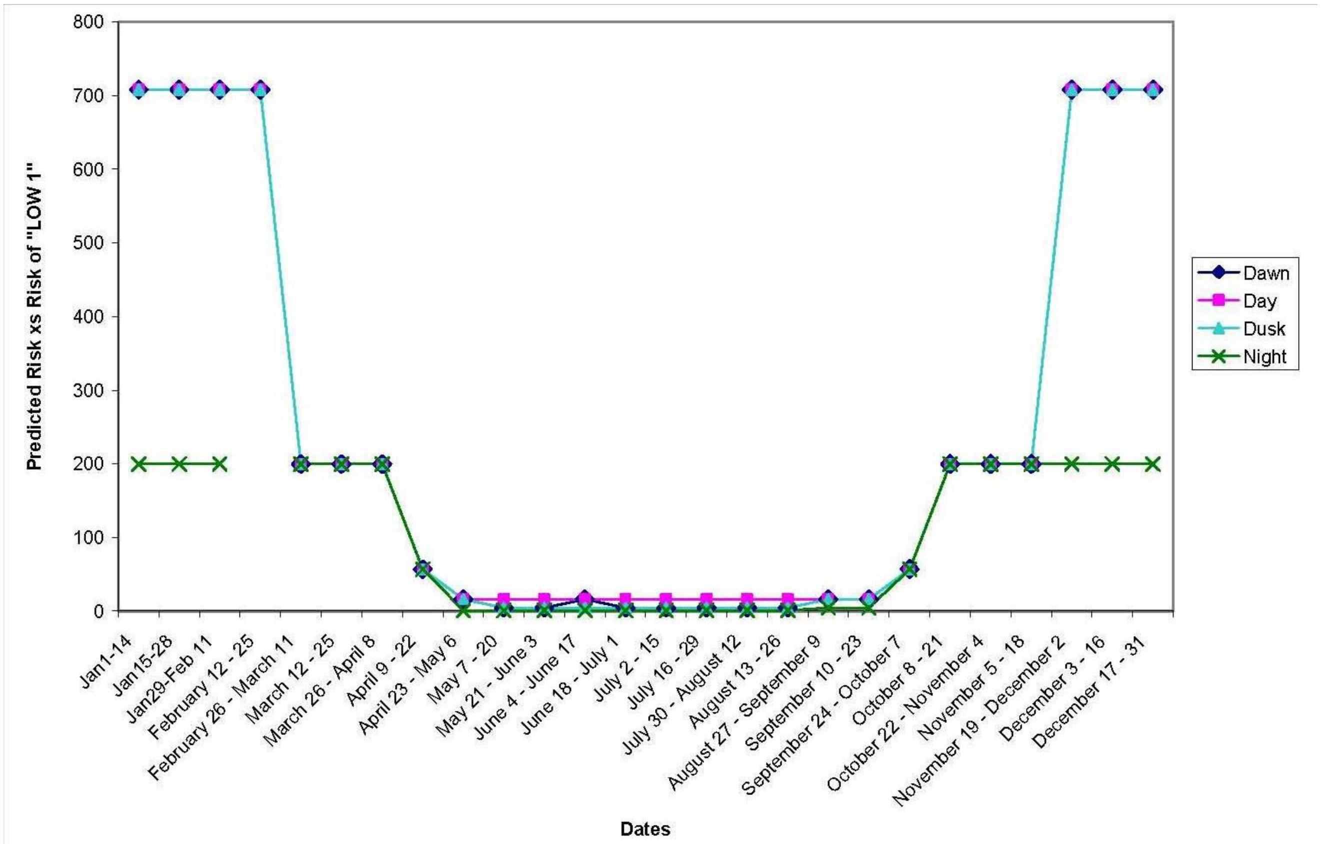
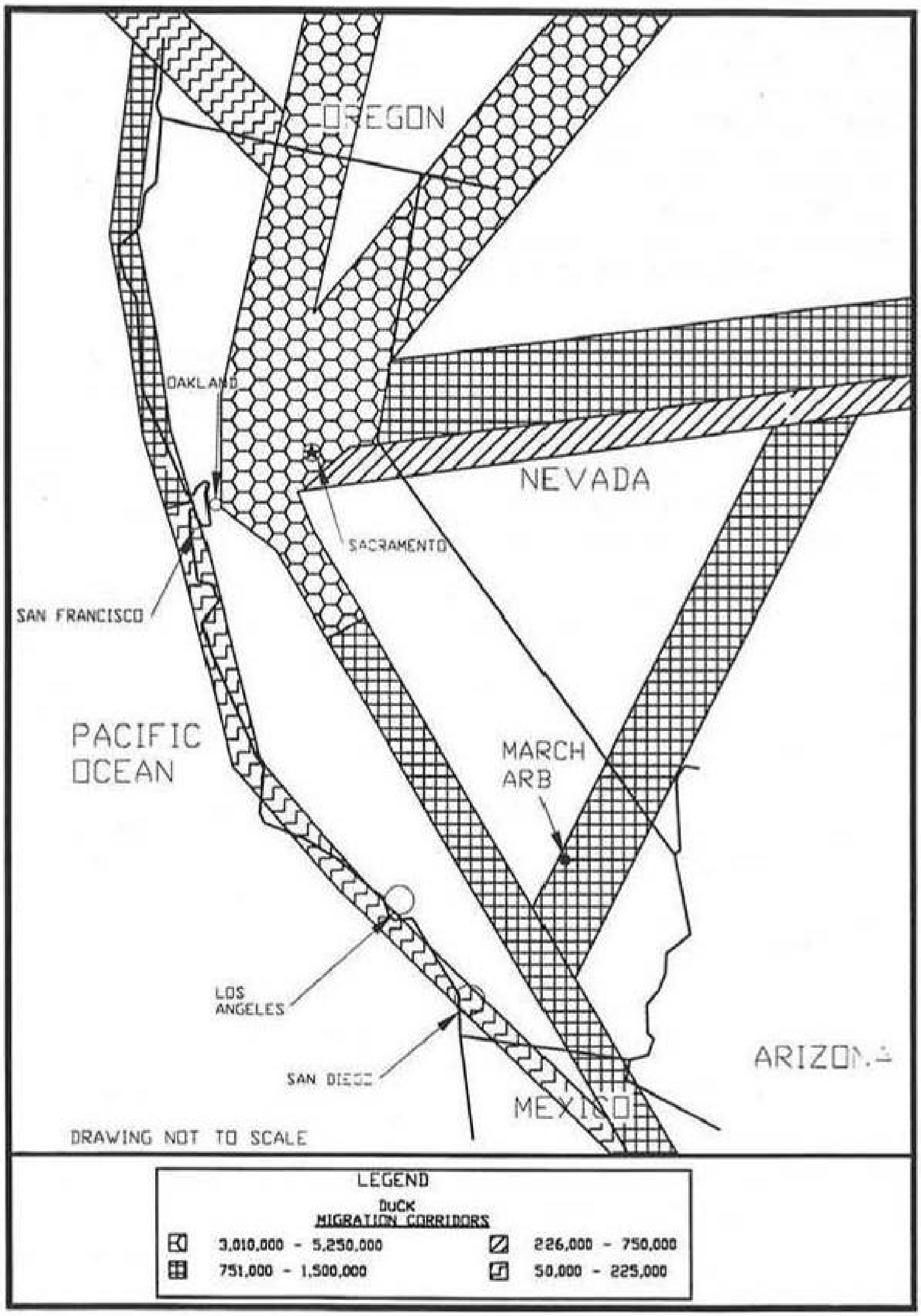
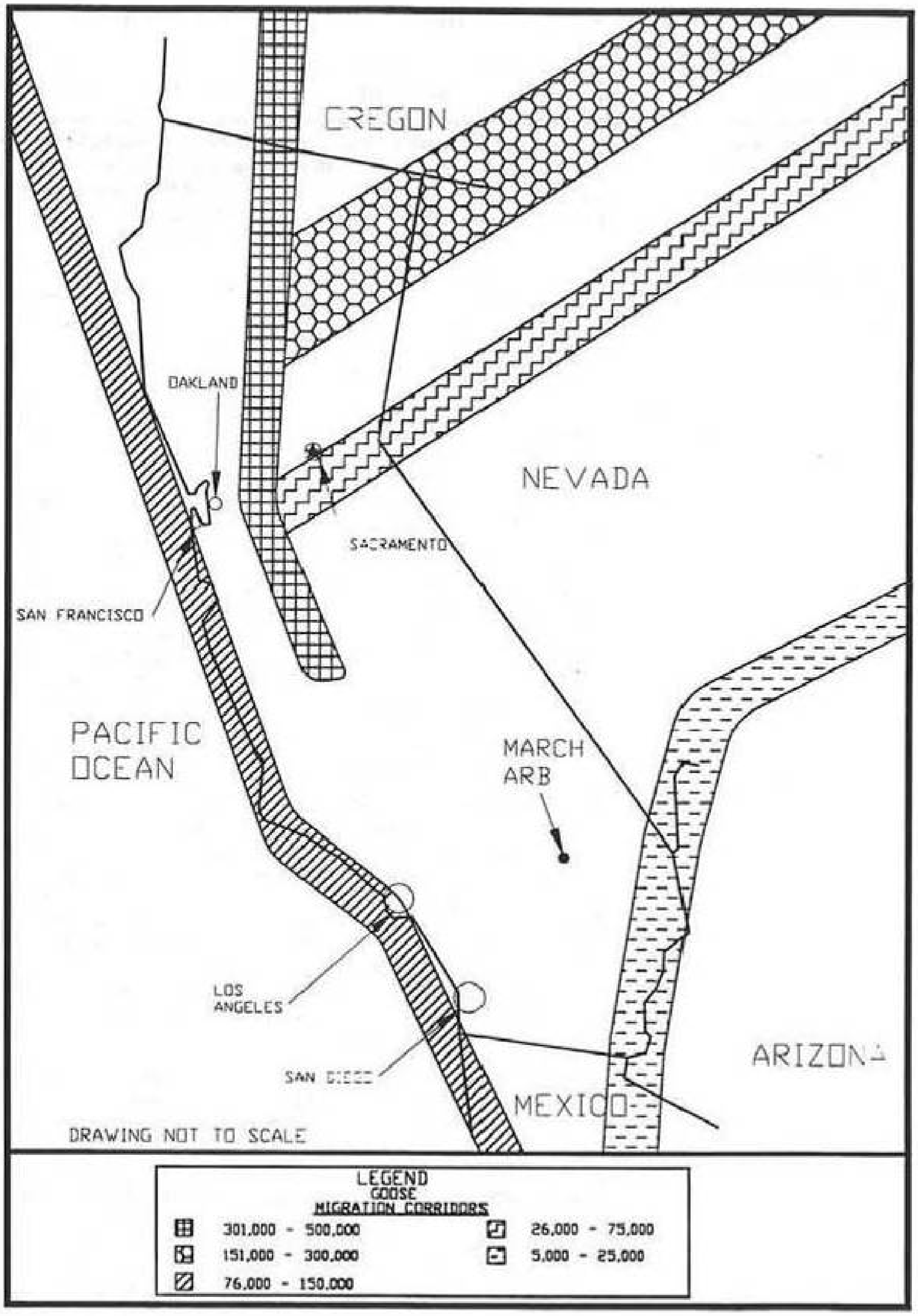


Figure 7-6. Bird Avoidance Model (BAM) Graph for March ARB



Source: Bellrose 1980

Figure 7-7. Duck Migration Corridors in Relation to March ARB



Source: Bellrose 1980

Figure 7-8. Goose Migration Corridors in Relation to March ARB

On March ARB, 381 bird/wildlife strike incidents were recorded during the 179-month period between October 2004 and August 2019. Of these, 261 occurred on-base, 82 occurred off-base, and 38 did not have the location recorded. Of the 261 on-base incidents, 235 were bird strikes and 26 were with non-bird organisms. Forty strikes (approximately 12 percent of total) occurred during the winter, with the remaining strikes spread generally evenly throughout the remainder of the year. This indicates the probability of a strike is greater during migration periods and when the local bird population increases with the addition of non-resident summer breeders.

Fourteen incidents resulted in aircraft damage, including six on-base (2.5 percent of on-base bird strikes), seven off-base (8.5 percent of off-base bird strikes), and one where the location was not recorded (2.6 percent of strikes with no location recorded). Although location data were not recorded, the damage rate would indicate that the strikes without recorded locations were on-base. All incidents were with military aircraft, except for one strike with a private Cessna; the Cessna strike was one of the fourteen strikes that resulted in aircraft damage.

The percentage of off-base strikes that result in damage is higher than on-base strikes, which is likely caused by aircraft traveling at greater speeds when off-base, resulting in impacts with greater energy and greater potential to cause damage. Three of the fourteen strikes causing damage resulted from strikes with unknown birds off-base. All on-base strikes causing damage were from identified bird species. Engine damage was the most common type of damage (10 of 14 damaging strikes), while two strikes resulted in minor wing damage, one strike resulted in minor nose damage, and one strike damaged the radome. Of the eleven damage-causing strikes from identified birds, eight were with birds with typical weights of 2 to 3.3 pounds (red-tailed hawk, turkey vulture, ferruginous hawk, western grebe, and pintail). Two much smaller birds (American kestrel and horned lark), weighing 0.5 pound or less, accounted for a single damaging incident each, and an unidentified group of perching birds of unknown number resulted in damage to a plane's radome.

Both of the small bird strikes resulted in engine damage. The remaining eight damaged engines resulted from seven collisions with large birds and one collision with an unknown bird. Wing damage resulted from collision with a ferruginous hawk and an unknown bird. Nose damage to a private Cessna resulted from collision with an unknown bird.

The six incidents with burrowing owls all resulted from locating burrowing owl remains on the airfield, with no strike being reported. None of these incidents resulted in aircraft damage. Burrowing owl incidents were recorded in February (2), July, September, October, and December.

7.12.2 Natural Resource Management Program Support of the BASH Plan

Natural resources personnel support the BASH Plan in the following ways:

- Assist the flight safety office and others in the development and implementation of the BASH Plan.
- Assist the flight safety office in providing oversight to external agencies or contractors involved in the implementation of the BASH Plan on Air Force property.
- The NRM is an active member of the March ARB Wildlife Hazard Working Group.
- Conduct local wildlife surveys to identify wildlife activity that may pose a risk to aircraft operations.

- Immediately notify USFWS of all aircraft strikes to eagles and T&E species via reporting to the USFWS Migratory Bird Permit Office.

7.12.3 Vegetation Maintenance to Reduce BASH Hazards

7.12.3.1 Vegetative Cover Height

As specified in the BASH Plan and AFI 91-212, vegetative cover within the Aircraft Movement Area (AMA), which is defined as the area of the airfield encompasses by the primary surface and clear zones, as well as apron areas and taxiways, must be maintained at a height between 7 and 14 inches and, where feasible, converted to a locally adapted vegetation species deemed unattractive to birds and other wildlife. At a minimum, vegetation cover should be maintained at the prescribed height 500 feet beyond the AMA where possible. The 7- to 14-inch standard is designed to minimize mowing frequency and improve growing conditions while providing minimal wildlife attraction. This height of vegetative cover discourages flocking species from foraging on the airfield due to limited visibility, difficulty for birds to locate invertebrate food sources, and difficulty in predator detection. Vegetative cover should not be allowed to exceed 14 inches, as it may attract some ground-nesting birds and provide cover or food for rodents that may attract predatory birds and mammals. Taller vegetation may also provide cover for larger animals, like coyotes, making them difficult to detect and remove.

Mowing should begin adjacent to the runways and finish in the infield or outer vegetation areas, as this will cause insects and other animals to move away from aircraft takeoff and landing areas. The directional pattern of mowing should be alternated to prevent the development of ruts and subsequent ponding.

7.12.3.2 Bare Areas

In accordance with the BASH Plan and AFI 91-212, bare areas should be eliminated within the AMA. Bare areas expose grit (sand and small stones), seeds, and invertebrates that are easily exploited by birds. They also attract flocking species and provide nesting sites for birds such as killdeer and grassland passerines. Bare areas should be seeded with native grasses with the lowest seed production.

7.12.3.3 Broad-Leaved Weeds

In accordance with the BASH Plan and AFI 91-212, broad-leaved weeds should be kept to a minimum on the airfield. Non-uniform plant species create an attractive mosaic of both lateral and vertical dimensions. If non-chemical methods to control weeds on the airfield are proven unsuccessful, then herbicides may be applied in a limited manner under the approval of the NRM and in accordance with the IPMP.

7.12.3.4 Drainage Ditches

Aquatic vegetation, trees, and brush along and within drainage ditches should be removed to prevent perching, loafing, and nesting areas and the accumulation of standing water.

7.12.4 Habitat Management to Reduce BASH Hazards

Reducing standing water on the airfield and implementing grounds management practices will reduce habitat resources, creating an area unattractive to hazardous wildlife and decreasing the threat of bird and mammal strikes.

7.12.5 Wildlife Control to Reduce BASH Hazards

Lethal control is authorized only after all practical non-lethal control measures have been exhausted, provided that the proposed actions are reviewed in EIAP procedures as stipulated in 32 CFR Part 989 and conducted in accordance with applicable depredation permits (refer to Section 7.12.5.1).

7.12.5.1 Depredation Permits

The BASH Program Manager will apply for permits and maintain records associated with harassment and depredation activities as long as they are sharing all reports, communication, and consulting with NRM/IPMC in relation to all wildlife, habitats, and all other natural resources issues. In some cases, the NRM/IPMC may need to take over the responsibility for all permitting related to the depredation program. The BASH Program Manager who manages BASH depredation shall carry a copy of the permits whenever exercising depredation authority. The Safety Office is responsible for preparation and submittal of annual depredation permit reports that include information on all strikes in the past year. The Safety Office also handles reporting any T&E or eagle strikes to USFWS; however, the strike reports need to be reviewed and approved by the NRM prior to submittal. Strike information needs to be shared with the NRM in a timely fashion in order to comply with notification requirements in the permits. In accordance with AFMAN 32-7003, *Environmental Conservation*, any proposal to intentionally kill, wound, capture, or collect a migratory bird requires a migratory bird depredation permit issued by the USFWS. To lessen the danger of wildlife strikes with aircraft, March ARB holds a federal Migratory Bird Depredation Permit that authorizes the take, temporary possession, and transportation of specified numbers and species of migratory birds to relieve or prevent injurious situations impacting human safety. Records are maintained at the 452 AMW Safety Office, Building 394. The Migratory Bird Depredation Permit is renewed annually.

March ARB holds an Eagle Depredation Permit that authorizes the use of non-lethal scare devices, scare tactics, or frightening devices to move or disperse bald eagles and golden eagles endangering human safety due to a high risk of a serious bird strike to landing and departing aircraft.

7.12.6 Coordination with BASH

As BASH projects at March ARB are proposed, appropriate coordination between programs and NEPA analysis would be conducted prior to their implementation.

7.13 Coastal Zone and Marine Resources Management

Applicability Statement

This section applies to USAF installations that are located along coasts and/or within coastal management zones. This section **IS NOT** applicable to this installation.

7.14 Cultural Resources Protection

Applicability Statement

This section applies to USAF installations that have cultural resources that may be impacted by natural resource management activities. This section **IS** applicable to this installation.

Program Overview/Current Management Practices

Cultural resources consist of prehistoric and historic sites, districts, structures, artifacts, and any other physical evidence of human activities considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. The National Historic Preservation Act, as amended in 1992 (54 U.S.C. § 300101 et seq.) and NEPA require the consideration of impacts on cultural resources either listed or eligible to be listed on the NRHP. Cultural resources can be divided into four major categories:

- Traditional cultural properties.
- Archaeological resources.
- Architectural resources.
- Cultural resources, including archaeological sites and designated historic areas, that are located on or in proximity to the Base.

In accordance with the March ARB ICRMP, any project with potential to impact known cultural resources is evaluated for compliance with the National Historic Preservation Act.

Traditional Cultural Properties

Traditional cultural properties include archaeological resources, buildings, neighborhoods, prominent topographic features, plants, animals, and minerals that Native American or other ethnic groups consider essential for the persistence of their traditional culture. Resources generally must be greater than 50 years old to be considered for protection under existing cultural resource legislation. The significance of traditional cultural properties is often determined through consultation with the groups that are associated with the sites. There are no known traditional cultural properties at March ARB.

Archaeological Resources

Archaeological resources consist of areas where human activity has measurably altered the earth or deposits of physical remains are found, such as arrowheads, pottery, human remains, and historical debris. All areas of the former and current installation have been surveyed for surface archaeological resources. As part of the 2011 ICRMP, a records search of previously recorded cultural resources and previously conducted archaeological investigations at March ARB was conducted using the California Historical Resources Information System. This search, along with information from the 2004 ICRMP, an ASM Affiliates 1996 report, and March ARB records, identified 57 archaeological investigations within the search area, which included the current boundaries of March ARB, areas west of the current base boundaries that were previously part of the Base, and a 500-foot search radius buffer. Six of these archaeological investigations include portions of the current March ARB boundaries, but no archaeological resources were identified within the boundaries of March ARB. Based on this information, no NRHP-listed, -eligible, or potentially eligible archaeological resources have been identified within the current boundaries of the installation (MARB 2021).

Architectural Resources

The March Field Historic District on March ARB property consists of essentially all buildings and structures constructed between 1928 and 1943 and one extant building from the original 1917 March Field. In 1994, the March Field Historic District was listed on the NRHP with the concurrence of the California SHPO. The March Field Historic District comprises 228 buildings and structures, 197 of which contribute to its historic significance. As a result of changes to the installation boundary from the 1996 realignment of the Base and the demolition of contributing resources Buildings 385 and 441 in 2017, only 68 of the 197 contributing elements of the historic district are currently located within the boundaries of March ARB. Additionally, the 2019 surveys for the ICRMP update identified one property, Building 413, that is individually eligible for listing in the NRHP and is also a contributing resource to the district. The historic properties primarily consist of non-commissioned officer family housing, barracks, a hospital, hangars, maintenance buildings, water pump houses, and a gymnasium. A complete listing of historic properties at March ARB and a description of the management measures being implemented for these resources is provided in the March ARB ICRMP (MARB 2021).

Unknown Cultural Resources

The potential for the inadvertent discovery of archaeological resources during ground-disturbing activities exists. Certain areas such as stream banks and bottoms have a higher potential to yield archaeological resources than other areas, such as steep slopes. The AFRC ensures that, in the event of the inadvertent discovery of archaeological resources, measures are taken to promptly protect the find from disturbance, assess the significance of the discovery, and implement appropriate mitigation measures for significant resources.

If human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered, the AFRC shall ensure that all appropriate measures are implemented to protect remains and any other protected cultural items. All appropriate tribes and agencies will be promptly notified of the find, and all applicable federal, tribal, and state procedures will be followed.

7.15 Public Outreach

Applicability Statement

This section applies to all USAF installations that maintain an INRMP. The installation **IS** required to implement this element.

Program Overview/Current Management Practices

The March ARB NRM, in conjunction with the 452 Public Affairs Office (452 AMW PA), is responsible for establishing and implementing a conservation education program to instruct Base personnel on the protection and enhancement of biological diversity on March ARB.

7.16 Climate Change Vulnerabilities

Applicability Statement

This section applies to USAF installations that have identified climate change risks, vulnerabilities, and adaptation strategies using authoritative region-specific climate science, climate projections, and existing tools. This section **IS** applicable to this installation.

Program Overview/Current Management Practices

DoD recognizes that climate change will play a significant role in its ability to fulfill its mission and may undermine the capacity of our military installations to support training activities. Because climate change will affect both the natural landscape and built infrastructure, it impacts readiness and environmental stewardship responsibilities at installations across the nation. DoD must employ creative ways to address the impact of climate change to remain ready to operate amid the challenges of changing environment and environmental damage (DoD 2014). Potential climate change impacts to the DoD mission and operations are identified as rising temperatures, changes in precipitation patterns, increases in storm frequency and intensity, rising sea levels and associated storm surge, increased frequency and severity of wildfires, and soil loss on coastal bluffs. However, more comprehensive and region- or base-specific vulnerability assessments are needed to determine what adaptive responses are most appropriate at individual bases.

In California, in accordance with the Governor's EO S-03-05, biannual climate change assessments have been conducted and reported by the California Energy Commission's California Climate Change Center using probabilistic forecasting models since 2006 (State of California 2019). Analyses conducted during the 2009 and 2018 California Climate Change Assessments used a number of widely accepted GCMs to forecast climate change through 2100 for two greenhouse gas emission scenarios. One scenario was based on a higher emissions rate (RCP8.5) and the other scenario used a more moderate emissions rate (RCP4.5) (Bedsworth et al. 2018). A brief summary of the forecasts from the 2018 California Climate Change Assessment relevant to March ARB trainers and NRMs follows.

7.16.1.1 Temperature

Temperature change has been increasing throughout the state over the last century. Statewide average temperatures in California rose about 1.7°F between 1895 and 2011 and are forecasted to continue to rise significantly during this century (Moser et al. 2012). Overall, warming projections from the 2018 California Climate Change Assessment range from about 4.4°F to 5.8°F by mid-century and 5.6°F to 8.8°F by the end of the twenty-first century (Bedsworth et al. 2018).

In the Los Angeles region, which includes western Riverside County, the intensity and frequency of extreme heat are projected to increase. The average hottest day of the year is expected to rise about 4 to 7°F under RCP4.5 and 7 to 10°F under RCP8.5. The total number of days per year with temperatures over 90°F is expected to increase from 15 days (current) to 50 to 90 days by the end of the century (Hall et al. 2018).

Environmental impacts of rising temperatures are likely to include shifts in vegetation communities, including any rare, threatened, or endangered species they support; increases in wildfire risk; and soil warming and drying. Potential impacts to the March ARB mission from increases in average yearly temperature and more frequent heat waves include increased occurrence of test/training limitations because of high heat days; wildfires that would impact air quality, whether fires are on Base or in surrounding lands or could burn onto Base lands; reduced military vehicle access; degrading infrastructure and increased maintenance costs for roads, utilities, and runways; reduced airlift capacity; increased energy costs for building and industrial operations; and increased operational health surveillance and risks (DoD 2014).

7.16.1.2 Precipitation

Precipitation in most of California is characterized by a Mediterranean pattern with most of the annual precipitation occurring between November and March. The climate change simulations from the GCMs indicate that California will retain its Mediterranean climate, with relatively cool and wet winters and hot, dry summers. The simulated annual precipitation models indicate that the high degree of variability that is historically characteristic of the region will continue during the next century.

Climate models show a tendency for the northern part of California to become wetter and very southern portion near Mexico to become drier. In the Los Angeles region, models tend to disagree on future precipitation averages. However, both dry and wet extremes are expected to increase in the future. The wettest day of the year in the Los Angeles region is expected to increase by up to 25 to 30 percent, and extremely dry years could potentially double or more in frequency by the late twenty-first century (Hall et al. 2018).

Spring snowpack in the mountains of California is projected to decline even if the amount of precipitation remains relatively stable over the central and northern California regions. Models predict the average amount of water contained within the snowpack could decline to less than two-thirds of the historical average by 2050 and up to one-third of the historical average by 2100 (Bedsworth et al. 2018).

Changes in precipitation amounts and patterns are likely to result in increased wildfire risk and altered burn regimes; impacts to air quality; increases in storm frequency and intensity; stream bank erosion and gullying; impacted soil function; soil loss; water supply constraints; impacted groundwater quality; increased dust; protected species stress and potential for more species placed at risk; and spread of invasive species.

Potential impact to the March ARB mission from changes in precipitation include increased maintenance costs for roads, utilities, and runways; reduced water availability and greater competition for limited water resources; reduced training land access; reduced training carrying capacity; operational health surveillance and risks; and increased flood control/erosion prevention measures (DoD 2014). Other impacts include military personnel safety; temporary or prolonged disruption of military operations or test and training activities because of intense storms and resulting storm damage; increased maintenance costs; increased flood control/erosion prevention measures; and transportation infrastructure damage (DoD 2014).

7.16.1.3 Wildfire Risk

Climate changes projected for California in the next century imply dramatic alteration of fire frequency from what has been experienced in the recent past (Moser et al. 2012). However, no appreciable increase in wildfire risk at March ARB would be expected under future climate change scenarios.

7.16.1.4 Vulnerability Assessments

Climate change vulnerability assessments are a means of preparing for, and coping with, the effects of climate change. A vulnerability assessment is a key element in identifying which species or systems are likely to be most strongly affected by projected changes in climate and provides a framework for understanding why particular species or systems are likely to be vulnerable, often depending on factors such as exposure, sensitivity, and adaptive capacity (Glick et al., eds. 2011). Vulnerability assessments inform conservation planning by identifying climate-related threats and resulting stresses, which then become part of the decision-making process undertaken to identify and prioritize conservation strategies. March ARB Environmental personnel will begin to analyze the likely effects of climate change to determine if adaptation and maintenance is necessary for cost-effective programs and to meet legal requirements to manage natural resources. Decision documents for the Base will consider climate change and species adaptation and resilience to these changes.

7.17 Geographic Information Systems

Applicability Statement

This section applies to all USAF installations that maintain an INRMP, since all geospatial information must be maintained within the USAF GeoBase system. The installation **IS** required to implement this element.

Program Overview/Current Management Practices

Facility maps and databases are incorporated into the geographic information system (GIS) at March ARB. The GIS application is used to collect, store, and maintain data pertaining to historical trends and conditions as well as the current status of critical indicators of ecological integrity and sustainability. The NRM updates and maintains natural resources GIS layers for March ARB.

8.0 MANAGEMENT GOALS AND OBJECTIVES

The installation establishes long-term, expansive goals and supporting objectives to manage and protect natural resources while supporting the military mission. Goals express a vision for a desired condition for the installation's natural resources and are the primary focal points for INRMP implementation. Objectives indicate a management initiative or strategy for specific long- or medium-range outcomes and are supported by projects. Projects are specific actions that can be accomplished within a single year. Actions are ongoing, routine management activities that recur across multiple years. Also, in cases where off-installation land use may jeopardize USAF missions, this section may list specific goals and objectives aimed at eliminating, reducing, or mitigating the effects of encroachment on military missions. These natural resources management goals for the future have been formulated by the preparers of the INRMP from an assessment of the natural resources, current condition of those resources, mission requirements, and management issues previously identified. Below are the integrated goals for the entire natural resources program.

The installation goals and objectives are provided in the section below in a format that facilitates an integrated approach to natural resources management. By using this approach, measurable objectives can be used to assess the attainment of goals. Individual work tasks support INRMP objectives. The projects are key elements of the annual work plans and are programmed into the conservation budget, as applicable.

Installation Supplement – Management Goals and Objectives

GOAL 1: WILDLIFE MANAGEMENT – MONITOR AND MANAGE WILDLIFE SPECIES ON MARCH ARB WHILE MINIMIZING POTENTIAL IMPACTS TO THE MILITARY MISSION

- OBJECTIVE 1.1: Employ a systematic approach to managing wildlife resources, using a process that includes monitoring, management, assessment, and evaluation.
  - ACTION 1.1.1: NRM to follow current USFWS recommendations when conducting inventories.
  - ACTION 1.1.2: NRM to select management strategies proven to effectively minimize BASH risk.
  - ACTION 1.1.3: NRM to maintain and involve partnerships with agencies and groups involved in wildlife and habitat management.

Migratory Birds

- OBJECTIVE 1.2: Promote the conservation of migratory birds at March ARB in ways that do not conflict with or impede military training.
  - ACTION 1.2.1: NRM to inventory and monitor bird populations at March ARB to the extent feasible to determine the need for, and effectiveness of, conservation efforts.

Pollinators

- OBJECTIVE 1.3: Determine presence of special-status pollinators on March ARB.
  - PROJECT 1.3.1: NRM to conduct a discovery or reconnaissance survey for USFWS BCC that are pollinators and within range of March ARB, including the Allen's hummingbird, calliope hummingbird, Costa's hummingbird, and rufous hummingbird.

- PROJECT 1.3.2: NRM to conduct a reconnaissance survey for applicable special-status insect pollinators listed in the U.S. Air Force Pollinator Conservation Reference Guide (USFWS 2017).
- PROJECT 1.3.3: If a special-status pollinator or its habitat is documented on Air Force lands, NRM to work with regional USFWS Migratory Birds staff for BCCs and the Palm Springs Fish and Wildlife Office for special-status insects to identify conservation actions to build into a pollinator management plan.

Invasive Wildlife

- OBJECTIVE 1.4: Prevent infestations of non-native, invasive, and nuisance wildlife on March ARB.
  - ACTION 1.4.1: NRM/IPMC to conduct surveys and monitoring for non-native, invasive, and nuisance wildlife species.
  - ACTION 1.4.2: NRM/IPMC to review and update list of non-native, invasive, and nuisance wildlife on an annual basis.

GOAL 2: VEGETATION MANAGEMENT – MANAGE VEGETATION ON MARCH ARB BY PROMOTING THE USE OF NATIVE AND SUSTAINABLE PLANTS AND SEEDS, PREVENTING THE SPREAD OF NON-NATIVE INVASIVE PLANT SPECIES, AND MINIMIZING ATTRACTANTS OF BASH THREAT SPECIES

Native Vegetation

- OBJECTIVE 2.1: Promote native plant species on March ARB.
  - PROJECT 2.1.1: NRM to complete vegetation study to develop future plans that incorporate the use of more native plants, as appropriate, throughout the Base. These plans to include airfield vegetation, urban landscaping, and all areas of vegetation communities.
- OBJECTIVE 2.2: Use plants that are native to the local region, or those that are not known to be invasive, in landscaping, land restoration, and erosion control projects.
  - PROJECT 2.2.1: NRM to develop a list of acceptable plants and seeds for contractors performing landscaping and land restoration work on Base.
- OBJECTIVE 2.3: Develop sources of seeds of native plant species of vernal pools, wet-meadows (wetland prairies), and upland grasslands that March ARB can access without undue delays.
  - PROJECT 2.3.1: NRM to determine best, feasible method of acquiring local, native plant seeds.

Non-native, Invasive, Noxious Weed Species

- OBJECTIVE 2.4: Prevent infestations of invasive plant species on March ARB.
  - PROJECT 2.4.1: NRM to develop an Early Detection and Rapid Response (EDRR) program for March ARB that will meet DoD requirements for weed management and, to the maximum extent practicable, avoid potential direct and indirect impacts to resources regulated under the ESA, CWA, and Migratory Bird Treaty Act.
  - PROJECT 2.4.2: NRM to develop and provide brochures to educate Base maintenance and vegetation managers and Base firefighters to detect emerging threat invasive species.

- ACTION 2.4.3: NRM to review and update the EDRR list of non-native, invasive, and noxious plant species on an annual basis.

Vegetation Communities

- OBJECTIVE 2.5: Update vegetation classifications to better understand how to manage all vegetation communities.
  - PROJECT 2.5.1: NRM to conduct classification and mapping of plant communities and land cover types on March ARB, including the identification and mapping of seasonally dry wet-meadows (wetland prairie patches). Determine the types of communities. Evaluations of plants present on Base will be conducted seasonally.
  - PROJECT 2.5.2: NRM to complete study for and develop a long-term vegetation plan for all vegetation communities that increases native plant cover and reduces the percent cover of non-native plant species if feasible.
  - ACTION 2.5.3: NRM to update vegetation descriptions and mapping in INRMP during annual reviews as information is available.
  - PROJECT 2.5.4: NRM to collect herbaria specimen(s) of *Centromadia pungens* ssp. *pungens* on March ARB and re-identify. Submit specimen(s) to the UCR Herbarium for confirmation of subspecies.
- OBJECTIVE 2.6: Prevent vegetation from altering flows in drainage systems and minimize attractants for BASH threat species.
  - ACTION 2.6.1: NRM/IPMC to identify and control, as feasible, plant species that compromise the flow efficiency of manmade drainage ditches on Base or attract BASH threat species.

Urban Landscape Vegetation

- OBJECTIVE 2.7: Promote the implementation of sustainable landscape design practices at March ARB.
  - PROJECT 2.7.1: NRM to prepare a landscape management plan that includes a list of existing types of landscape on Base, what is suggested for the future[1], and a classification of landscape plants. National Historic Preservation Act Section 106 consultation with the California SHPO may be required if changes would impact the historic district (e.g., adding xeriscaping and removal of grassy areas in the historic district).

Grounds Vegetation Maintenance

- OBJECTIVE 2.8: Ensure that the grounds maintenance program complies with all applicable environmental rules, regulations, and requirements.
  - ACTION 2.8.1: NRM to coordinate with grounds maintenance manager annually to ensure that all grounds maintenance activities follow CEV procedures.

[1] Include native species of shrubs, wildflowers, and groundcover plants from chaparral, coastal sage scrub, and Southern California grasslands that appear to be compatible or useful for ornamental landscaping.

  - ACTION 2.8.2: NRM to coordinate with grounds maintenance manager to ensure the grounds maintenance plan incorporates T&E and special-status species management and BASH reduction strategies.
  - ACTION 2.8.3: NRM to continually assess grounds maintenance activities for any adverse effects on T&E and special-status species and/or attraction of BASH threat species and make modifications as needed.
  - ACTION 2.8.4: NRM to manage vegetation through grounds maintenance along runways and taxiways to deter bird activity.
  - ACTION 2.8.5: NRM/IPMC to manage all pesticides used through grounds maintenance on airfield to best manage deterrence of bird activity. Methods with the lowest risks and effects, such as manual methods, should be used first. Methods with higher risks, such as pesticides, should only be employed if hazards are deemed high and lower risk methods have proven unsuccessful.
- OBJECTIVE 2.9: Minimize pest attractants and breeding areas for pest species.
  - ACTION 2.9.1: NRM to ensure drainage ditch vegetation maintenance is performed routinely and in a manner that does not promote standing water on the airfield.
  - ACTION 2.9.2: NRM to ensure the removal of dead vegetation such as brush piles, grass piles, clippings, hay bales, etc.
  - ACTION 2.9.3: NRM to ensure there are no debris piles (e.g., concrete blocks, scraps, pallets, etc.) from construction or other work.
- OBJECTIVE 2.10: Manage urban trees in landscaped areas and other locations.
  - ACTION 2.10.1: NRM to coordinate with arborists to evaluate trees that may be affected by disease or other stressors and determine which need to be removed or managed to prevent them from becoming a safety hazard.
  - ACTION 2.10.2: NRM to ensure that all trees that may harbor wildlife that could pose a BASH issue are removed or pruned to reduce such risks.
  - ACTION 2.10.3: NRM to reduce available mast-producing hardwood stands near the airfield to reduce habitat preferred by species deemed a BASH threat.

GOAL 3: SPECIAL-STATUS SPECIES MANAGEMENT – MANAGE SPECIAL-STATUS SPECIES IN ACCORDANCE WITH APPLICABLE FEDERAL AND STATE LAWS, REGULATIONS, AND POLICES

- OBJECTIVE 3.1: Coordinate with USFWS and CDFW on management of special-status species found on Base.
  - ACTION 3.1.1: NRM to periodically review the management strategies suggested by CDFW and USFWS for special-status species and balance these strategies with the protocols established for the reduction of the BASH risk on the Base.

Burrowing Owl

- OBJECTIVE 3.2: Provide for continued protection and conservation of burrowing owls on March ARB, while maintaining the military mission.
  - PROJECT 3.2.1: NRM to prepare a burrowing owl management plan for March ARB.
  - ACTION 3.2.2: NRM to conduct annual or biannual burrowing owl surveys, as feasible. Surveys should be conducted during the breeding season (February 1 to August 31) at a minimum. Point-count surveys are recommended as an efficient method for monitoring population trends at March ARB, although transect surveys, motion cameras, and/or other methodology may be used. NRM to ensure that protocol-level surveys conducted by a qualified biologist in accordance with current CDFW protocol recommendations (the CDFW 2012 Staff Report on Burrowing Owl Mitigation) are conducted every 5 years.
  - ACTION 3.2.3: NRM to manage annual inspection and maintenance of artificial burrows during the non-breeding season (September 1 to January 31) to confirm the artificial burrows are in suitable condition for use by burrowing owls.
  - ACTION 3.2.4: NRM to post signs along the perimeter of burrowing owl-occupied areas that clearly identify the presence of the species and specify the area is off-limits for foot or vehicle traffic (unless specifically authorized by Natural Resources staff).
  - ACTION 3.2.5: If disturbance activities are planned in burrowing owl-supported areas, a survey of current burrowing owl activity should be conducted by the NRM biologist or an NRM-approved biologist prior to disturbing the area. If burrowing owls are present, appropriate actions should be taken to avoid impacts.
  - ACTION 3.2.6: NRM to manage areas currently supporting burrowing owls on Base to maintain habitat quality and minimize disturbance.
  - ACTION 3.2.7: NRM to ensure the continuation of regular mowing of the airfield, even during burrowing owl breeding season.
  - ACTION 3.2.8: NRM/IPMC to ensure the use of pesticides is in compliance with the IPMP for protection of burrowing owls.
  - ACTION 3.2.9: NRM to ensure burrowing owl are not increasing BASH risk. NRM to coordinate with the BASH program for BASH updates and observations related to hazards and modify burrowing owl deterrence and avoidance measures and consider modification of habitat or populations with consultation with USFWS, as needed.

Stephens' Kangaroo Rat

- OBJECTIVE 3.3: Evaluate whether land set aside for the protection of SKR on the main March ARB east of I-215 should be opened up for other uses due to no further use by the species.
  - PROJECT 3.3.1: NRM to work with the USFWS and CDFW to consider removal of the Open Space, as defined in the USFWS 1991 BO (1-6-91-F-33; USFWS 1991), set aside for SKR on the main Base and allow use for other purposes.

- OBJECTIVE 3.4: Implement measures to avoid impacts to SKR in occupied habitat at the March ARB small arms range west of I-215.
  - PROJECT 3.4.1: NRM to develop a management plan for the protection of SKR at the March ARB small arms range west of I-215.
  - PROJECT 3.4.2: NRM to post signs at the March ARB small arms range to clearly identify the presence of a federally listed endangered species.
  - ACTION 3.4.3: NRM to ensure ground-disturbing grounds maintenance activities and new construction activities do not occur within SKR-occupied habitat at the March ARB small arms range to prevent adverse impacts to SKR. NRM to consult informally or formally, as needed, with USFWS should NRM conclude there could be adverse impacts (e.g., from habitat or ground disturbance) to SKR.
  - ACTION 3.4.4: NRM/IPMC to ensure pesticide use, including herbicides, is avoided in, or adjacent to, SKR-occupied habitat at the March ARB small arms range, unless chemicals are safe according to labels and approved for use by the NRM/IPMC.
  - ACTION 3.4.5: NRM/IPMC to manage the control of non-native predators at the March ARB small arms range to minimize predation of SKR using methods described in the IPMP.
- OBJECTIVE 3.5: Maintain the quality of SKR-occupied habitat and adjacent areas at the March ARB small arms range west of I-215.
  - ACTION 3.5.1: NRM to manage vegetation at small arms range to maintain habitat quality to support SKR. Shrub canopy to be removed in SKR-occupied scrub habitat and adjoining 20 ft by manually clipping aboveground portions of all shrubs at intervals to maintain suitable open conditions for SKR. As needed, SKR-occupied grassland habitat to be mowed annually following seed set of annual grasses/forbs. Re-evaluate in abnormally wet years to determine whether a second mowing is necessary. All thatch should be removed following mowing and not left on the ground.

Listed Fairy Shrimp

- OBJECTIVE 3.6: Identify and protect vernal pools and seasonally ponded areas on March ARB that may support federally listed fairy shrimp species.
  - PROJECT 3.6.1: NRM to coordinate formal presence/absence surveys for federally listed fairy shrimp in accordance with current USFWS survey protocols every 5 years and prior to any disturbance of vernal pools on March ARB.
  - PROJECT 3.6.2: NRM to establish a protocol for conducting informal surveys and monitoring of fairy shrimp occupancy in vernal pools.
  - PROJECT 3.6.3: NRM to identify occupied vernal pools that should be protected because of the potential presence of federally listed vernal pool species.
  - PROJECT 3.6.4: NRM to coordinate with the USFWS to create a Vernal Pool Management Plan to guide protection efforts for the area and create goals for this habitat on March ARB consistent with the military mission.

GOAL 4: HABITAT MANAGEMENT – MANAGE SPECIAL HABITATS, PROMOTE POLLINATORS, AND MINIMIZE HABITAT DEGRADATION WITHIN THE CONSTRAINTS OF THE MILITARY MISSION

Wetlands and Drainages

- OBJECTIVE 4.1: Minimize the operational impact of March ARB missions on seasonal wetlands and drainages.
  - PROJECT 4.1.1: NRM to develop an education plan and/or brochure for key Base personnel that are likely to perform activities that impact jurisdictional waters.
  - ACTION 4.1.2: NRM to ensure March ARB remains in compliance with USACE wetlands regulations, RWQCB regulations, the Porter-Cologne Act, Section 401 of the CWA, and all other applicable wetlands regulations.
  - ACTION 4.1.3: NRM to ensure that current activities on March ARB do not impact vernal pools and jurisdictional waters to the extent feasible and that proper permitting procedures (see Figure 7-5) are followed prior to any encroachment upon these resources.
  - ACTION 4.1.4: NRM to monitor contracted grounds activities with potential to impact vernal pools and jurisdictional waters.
  - ACTION 4.1.5: NRM to ensure vegetative maintenance is restricted within areas identified as vernal pools, wet-meadows, or jurisdictional wetlands during the wet season. If maintenance is required to reduce the BASH threat or maintain airfield drainage critical to infrastructure protection (i.e., airfield under-drains), NRM to ensure maintenance is conducted in accordance with applicable regulations.
  - ACTION 4.1.6: When feasible, NRM to ensure alternative sites or designs are selected for construction projects and training activities that would encroach upon vernal pools or jurisdictional waters to avoid and/or minimize impacts.

Special-status Species Habitats

- OBJECTIVE 4.2: Without decreasing readiness proficiency, schedule training requirements/areas in time and place to mitigate impacts to special-status species.
  - ACTION 4.2.1: If military exercises are increased to include bivouac, NRM to ensure the area of training activities is rotated for continual exercises to minimize the impacts to any one area and avoid special-status species and habitats.

Vernal Pools

- OBJECTIVE 4.3: Manage vernal pool habitats to support federally or state-listed species, within the constraints of the military mission.
  - ACTION 4.3.1: NRM to prohibit, to the extent practicable, new construction projects or development in habitat with potential to support listed fairy shrimp. A minimum 100-ft buffer between new development and pool watersheds and no ground disturbance on the associated vernal wetland are recommended.
  - ACTION 4.3.2: NRM to prohibit filling or intentional destruction of existing pools that may support federally or state-listed species, to the extent practicable, especially pools along existing roadways outside the airfield where vehicle travel is less restricted.

- ACTION 4.3.3: NRM/IPMC to ensure all pesticide use is restricted within 50 ft or more of vernal pools (depending on label directions). Avoid applications in drainage ditches that drain to vernal pools, unless otherwise approved by the NRM.
- ACTION 4.3.4: NRM/IPMC to ensure development or grounds maintenance that would alter hydrology of the vernal pool complex is limited to prevent the following: increased flow velocities that could generate scour, decreased flow that could shorten the ponding period, or increased sedimentation that could reach the vernal pools.
- PROJECT 4.3.5: Produce fine-scale maps depicting vernal pools, their associated watersheds, and the direction of water flow.
- PROJECT 4.3.6: NRM to monitor the distribution and abundance of Parish's flatsedge (*Cyperus parishii*) and any other rare or declining wetland plant species detected on March ARB, collect seed of this species, and re-distribute seeds to similar but unoccupied habitats on the Base as a hedge against future development impacts on the Base or against future drought impacts on this species.

- OBJECTIVE 4.4: Restore degraded vernal pools that may support federally or state-listed species to maintain habitat for fairy shrimp, as feasible and within the constraints of the military mission.
  - ACTION 4.4.1: NRM to coordinate with grounds maintenance contractor to ensure that trash buildup within drainages from storms is cleaned out by base operations contractor in order to ensure clean watersheds on March ARB.
- OBJECTIVE 4.5: Maintain the plant species' diversity of March ARB vernal pools.
  - ACTION 4.5.1: NRM to monitor the floristic composition of each vernal pool and seasonally dry wetland feature over the long term to detect trends pointing to the potential loss of species diversity within vernal pools and other seasonally dry wetlands.
  - ACTION 4.5.2: NRM to develop procedures for the reintroduction of vernal pool and seasonal wetland plant species using low-impact seeding practices that would be implemented if intervention is needed to restore the species diversity of vernal pools or other ephemeral wetland features on the Base.
  - ACTION 4.5.3: In support of ACTION 4.5.2, NRM to develop commercial, NGO-held, or in-house sources of seeds of native plant species of vernal pools, wetland meadows, and other seasonal wetlands from which March ARB can readily procure seeds to implement ACTION 4.5.2.

Pollinator Habitats

- OBJECTIVE 4.6: Where feasible, create, maintain, and enhance habitats to promote use by pollinators.
  - PROJECT 4.6.1: NRM to identify pollinator habitat, such as nesting and overwintering sites, and protect, as feasible.
  - ACTION 4.6.2: NRM to coordinate the planting and maintenance of a diverse array of native flowering plants, with an emphasis on creating habitat for native bees and butterflies. Only plants with lower seed production should be considered for planting on the airfield to avoid attraction of avian species. Consider development of an educational pollinator garden.

  - ACTION 4.6.3: NRM to ensure wildflower blooms are encouraged by avoiding the mowing of active wildflower blooms, as practicable.

Habitat Degradation

- OBJECTIVE 4.7: Reduce/control nutrient and sediment inputs that have the potential to degrade special habitats.
  - ACTION 4.7.1: NRM/IPMC to ensure alternatives to pesticides, such as cultural, physical, and mechanical methods, are used prior to resorting to pesticides. If pesticide use is necessary, the NRM will screen pesticides and select alternatives that are environmentally sensitive to avoid nutrient loading of adjacent water bodies and impacts to special habitats. Comply with pesticide label directions and restrictions.
  - ACTION 4.7.2: NRM to periodically inspect/monitor construction sites to ensure that natural resources are not being adversely affected by construction activities.
  - ACTION 4.7.3: NRM to ensure that environmental requirements are in place to prevent impacts to natural resources from water quality or contamination issues.
- OBJECTIVE 4.8: Avoid/minimize impacts to natural resources from March JPA ERP site cleanup activities.
  - ACTION 4.8.1: NRM to ensure any contaminated run-off is managed to protect natural resources.
- OBJECTIVE 4.9: Avoid/minimize impacts to natural resources from releases, accidents, and spills.
  - ACTION 4.9.1: In the event of any releases, accidents, or spills, NRM to assess natural resources for damages/impacts and manage any necessary mitigation.

GOAL 5: PEST MANAGEMENT – CONTROL INVASIVE, PEST, AND NUISANCE SPECIES INHABITING MARCH ARB

- OBJECTIVE 5.1: Continue to evaluate the presence of nuisance species on the Base and adapt management strategies to effectively manage their populations and eliminate attraction sites.
  - PROJECT 5.1.1: NRM/IPMC to complete revision of the IPMP, which will establish procedures and protocols for the management of nuisance species and annual reports.
  - ACTION 5.1.2: NRM/IPMC to ensure compliance with all federal, state, and DoD requirements when any treatment of non-native, invasive, noxious, or nuisance species is proposed.
  - ACTION 5.1.3: When necessary, NRM/IPMC to conduct NEPA analysis for pesticides used on Base.
  - ACTION 5.1.4: NRM/IPMC to implement procedures established in the IPMP and this INRMP (Section 7.1.3) for the capture, removal, and depredation through lethal control of pest and nuisance species.
  - ACTION 5.1.5: Prior to implementation, NRM/IPMC to assess the control strategies for nuisance species to determine how to best accomplish the control while managing special-status species inhabiting the Base.

- ACTION 5.1.6: NRM/IPMC to monitor for project-related materials that may temporarily pile up and that would attract nuisance or pest species. If observed, NRM/IPMC to notify appropriate contact to have the piles removed.
- ACTION 5.1.7: NRM/IPMC to ensure a pest deterrent/control plan is in place to address situations such as perches, roosting areas, and established pest residence or pest traffic areas.

Birds

- ACTION 5.1.8: NRM/IPMC to continue to evaluate the presence of birds nesting and/or roosting in aircraft hangers and implement management strategies as needed.
- ACTION 5.1.9: NRM/IPMC to review and revise control methods for bird species inhabiting aircraft hangars, warehouses, garages, and other large buildings in the March ARB IPMP.

Grounds Maintenance

- ACTION 5.1.10: If new vegetation associations begin to occur on the installation, NRM/IPMC to evaluate for specific foraging habitat requirements of nuisance species. If needed, implement plans for possible vegetation modification.

California Ground Squirrels

- ACTION 5.1.11: NRM/IPMC to continue to conduct routine surveys to determine the locations of California ground squirrel populations on Base and whether management practices are effective at controlling the populations on March ARB.
- ACTION 5.1.12: NRM/IPMC to implement controls and management strategies detailed in the IPMP and Section 7.1.3 of this INRMP to reduce California ground squirrel population densities, especially within the landscaped areas, airfield, and clear zones.
- ACTION 5.1.13: NRM/IPMC to continue to consult and contract with licensed lethal control administrators to perform on-Base California ground squirrel control.
- ACTION 5.1.14: NRM/IPMC to identify and clearly mark burrows occupied by burrowing owls for avoidance prior to implementation of pest control methods that will affect burrows, such as burrow collapse or filling.

GOAL 6: BASH HAZARDS MANAGEMENT – MANAGE HAZARDS TO REDUCE BASH RISK

- OBJECTIVE 6.1: Control wildlife and manage habitat to reduce BASH risk.
  - ACTION 6.1.1: NRM/IPMC to ensure vegetation on the airfield is maintained at a height between 7 and 14 inches to reduce attractiveness to wildlife. Vegetation height should be established prior to the bird breeding season and maintained at appropriate height throughout the bird breeding season to deter attractants for nuisance species.
  - ACTION 6.1.2: NRM/IPMC to identify and remove and/or modify potential roosting, refuge, and foraging sites to reduce the attraction of birds and other animal species.
  - ACTION 6.1.3: NRM/IPMC to oversee and monitor the removal of bird/animal carcasses from the airfields to avoid attracting vultures and other scavengers.
  - ACTION 6.1.4: NRM/IPMC to ensure any opportunities to control insects that attract hazardous wildlife will be evaluated and the safest measures for the environment will be used

to control them if needed. Considerations would include all vectors such as vegetation modifications or possible treatments with insecticides to control mass infestations.

- PROJECT 6.1.5: NRM/IPMC to monitor and evaluate mass insect infestations to determine long-term management solutions.
- ACTION 6.1.6: NRM/IPMC to ensure vegetation is clear from runways and taxiways. Methods with the lowest risk and lowest effects will be implemented first. Vegetation should be manually removed from runways and taxiways several times a year and post-emergent herbicide may be applied in approved areas during the highest growing season for maximum efficiency.
- ACTION 6.1.7: NRM/IPMC to oversee the BASH programs' implementation of the existing avian pyrotechnic or frightening device program to deter birds/wildlife from occupying the area.
- ACTION 6.1.8: NRM to review, approve, monitor, track, and keep records of USFWS Depredation Permits or permit modifications to allow the take of birds that pose a hazard to human safety and equipment on or around the flight line.
- ACTION 6.1.9: NRM/IPMC to oversee the existing bird spike implementation program to deter birds from occupying perching locations. This includes regular assessment, monitoring, and tracking of existing bird spikes located on the Base. NRM/IPMC to ensure that bird deterrents are maintained.
- ACTION 6.1.10: NRM to manage bare areas within the AMA. Bare areas should be seeded with native plants with the lowest seed production or non-native seed approved by NRM/IPMC within the existing associated vegetation that also has the lowest seed production.
- ACTION 6.1.11: NRM/IPMC to regularly assess wildlife control strategies for their effect on special-status species inhabiting the Base.
- ACTION 6.1.12: NRM to ensure that management strategies used by the BASH program are in compliance with laws, regulations, guidelines, and consultations and agreements with wildlife agencies.

- OBJECTIVE 6.2: Ensure that bird remains are shipped to the Smithsonian Institution as designated by USAF policy.
  - ACTION 6.2.1: NRM to oversee that the species of all bird remains discovered on March ARB or on 452 AMW aircraft as a result of aircraft strikes with birds are investigated and identified.
  - ACTION 6.2.2: In accordance with USAF policy (AFI 91-212), NRM to oversee and track that all bird remains encountered are sent to:

Dr. Carla Dove
Smithsonian Institution
Feather Identification Lab
E600, MRC 116
P.O. Box 37012
Washington, DC 20013-7012

- OBJECTIVE 6.3: Prevent wildlife that pose a security concern to the flight mission from entering BASH threat areas.
  - ACTION 6.3.1: NRM/IPMC to oversee and encourage that the perimeter fence is up to date with security measures and height and that BASH features are installed to prevent large wildlife or grazing animals from entering the airfield and to help control all other ground pests.
  - ACTION 6.3.2: NRM/IPMC to coordinate on all perimeter pest vector locations related to pest deterrence, such as fencing and culvert access, to prevent wildlife from entering the base. All adequate exclusion measures should be considered and installed, as feasible, at all outfall points to prevent the entry of wildlife onto the Base without adversely affecting flow. Vector management should ensure animal access opportunities such as culverts are secure from allowing access onto the Base. These can be secured by such things as culvert grill doors and pest access holes. Perimeter pest vectors should be monitored on a regular basis.
  - ACTION 6.3.3: Coordination for all perimeter pest vector locations may include coordinating with base operating support (BOS) contract to ensure maintenance and repair of all damaged portions of the perimeter fence line to adequately exclude wildlife entry through outfall points.
- OBJECTIVE 6.4: Manage airfield wildlife and habitat to reduce BASH risk.
  - ACTION 6.4.1: NRM to ensure seasonal wetland/vernal pool habitat is managed and maintained without increasing threats to airfield operations.
  - ACTION 6.4.2: NRM to coordinate and manage perch and hide attractants, as feasible, for avian species. Such perch and hide attractants may include erect woody plants (caulescent shrubs and trees) and robust herbaceous vegetation or construction piles. All such perch and hide attractants should be removed/prevented around all vernal pools, drainages, and waterways in order to avoid encouragement of these wetland type habitats from becoming attractants.
  - PROJECT 6.4.3: NRM to conduct annual surveys of seasonal wetlands/vernal pools to document active pools and wildlife use and determine the lowest risk and lowest effects way to prevent/minimize attractants.
  - ACTION 6.4.4: NRM to monitor burrowing owls on the airfield regularly to determine strike risk and risk mitigation strategies.
  - ACTION 6.4.5: NRM/IPMC to survey and evaluate mass insect infestations to determine long-term management solutions.

GOAL 7: CLIMATE CHANGE MANAGEMENT – MINIMIZE IMPACTS OF CLIMATE CHANGE TO NATURAL RESOURCES

- OBJECTIVE 7.1: Research and develop management to address effects of climate change.
  - PROJECT 7.1.1: NRM to conduct a review of the potential effects of climate change on natural resources on Base every 5 years. Results of the 5-year review will be compiled into a report that will include any recommended changes to natural resources management strategies based on the findings of the report.

GOAL 8: DATA MANAGEMENT – MANAGE NATURAL RESOURCE DATA REQUIRED FOR PROGRAM MANAGEMENT

- OBJECTIVE 8.1: Maintain current natural resource data.
  - ACTION 8.1.1: NRM to maintain and update natural resources GIS data layers.
  - ACTION 8.1.2: NRM to maintain and update species lists for March ARB, including flora/fauna inventories, EDRR weed list, and approved plant list for new projects or landscaping.
  - ACTION 8.1.3: NRM to maintain compliance calendar.
  - ACTION 8.1.4: NRM to update and maintain current applicable laws and regulations, including DoDIs, AFMANs, and AFIs. Updates to be incorporated into annual INRMP and IPMP reviews and updates.
  - ACTION 8.1.5: NRM to update and maintain the pest management, cultural resources management, natural resource management, and species and habitat folders that are used to guide the natural resources management program.
  - ACTION 8.1.6: NRM to ensure the BASH Plan is current and coordinated with the NRM/IPMC.
  - ACTION 8.1.7: NRM to annually review and update as necessary all plans related to natural resources.
- OBJECTIVE 8.2: Efficiently manage INRMP record keeping and reporting.
  - PROJECT 8.2.1: NRM to develop an INRMP records management system.

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9.0 INRMP IMPLEMENTATION, UPDATE, AND REVISION PROCESS

9.1 Natural Resources Management Staffing and Implementation

The organizations responsible for implementation of the INRMP and staffing requirements for implementing the INRMP are described below.

- 452 MSG/CEV is responsible for preparing, sustaining, and implementing the INRMP pursuant to the Sikes Act, Section 101(a)(2).
- 452 MSG/CEV is responsible for conducting annual reviews of the INRMP and coordinating draft INRMP revisions through the installation chain of command and other identified stakeholders involved in INRMP implementation. The NRM is responsible for ensuring that the INRMP, ICRMP, BASH Plan, IPMP, and AICUZ studies are mutually supportive and not in conflict.
- In accordance with DoDI 4715.03, installations will use professionally trained natural resources management personnel with a degree in the natural sciences to develop and implement the installation INRMP.
- When it is not practicable to use DoD personnel to perform inherently governmental natural resources management duties, March ARB may obtain inherently governmental services from federal agencies having responsibilities for the conservation and management of natural resources.
- In accordance with the Sikes Act, 16 U.S.C. § 670c-1, interagency agreements with other federal agencies, and cooperative agreements with states, local governments, Indian Tribes, and nongovernmental entities may be used to implement actions in support of an INRMP. Agreements for the maintenance and improvement of natural resources outside installation boundaries are appropriate if the purpose of the cooperative agreement or interagency agreement is to eliminate current or anticipated challenges that could restrict or interfere with current or anticipated military activities. Funds committed to a cooperative agreement or interagency agreement under 16 U.S.C. § 670c-1 may be obligated to cover the cost of goods and services provided under the cooperative agreement or interagency agreement during any 18-month period beginning in that fiscal year, without regard to whether the agreement crosses fiscal years. Obligations made by a receiving federal agency under an interagency agreement for the maintenance and improvement of natural resources on behalf of the Air Force shall be subject to a performance period consistent with the policy of the supporting agency.
- Non-Appropriated Fund personnel and resources may be used to assist in the implementation of natural resources management programs. In such cases, supervision and control of natural resources management programs remain under the designated installation natural resources program manager.

9.1.1 INRMP Implementation and Responsibilities

This INRMP has been organized to ensure the implementation of year-round, cost-effective management activities and projects that meet the requirements of March ARB's mission. Various organizations on March ARB that participate in implementation of the INRMP are described in the following subsections.

9.1.1.1 Property Owner

The March ARB property is owned by the 452 AMW of AFRC. The oversight and implementation of this Plan is ultimately the responsibility of the 452 AMW. As the owner of the property, any injury to personnel or the environment that can be attributed to improper or insufficient implementation of this Plan could result in liability to the 452 AMW.

9.1.1.2 Wing Commander

The Wing Commander of the 452 AMW serves as the Chairman of the March ARB EPC. In that capacity, the Wing Commander will ensure the implementation of the INRMP to the fullest extent practicable based on funding and available manpower. The final approval of the INRMP and any future changes will be approved by the Wing Commander.

9.1.1.3 Base Civil Engineer 452 MSG/CEV

The March ARB plans, budgets, approves, and oversees all maintenance, environmental, and construction activities performed on the Base. All projects or management activities proposed in this Plan should be approved by the Base Civil Engineer to ensure that (1) funding is available and (2) these projects are complimentary to the Base comprehensive planning process.

9.1.1.4 Base Environmental Office

In addition to the INRMP implementation responsibilities outlined in Section 9.1, 452 MSG/CEV serves as the lead technical representative and consultant for installation environmental programs. The NRM implements the natural resources management program and is the lead for monitoring compliance with applicable federal, state, and local regulations. To ensure compliance with all natural resources laws and regulations, the NRM coordinates with installation organizations to assess the potential impacts of proposed activities on sensitive natural resources and makes recommendations to reduce, avoid, or mitigate adverse effects. The NRM reviews all aspects of installation natural resources management for potential hazards to aircraft operations. Natural resources personnel assist the installation Flight Safety office and others in the development and implementation of the BASH Plan and provide oversight to external agencies and contractors involved in the implementation of the BASH program on Air Force property. The NRM is required to be an active member of the installation Bird Hazard Working Group and is also responsible for annual and bi-annual reporting of all pest control actions.

The March ARB NRM, in conjunction with the 452 AMW PA, is responsible for establishing and implementing a conservation education program to instruct Base personnel on the protection and enhancement of biological diversity on March ARB. The March ARB NRM directs the ongoing natural resources management activities presented in this Plan. CEV is also responsible for NEPA compliance.

9.1.1.5 Chief – Airfield Management

Chief of Airfield Management is responsible for ensuring that all proposed actions related to the airfield have been evaluated by NRM/IPMC in order to ensure compliance with all natural resources laws and regulations. Coordinate with installation Natural Resources for all proposed actions so that an assessment of the potential impacts of proposed activities on sensitive natural resources can be done. This is done through the Air Force (AF) Form 332, *Base Civil Engineer Work Request*, and the AF Form 813, *Request for Environmental Impact Analysis*.

9.1.1.6 Flight Safety Officer

The March ARB 452 AMW Flight Safety Officer is responsible for ensuring that all proposed actions related to the flight safety have been evaluated by NRM/IPMC in order to ensure compliance with all natural resources laws and regulations. Coordinate with installation Natural Resources for all proposed actions so that an assessment of the potential impacts of proposed activities on sensitive natural resources can be done.

This is done through the AF Form 332 and AF Form 813 process. Coordinate with installation Pest Management Coordinator for all proposed actions so that the potential impacts of proposed activities on sensitive natural resources can be assessed. This is also done through the AF Form 332 and AF Form 813 process.

9.1.1.7 BASH Program Manager

The BASH Program Manager is responsible for ensuring that all proposed actions related to the flight safety have been evaluated by NRM/IPMC in order to ensure compliance with all natural resources laws and regulations. All natural resources management actions and all pest management actions are under ultimate supervision of the installation NRM and the IPMC. Coordinate with installation Natural Resources for all proposed actions so that an assessment of the potential impacts of proposed activities on sensitive natural resources can be done. This is done through the AF Form 332 and AF Form 813 process. Coordinate with IPMC for all proposed actions so that an assessment of the potential impacts of proposed activities on sensitive natural resources can be done. This is also done through the AF Form 332 and AF Form 813 process.

9.1.1.8 Public Affairs Office

The 452 AMW PA is responsible for the coordination of access to public events at the Base. Public facilities/recreational land use is oriented to providing recreational opportunities to assigned Base personnel, members of reserve components and their families, active and retired military, and civil service personnel. Open public recreational use of March ARB is precluded by the military mission and limited by the lack of outdoor resources on Base. The 452 AMW PA will serve as the Base POC to interface between the Base Commander and civilian groups interested in using March ARB for educational or other purposes.

9.1.1.9 Base Contracting Office (452 MSG/PK)

The Base Contracting Office (452 MSG/PK) is responsible for updating or revising the contracts during the next re-bid cycle to implement the adaptive management strategies in this Plan, in coordination with CEV/NRM for specific resource or specific management of the INRMP.

9.1.1.10 Grounds Maintenance Contractor

The March ARB Base Operating Support is responsible for all ground maintenance activities on the Base, including those performed by contractors. The March ARB Base Operation Support will ensure that the habitat management protocols established in this Plan for the conservation of biodiversity on March ARB are implemented. The Operations and Maintenance office will periodically review the type of grounds maintenance equipment to determine if new or additional equipment is needed for the proper maintenance of the Base’s landscapes.

9.1.1.11 Legal Office

The Legal Office will review any future natural resources management proposals and alert the March ARB Environmental Management Office if there are any regulatory conflicts or shortfalls.

9.1.1.12 Security Forces

March ARB Security Forces (452 SFS) are responsible for enforcing the no hunting policy and coordinating the feral animal removal plan on the Base. 452 SFS personnel inform civilian groups and other visitors to March ARB of (1) the restricted areas on the Base, and (2) notification and evacuation procedures in the case of an on-Base emergency.

9.1.1.13 Other Organizations

The USFWS and CDFW may provide technical assistance to March ARB. Specifically, these agencies will alert the March ARB NRM whenever new species with the potential for inhabiting the Base are added to the federal or state endangered species lists. In addition, March ARB will coordinate with these agencies regarding implementation of BASH reduction strategies or when consultation is required for proposed actions with the potential to affect threatened, endangered, or special-status species on the installation.

9.2 Monitoring INRMP Implementation

The NRM is responsible for monitoring INRMP implementation for effectiveness and compliance with the legal requirements of the Sikes Act.

9.3 Annual INRMP Review and Update Requirements

The INRMP requires annual review, in accordance with DoDI 4715.03 and AFMAN 32-7003, to ensure the achievement of mission goals, verify the implementation of projects, and establish any necessary new management requirements. This process involves installation natural resources personnel and external agencies working in coordination to review the INRMP. If the installation mission or any of its natural resources management issues change significantly after the creation of the original INRMP, a major revision to the INRMP is required. The need to accomplish a major revision is normally determined during the annual review with USFWS, the appropriate state, and NOAA (if required). The NRM/POC documents the findings of the annual review in an Annual INRMP Review Summary and obtains signatures from the coordinating agencies on review findings. By signing the Annual INRMP Review Summary, the collaborating agency representatives assert concurrence with the findings. If any agency declines to participate in an onsite annual review, the NRM submits the INRMP for review along with the Annual INRMP Review Summary document to the agency via official correspondence and requests return correspondence with comments/concurrence.

The USFWS, the state, NOAA (if applicable), and the NRM conduct an Annual INRMP Review Meeting. This meeting takes place in person with respective representatives for each agency. Individuals may telephone or video call if they cannot attend in person. During this meeting, the NRM updates the external stakeholders and parties with the end of the year execution report and coordinates future work plans and any necessary changes to management methods, etc. All parties review the INRMP and begin preliminary collaborative work on updating the INRMP (new policies, procedures, impacts, mitigations, etc.) as applicable.

Agency correspondence and documentation for the 2021 INRMP are included in Appendix J.

9.4 NEPA Compliance and Integration

Installations may, but are not required to, complete an environmental impact analysis of an INRMP before it is signed. However, actions proposed in development of an INRMP are subject to 40 CFR Parts 1500–1508, *CEQ Regulations for Implementing the Procedural Provisions of NEPA*, and 32 CFR Part 989, *Environmental Impact Analysis Process (EIAP)*. An appropriate level of analysis must be completed before such actions are implemented. Where an installation has previously completed an environmental impact analysis of an INRMP, it may (consistent with 40 CFR § 1500.4, 40 CFR § 1502.4(b), and 40 CFR § 1502.20) tier from that analysis when performing subsequent analyses on specific actions proposed in the INRMP.

9.4.1 National Environmental Policy Act of 1969

NEPA is a federal statute requiring the identification and analysis of potential environmental impacts of proposed federal actions before those actions are taken. NEPA established the Council on Environmental Quality (CEQ), which is charged with the development of implementing regulations and ensuring federal agency compliance with NEPA. CEQ regulations mandate that all federal agencies use a systematic interdisciplinary approach to environmental planning and the evaluation of actions that may affect the environment. This process evaluates potential environmental consequences associated with a Proposed Action and considers alternative courses of action. The intent of NEPA is to protect, restore, or enhance the environment through well-informed federal decisions.

The process for implementing NEPA is codified in 40 CFR Parts 1500–1508, *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act.* The CEQ was established under NEPA to implement and oversee federal policy in this process. To this end, the CEQ regulations specify that an environmental assessment (EA) be prepared to:

- Briefly provide evidence and analysis for determining whether to prepare an environmental impact statement (EIS) or a FONSI.
- Aid in an agency's compliance with NEPA when an EIS is unnecessary.
- Facilitate preparation of an EIS when one is necessary.

AFPD 32-70, *Environmental Considerations in Air Force Programs and Activities,* states that the USAF will comply with applicable federal, state, and local environmental laws and regulations, including NEPA. The USAF's implementing regulation for NEPA is the EIAP at 32 CFR Part 989.

9.4.2 Air Force Instructions

AFMAN 32-7003, *Environmental Conservation*, implements AFPD 32-70, *Environmental Considerations in Air Force Programs and Activities*, and supports AFI 32-7001, *Environmental Management*. It explains how to manage natural resources on USAF property in compliance with federal, state, and local standards. The implementation of an INRMP constitutes a potentially significant federal action as defined in 40 CFR § 1508.18(b)(2). As such, implementation of projects identified in the Plan may require consideration of potential environmental effects as described in the EIAP at 32 CFR Part 989.

9.4.3 INRMP and NEPA Integration

To comply with NEPA, the planning and decision-making process for actions proposed by federal agencies involves a study of other relevant environmental statutes and regulations. The NEPA process, however, does not replace procedural or substantive requirements of other environmental statutes and regulations. It addresses them collectively in the form of an EA or EIS, which enables the decision-maker to have a comprehensive view of major environmental issues and requirements associated with the Proposed Action. According to CEQ regulations, the requirements of NEPA must be integrated "with other planning and environmental review procedures required by law or by agency so that all such procedures run concurrently rather than consecutively." The adoption of an INRMP can be considered a major federal action as defined by Section 1508.18 of the CEQ regulations. The Headquarters United States Air Force, Deputy Chief of Staff of Installation and Logistics, Environmental Division (HQ USAF/ILEV) *Policy Memo for Implementation of Sikes Act Improvement Amendments*, dated January 29, 1999, requires the preparation of an EA or EIS for the implementation of an INRMP, whichever is appropriate.

9.4.4 2012 NEPA Findings

For implementation of the 2012 INRMP for March ARB, an EA was chosen as the appropriate level of NEPA analysis and was integrated as part of the 2012 INRMP. Based on the results of the 2012 NEPA analysis, it was determined that the implementation of the Proposed Action would have no significant, direct, indirect, or cumulative impacts on the quality of the natural or human environment. Implementation of the 2012 INRMP was expected to improve existing conditions at March ARB because of the potential for beneficial effects. It was determined that the Proposed Action would enable March ARB, over time, to achieve its goal of maintaining ecosystem viability and ensuring sustainability of desired military training conditions. A FONSI was signed in late 2012.

9.4.5 2021 INRMP Revision and NEPA Need

This INRMP is a revision of the 2012 INRMP. This INRMP revision includes species nomenclature and status changes that have occurred since 2012; identifies new guidance on invasive species, nuisance species, and climate change; and identifies studies and plan developments that will be initiated over the next 5 years to direct future natural resources management for the installation.

This INRMP Revision was analyzed under NEPA through development of an EA that included public involvement and review. The NEPA analysis determined that there would be no significant effects from implementation of this revised INRMP. The FONSI was staffed for signature along with the INRMP Revision. Additional environmental analysis may be required as new management goals, objectives, and projects are identified to be implemented over the long term (i.e., beyond 5 years).

10.0 ANNUAL WORK PLAN

The INRMP annual work plan is presented in Table 10-1. The projects and actions are listed by fiscal year, including the current year and the four succeeding years. For each project and activity, a specific timeframe for implementation is provided, as applicable, as well as the appropriate funding source and priority for implementation. The work plan provides all the necessary information for building a budget within the USAF framework. Priorities are defined as follows:

- High: The INRMP signatories assert that if the project is not funded, the INRMP is not being implemented and the USAF is non-compliant with the Sikes Act; or that it is specifically tied to an INRMP goal and objective and is part of a "benefit of the species" determination necessary for ESA § 4(a)(3)(B)(i) critical habitat exemption.
- Medium: Project supports a specific INRMP goal and objective and is deemed by the INRMP signatories to be important for preventing non-compliance with a specific requirement within a natural resources law or EO 13112, *Exotic and Invasive Species*. However, the INRMP signatories would not contend that the INRMP is not being implemented if the project is not accomplished within the programmed year because of other priorities.
- Low: Project supports a specific INRMP goal and objective, enhances conservation resources or the integrity of the installation mission, and/or supports long-term compliance with specific requirements within natural resources law, but it is not directly tied to specific compliance within the proposed year of execution.

Table 10-1. Annual Work Plan

Project	Office of Primary Responsibility	Funding Source	Priority Level	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
GOAL 1: WILDLIFE MANAGEMENT – MONITOR AND MANAGE WILDLIFE SPECIES ON MARCH ARB WHILE MINIMIZING POTENTIAL IMPACTS TO THE MILITARY MISSION								
OBJECTIVE 1.1: Employ a systematic approach to managing wildlife resources, using a process that includes monitoring, management, assessment, and evaluation.								
ACTION 1.1.1: NRM to follow current USFWS recommendations when conducting inventories.	CEV/NRM	NR	High	X	X	X	X	X
ACTION 1.1.2: NRM to select management strategies proven to effectively minimize BASH risk.	CEV/NRM	NR	High	X	X	X	X	X
ACTION 1.1.3: NRM to maintain and involve partnerships with agencies and groups involved in wildlife and habitat management.	CEV/NRM	NR	High	X	X	X	X	X
OBJECTIVE 1.2: Promote the conservation of migratory birds at March ARB in ways that do not conflict with or impede military training.								
ACTION 1.2.1: NRM to inventory and monitor bird populations at March ARB to the extent feasible to determine the need for, and effectiveness of, conservation efforts.	CEV/NRM	NR	Med	X	X	X	X	X
OBJECTIVE 1.3: Determine presence of special-status pollinators on March ARB.								
PROJECT 1.3.1: NRM to conduct a discovery or reconnaissance survey for USFWS BCC that are pollinators and within range of March ARB, including the Allen’s hummingbird, calliope hummingbird, Costa’s hummingbird, and rufous hummingbird.	CEV/NRM	NR	Med		X	X	X	X
PROJECT 1.3.2: NRM to conduct a reconnaissance survey for applicable special-status insect pollinators listed in the U.S. Air Force Pollinator Conservation Reference Guide (USFWS 2017).	CEV/NRM	NR	Med		X	X	X	X
PROJECT 1.3.3: If a special-status pollinator or its habitat is documented on Air Force lands, NRM to work with regional USFWS Migratory Birds staff for BCCs and the Palm Springs Fish and Wildlife Office for special-status insects to identify conservation actions to build into a pollinator management plan.	CEV/NRM	NR	Med		X	X	X	X

Project	Office of Primary Responsibility	Funding Source	Priority Level	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
OBJECTIVE 1.4: Prevent infestations of non-native, invasive, and nuisance wildlife on March ARB.								
ACTION 1.4.1: NRM/IPMC to conduct surveys and monitoring for non-native, invasive, and nuisance wildlife species.	CEV	NR	Med	X	X	X	X	X
ACTION 1.4.2: NRM/IPMC to review and update list of non-native, invasive, and nuisance wildlife on an annual basis.	CEV	NR	Med	X	X	X	X	X
GOAL 2: VEGETATION MANAGEMENT – MANAGE VEGETATION ON MARCH ARB BY PROMOTING THE USE OF NATIVE AND SUSTAINABLE PLANTS AND SEEDS, PREVENTING THE SPREAD OF NON-NATIVE INVASIVE PLANT SPECIES, AND MINIMIZING ATTRACTANTS OF BASH THREAT SPECIES								
OBJECTIVE 2.1: Promote native plant species on March ARB.								
PROJECT 2.1.1: NRM to complete vegetation study to develop future plans that incorporate the use of more native plants, as appropriate, throughout the Base. These plans to include airfield vegetation, urban landscaping, and all areas of vegetation communities.	CEV	NR	Med		X	X	X	X
OBJECTIVE 2.2: Use plants that are native to the local region, or those that are not known to be invasive, in landscaping, land restoration, and erosion control projects.								
PROJECT 2.2.1: NRM to develop a list of acceptable plants and seeds for contractors performing landscaping and land restoration work on Base.	CEV	NR	Med		X			
OBJECTIVE 2.3: Develop sources of seeds of native plant species of vernal pools, wet-meadows (wetland prairies), and upland grasslands that March ARB can access without undue delays.								
PROJECT 2.3.1: NRM to determine best, feasible method of acquiring local, native plant seeds.	CEV	NR	High		X			
OBJECTIVE 2.4: Prevent infestations of invasive plant species on March ARB.								
PROJECT 2.4.1: NRM to develop an Early Detection and Rapid Response (EDRR) program for March ARB that will meet DoD requirements for weed management and, to the maximum extent practicable, avoid potential direct and indirect impacts to resources regulated under the ESA, CWA, and Migratory Bird Treaty Act.	CEV	NR	Med		X	X		

Project	Office of Primary Responsibility	Funding Source	Priority Level	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
PROJECT 2.4.2: NRM to develop and provide brochures to educate Base maintenance and vegetation managers and Base firefighters to detect emerging threat invasive species.	CEV	NR	Med					X
ACTION 2.4.3: NRM to review and update the EDRR list of non-native, invasive, and noxious plant species on an annual basis.	CEV	NR	Med	X	X	X	X	X
OBJECTIVE 2.5: Update vegetation classifications to better understand how to manage all vegetation communities.								
PROJECT 2.5.1: NRM to conduct classification and mapping of plant communities and land cover types on March ARB, including the identification and mapping of seasonally dry wet-meadows (wetland prairie patches). Determine the types of communities. Evaluations of plants present on Base will be conducted seasonally.	CEV	NR	Med					X
PROJECT 2.5.2: NRM to complete study for and develop a long-term vegetation plan for all vegetation communities that increases native plant cover and reduces the percent cover of non-native plant species if feasible.	CEV	NR	Med					X
ACTION 2.5.3: NRM to update vegetation descriptions and mapping in INRMP during annual reviews as information is available.	CEV	NR	Med	X	X	X	X	X
PROJECT 2.5.4: NRM to collect herbaria specimen(s) of *Centromadia pungens* ssp. *pungens* on March ARB and re-identify. Submit specimen(s) to the UCR Herbarium for confirmation of subspecies.	CEV	NR	Med		X			
OBJECTIVE 2.6: Prevent vegetation from altering flows in drainage systems and minimize attractants for BASH threat species.								
ACTION 2.6.1: NRM/IPMC to identify and control, as feasible, plant species that compromise the flow efficiency of manmade drainage ditches on Base or attract BASH threat species.	CEV	NR	Med	X	X	X	X	X

Project	Office of Primary Responsibility	Funding Source	Priority Level	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
OBJECTIVE 2.7: Promote the implementation of sustainable landscape design practices at March ARB.								
PROJECT 2.7.1: NRM to prepare a landscape management plan that includes a list of existing types of landscape on Base, what is suggested for the future, and a classification of landscape plants. National Historic Preservation Act Section 106 consultation with the California SHPO may be required if changes would impact the historic district (e.g., adding xeriscaping and removal of grassy areas in the historic district).	CEV	NR	Med					X
OBJECTIVE 2.8: Ensure that the grounds maintenance program complies with all applicable environmental rules, regulations, and requirements.								
ACTION 2.8.1: NRM to coordinate with grounds maintenance manager annually to ensure that all grounds maintenance activities follow CEV procedures.	CEV	NR	High	X	X	X	X	X
ACTION 2.8.2: NRM to coordinate with grounds maintenance manager to ensure the grounds maintenance plan incorporates T&E and special-status species management and BASH reduction strategies.	CEV	NR	Med	X	X	X	X	X
ACTION 2.8.3: NRM to continually assess grounds maintenance activities for any adverse effects to T&E and special-status species and/or attraction of BASH threat species and make modifications as needed.	CEV	NR	Med	X	X	X	X	X
ACTION 2.8.4: NRM to manage vegetation through grounds maintenance along runways and taxiways to deter bird activity.	CEV	NR	Med	X	X	X	X	X
ACTION 2.8.5: NRM/IPMC to manage all pesticides used through grounds maintenance on airfield to best manage deterrence of bird activity. Methods with the lowest risks and effects, such as manual methods, should be used first. Methods with higher risks, such as pesticides, should only be employed if hazards are deemed high and lower risk methods have proven unsuccessful.	CEV	NR	High	X	X	X	X	X

Project	Office of Primary Responsibility	Funding Source	Priority Level	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
OBJECTIVE 2.9: Minimize pest attractants and breeding areas for pest species.								
ACTION 2.9.1: NRM to ensure drainage ditch vegetation maintenance is performed routinely and in a manner that does not promote standing water on the airfield.	CEV	NR	Med	X	X	X	X	X
ACTION 2.9.2: NRM to ensure the removal of dead vegetation such as brush piles, grass piles, clippings, hay bales, etc.	CEV	NR	Med	X	X	X	X	X
ACTION 2.9.3: NRM to ensure there are no debris piles (e.g., concrete blocks, scraps, pallets, etc.) from construction or other work.	CEV	NR	Med	X	X	X	X	X
OBJECTIVE 2.10: Manage urban trees in landscaped areas and other locations.								
ACTION 2.10.1: NRM to coordinate with arborists to evaluate trees that may be affected by disease or other stressors and determine which need to be removed or managed to prevent them from becoming a safety hazard.	CEV	NR	Med	X	X	X	X	X
ACTION 2.10.2: NRM to ensure that all trees that may harbor wildlife that could pose a BASH issue are removed or pruned to reduce such risks.	CEV	NR	Med	X	X	X	X	X
ACTION 2.10.3: NRM to reduce available mast-producing hardwood stands near the airfield to reduce habitat preferred by species deemed a BASH threat.	CEV	NR	Med	X	X	X	X	X
GOAL 3: SPECIAL-STATUS SPECIES MANAGEMENT – MANAGE SPECIAL-STATUS SPECIES IN ACCORDANCE WITH APPLICABLE FEDERAL AND STATE LAWS, REGULATIONS, AND POLICES								
OBJECTIVE 3.1: Coordinate with USFWS and CDFW on management of special-status species found on Base.								
ACTION 3.1.1: NRM to periodically review the management strategies suggested by CDFW and USFWS for special-status species and balance these strategies with the protocols established for the reduction of the BASH risk on the Base.	CEV	NR	High	X	X	X	X	X
OBJECTIVE 3.2: Provide for continued protection and conservation of burrowing owls on March ARB, while maintaining the military mission.								
PROJECT 3.2.1: NRM to prepare a burrowing owl management plan for March ARB.	CEV	NR	Med			X	X	X

	Project	Office of Primary Responsibility	Funding Source	Priority Level	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
	ACTION 3.2.2: NRM to conduct annual or biannual burrowing owl surveys, as feasible. Surveys should be conducted during the breeding season (February 1 to August 31) at a minimum. Point-count surveys are recommended as an efficient method for monitoring population trends at March ARB, although transect surveys, motion cameras, and/or other methodology may be used. NRM to ensure that protocol-level surveys conducted by a qualified biologist in accordance with current CDFW protocol recommendations (the CDFW 2012 Staff Report on Burrowing Owl Mitigation) are conducted every 5 years.	CEV	NR	Med	X	X	X	X	X
	ACTION 3.2.3: NRM to manage annual inspection and maintenance of artificial burrows during the non-breeding season (September 1 to January 31) to confirm the artificial burrows are in suitable condition for use by burrowing owls.	CEV	NR	Med	X	X	X	X	X
	ACTION 3.2.4: NRM to post signs along the perimeter of burrowing owl-occupied areas that clearly identify the presence of the species and specify the area is off-limits for foot or vehicle traffic (unless specifically authorized by Natural Resources staff).	CEV	NR	Med	X	X	X	X	X
	ACTION 3.2.5: If disturbance activities are planned in burrowing owl-supported areas, a survey of current burrowing owl activity should be conducted by the NRM biologist or an NRM-approved biologist prior to disturbing the area. If burrowing owls are present, appropriate actions should be taken to avoid impacts.	CEV	NR	High	X	X	X	X	X
	ACTION 3.2.6: NRM to manage areas currently supporting burrowing owls on Base to maintain habitat quality and minimize disturbance.	CEV	NR	High	X	X	X	X	X
	ACTION 3.2.7: NRM to ensure the continuation of regular mowing of the airfield, even during burrowing owl breeding season.	CEV	NR	Med	X	X	X	X	X
	ACTION 3.2.8: NRM/IPMC to ensure the use of pesticides is in compliance with the IPMP for protection of burrowing owls.	CEV	NR	High	X	X	X	X	X

Project	Office of Primary Responsibility	Funding Source	Priority Level	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
ACTION 3.2.9: NRM to ensure burrowing owl are not increasing BASH risk. NRM to coordinate with the BASH program for BASH updates and observations related to hazards and modify burrowing owl deterrence and avoidance measures and consider modification of habitat or populations with consultation with USFWS, as needed.	CEV	NR	Med	X	X	X	X	X
OBJECTIVE 3.3: Evaluate whether land set aside for the protection of SKR on the main March ARB east of I-215 should be opened up for other uses due to no further use by the species.								
PROJECT 3.3.1: NRM to work with the USFWS and CDFW to consider removal of the Open Space, as defined in the USFWS 1991 BO (1-6-91-F-33; USFWS 1991), set aside for SKR on the main Base and allow use for other purposes.	CEV	NR	Low					X
OBJECTIVE 3.4: Implement measures to avoid impacts to SKR in occupied habitat at the March ARB small arms range west of I-215.								
PROJECT 3.4.1: NRM to develop a management plan for the protection of SKR at the March ARB small arms range west of I-215.	CEV	NR	Med					X
PROJECT 3.4.2: NRM to post signs at the March ARB small arms range to clearly identify the presence of a federally listed endangered species.	CEV	NR	Med		X			
ACTION 3.4.3: NRM to ensure ground-disturbing grounds maintenance activities and new construction activities do not occur within SKR-occupied habitat at the March ARB small arms range to prevent adverse impacts to SKR. NRM to consult, informally or formally, as needed, with USFWS should NRM conclude there could be adverse impacts (e.g., from habitat or ground disturbance) to SKR.	CEV	NR	High	X	X	X	X	X
ACTION 3.4.4: NRM/IPMC to ensure pesticide use, including herbicides, is avoided in, or adjacent to, SKR-occupied habitat at the March ARB small arms range, unless chemicals are safe according to labels and approved for use by the NRM/IPMC.	CEV	NR	High	X	X	X	X	X
ACTION 3.4.5: NRM/IPMC to manage the control of non-native predators at the March ARB small arms range to minimize predation of SKR using methods described in the IPMP.	CEV	NR	High	X	X	X	X	X

Project	Office of Primary Responsibility	Funding Source	Priority Level	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
OBJECTIVE 3.5: Maintain the quality of SKR-occupied habitat and adjacent areas at the March ARB small arms range west of I-215.								
ACTION 3.5.1: NRM to manage vegetation at small arms range to maintain habitat quality to support SKR. Shrub canopy to be removed in SKR-occupied scrub habitat and adjoining 20 ft by manually clipping aboveground portions of all shrubs at intervals to maintain suitable open conditions for SKR. As needed, SKR-occupied grassland habitat to be mowed annually following seed set of annual grasses/forbs. Re-evaluate in abnormally wet years to determine whether a second mowing is necessary. All thatch should be removed following mowing and not left on the ground.	CEV	NR	Med	X	X	X	X	X
OBJECTIVE 3.6: Identify and protect vernal pools and seasonally ponded areas on March ARB that may support federally listed fairy shrimp species.								
PROJECT 3.6.1: NRM to coordinate formal presence/absence surveys for federally listed fairy shrimp in accordance with current USFWS survey protocols every 5 years and prior to any disturbance of vernal pools on March ARB.	CEV	NR	High		X	X	X	X
PROJECT 3.6.2: NRM to establish a protocol for conducting informal surveys and monitoring of fairy shrimp occupancy in vernal pools.	CEV	NR	Med		X	X		
PROJECT 3.6.3: NRM to identify occupied vernal pools that should be protected because of the potential presence of federally listed vernal pool species.	CEV	NR	Med		X	X	X	X
PROJECT 3.6.4: NRM to coordinate with the USFWS to create a Vernal Pool Management Plan to guide protection efforts for the area and create goals for this habitat on March ARB consistent with the military mission.	CEV	NR	High					X
GOAL 4: HABITAT MANAGEMENT – MANAGE SPECIAL HABITATS, PROMOTE POLLINATORS, AND MINIMIZE HABITAT DEGRADATION WITHIN THE CONSTRAINTS OF THE MILITARY MISSION								
OBJECTIVE 4.1: Minimize the operational impact of March ARB missions on seasonal wetlands and drainages.								
PROJECT 4.1.1: NRM to develop an education plan and/or brochure for key Base personnel that are likely to perform activities that impact jurisdictional waters.	CEV	NR	Med		X			

Project	Office of Primary Responsibility	Funding Source	Priority Level	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
ACTION 4.1.2: NRM to ensure March ARB remains in compliance with USACE wetlands regulations, RWQCB regulations, the Porter-Cologne Act, Section 401 of the CWA, and all other applicable wetlands regulations.	CEV	NR	High	X	X	X	X	X
ACTION 4.1.3: NRM to ensure that current activities on March ARB do not impact vernal pools and jurisdictional waters to the extent feasible and that proper permitting procedures (see Figure 7-5) are followed prior to any encroachment upon these resources.	CEV	NR	High	X	X	X	X	X
ACTION 4.1.4: NRM to monitor contracted grounds activities with potential to impact vernal pools and jurisdictional waters.	CEV	NR	Med	X	X	X	X	X
ACTION 4.1.5: NRM to ensure vegetative maintenance is restricted within areas identified as vernal pools, wet-meadows, or jurisdictional wetlands during the wet season. If maintenance is required to reduce the BASH threat or maintain airfield drainage critical to infrastructure protection (i.e., airfield under-drains), NRM to ensure maintenance is conducted in accordance with applicable regulations	CEV	NR	Med	X	X	X	X	X
ACTION 4.1.6: When feasible, NRM to ensure alternative sites or designs are selected for construction projects and training activities that would encroach upon vernal pools or jurisdictional waters to avoid and/or minimize impacts.	CEV	NR	Med	X	X	X	X	X
OBJECTIVE 4.2: Without decreasing readiness proficiency, schedule training requirements/areas in time and place to mitigate impacts to special-status species.								
ACTION 4.2.1: If military exercises are increased to include bivouac, NRM to ensure the area of training activities is rotated for continual exercises to minimize the impacts to any one area and avoid special-status species and habitats.	CEV	NR	Med	X	X	X	X	X
OBJECTIVE 4.3: Manage vernal pool habitats to support federally or state-listed species, within the constraints of the military mission.								
ACTION 4.3.1: NRM to prohibit, to the extent practicable, new construction projects or development in habitat with potential to support listed fairy shrimp. A minimum 100-foot buffer between new development and pool watersheds and no ground disturbance on the associated vernal wetland are recommended.	CEV	NR	High	X	X	X	X	X

Project	Office of Primary Responsibility	Funding Source	Priority Level	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
ACTION 4.3.2: NRM to prohibit filling or intentional destruction of existing pools that may support federally or state-listed species, to the extent practicable, especially pools along existing roadways outside the airfield where vehicle travel is less restricted.	CEV	NR	High	X	X	X	X	X
ACTION 4.3.3: NRM/IPMC to ensure all pesticide use is restricted within 50 ft or more of vernal pools (depending on label directions). Avoid applications in drainage ditches that drain to vernal pools, unless otherwise approved by the NRM.	CEV	NR	High	X	X	X	X	X
ACTION 4.3.4: NRM/IPMC to ensure development or grounds maintenance that would alter hydrology of the vernal pool complex is limited to prevent the following: increased flow velocities that could generate scour; decreased flow that could shorten the ponding period; or increased sedimentation that could reach the vernal pools.	CEV	NR	Med	X	X	X	X	X
PROJECT 4.3.5: Produce fine-scale maps depicting vernal pools, their associated watersheds, and the direction of water flow.	CEV	NR	Med		X			
PROJECT 4.3.6: NRM to monitor the distribution and abundance of Parish's flatsedge (*Cyperus parishii*) and any other rare or declining wetland plant species detected on March ARB, collect seed of this species, and re-distribute seeds to similar but unoccupied habitats on the Base as a hedge against future development impacts on the Base or against future drought impacts on this species.	CEV	NR	High		X			
OBJECTIVE 4.4: Restore degraded vernal pools that may support federally or state-listed species to maintain habitat for fairy shrimp, as feasible and within the constraints of the military mission.								
ACTION 4.4.1: NRM to coordinate with grounds maintenance contractor to ensure that trash buildup within drainages from storms is cleaned out by base operations contractor in order to ensure clean watersheds on March ARB.	CEV	NR	Med	X	X	X	X	X
OBJECTIVE 4.5: Maintain the plant species' diversity of March ARB vernal pools.								
ACTION 4.5.1: NRM to monitor the floristic composition of each vernal pool and seasonally dry wetland feature over the long term to detect trends pointing to potential loss of species diversity within vernal pools and other seasonally dry wetlands.	CEV	NR	Med		X	X	X	X

Project	Office of Primary Responsibility	Funding Source	Priority Level	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
ACTION 4.5.2: NRM to develop procedures for the reintroduction of vernal pool and seasonal wetland plant species using low-impact seeding practices that would be implemented if intervention is needed to restore the species diversity of vernal pools or other ephemeral wetland features on the Base.	CEV	NR	Med			X		
ACTION 4.5.3: In support of ACTION 4.5.2, NRM to develop commercial, NGO-held, or in-house sources of seeds of native plant species of vernal pools, wetland meadows, and other seasonal wetlands from which March ARB can readily procure seeds to implement ACTION 4.5.2.	CEV	NR	Med				X	
OBJECTIVE 4.6: Where feasible, create, maintain, and enhance habitats to promote use by pollinators.								
PROJECT 4.6.1: NRM to identify pollinator habitat, such as nesting and overwintering sites, and protect, as feasible.	CEV	NR	Med		X	X	X	X
ACTION 4.6.2: NRM to coordinate the planting and maintenance of a diverse array of native flowering plants, with an emphasis on creating habitat for native bees and butterflies. Only plants with lower seed production should be considered for planting on the airfield to avoid attraction of avian species. Consider development of an educational pollinator garden.	CEV	NR	Med					X
ACTION 4.6.3: NRM to ensure wildflower blooms are encouraged by avoiding the mowing of active wildflower blooms, as practicable.	CEV	NR	Med	X	X	X	X	X
OBJECTIVE 4.7: Reduce/control nutrient and sediment inputs that have the potential to degrade special habitats.								
ACTION 4.7.1: NRM/IPMC to ensure alternatives to pesticides, such as cultural, physical, and mechanical methods, are used prior to resorting to pesticides. If pesticide use is necessary, the NRM will screen pesticides and select alternatives that are environmentally sensitive to avoid nutrient loading of adjacent water bodies and impacts to special habitats. Comply with pesticide label directions and restrictions.	CEV	NR	High	X	X	X	X	X
ACTION 4.7.2: NRM to periodically inspect/monitor construction sites to ensure that natural resources are not being adversely affected by construction activities.	CEV	NR	Med	X	X	X	X	X

Project	Office of Primary Responsibility	Funding Source	Priority Level	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
ACTION 4.7.3: NRM to ensure that environmental requirements are in place to prevent impacts to natural resources from water quality or contamination issues.	CEV	NR	Med	X	X	X	X	X
OBJECTIVE 4.8: Avoid/minimize impacts to natural resources from March JPA ERP site cleanup activities.								
ACTION 4.8.1: NRM to ensure any contaminated run-off is managed to protect natural resources.	CEV	NR	Med	X	X	X	X	X
OBJECTIVE 4.9: Avoid/minimize impacts to natural resources from releases, accidents, and spills.								
ACTION 4.9.1: In the event of any releases, accidents, or spills, NRM to assess natural resources for damages/impacts and manage any necessary mitigation.	CEV	NR	High	X	X	X	X	X
GOAL 5: PEST MANAGEMENT – CONTROL INVASIVE, PEST, AND NUISANCE SPECIES INHABITING MARCH ARB								
OBJECTIVE 5.1: Continue to evaluate the presence of nuisance species on the Base and adapt management strategies to effectively manage their populations and eliminate attraction sites.								
PROJECT 5.1.1: NRM/IPMC to complete revision of the IPMP, which will establish procedures and protocols for the management of nuisance species and annual reports.	CEV	NR	High	X				
ACTION 5.1.2: NRM/IPMC to ensure compliance with all federal, state, and DoD requirements when any treatment of non-native, invasive, noxious, or nuisance species is proposed.	CEV	NR	High	X	X	X	X	X
ACTION 5.1.3: When necessary, NRM/IPMC to conduct NEPA analysis for pesticides used on Base.	CEV	NR	High	X	X	X	X	X
ACTION 5.1.4: NRM/IPMC to implement procedures established in the IPMP and this INRMP (Section 7.1.3) for the capture, removal, and depredation through lethal control of pest and nuisance species.	CEV	NR	High	X	X	X	X	X
ACTION 5.1.5: Prior to implementation, NRM/IPMC to assess the control strategies for nuisance species to determine how to best accomplish the control while managing special-status species inhabiting the Base.	CEV	NR	High	X	X	X	X	X

	Project	Office of Primary Responsibility	Funding Source	Priority Level	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
	ACTION 5.1.6: NRM/IPMC to monitor for project-related materials that may temporarily pile up and that would attract nuisance or pest species. If observed, NRM/IPMC to notify appropriate contact to have the piles removed.	CEV	NR	Med	X	X	X	X	X
	ACTION 5.1.7: NRM/IPMC to ensure a pest deterrent/control plan is in place to address situations such as perches, roosting areas, and established pest residence or pest traffic areas.	CEV	NR	Med	X	X	X	X	X
	ACTION 5.1.8: NRM/IPMC to continue to evaluate the presence of birds nesting and/or roosting in aircraft hangers and implement management strategies as needed.	CEV	NR	Med	X	X	X	X	X
	ACTION 5.1.9: NRM/IPMC to review and revise control methods for bird species inhabiting aircraft hangars, warehouses, garages, and other large buildings in the March ARB IPMP.	CEV	NR	Med	X				
	ACTION 5.1.10: If new vegetation associations begin to occur on the installation, NRM/IPMC to evaluate for specific foraging habitat requirements of nuisance species. If needed, implement plans for possible vegetation modification.	CEV	NR	Med	X	X	X	X	X
	ACTION 5.1.11: NRM/IPMC to continue to conduct routine surveys to determine the locations of California ground squirrel populations on Base and whether management practices are effective at controlling the populations on March ARB.	CEV	NR	Med	X	X	X	X	X
	ACTION 5.1.12: NRM/IPMC to implement controls and management strategies detailed in the IPMP and Section 7.1.3 of this INRMP to reduce California ground squirrel population densities, especially within the landscaped areas, airfield, and clear zones.	CEV	NR	Med	X	X	X	X	X
	ACTION 5.1.13: NRM/IPMC to continue to consult and contract with licensed lethal control administrators to perform on-Base California ground squirrel control.	CEV	NR	Med	X	X	X	X	X
	ACTION 5.1.14: NRM/IPMC to identify and clearly mark burrows occupied by burrowing owls for avoidance prior to implementation of pest control methods that will affect burrows, such as burrow collapse or filling.	CEV	NR	High	X	X	X	X	X

Project	Office of Primary Responsibility	Funding Source	Priority Level	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
GOAL 6: BASH HAZARDS MANAGEMENT – MANAGE HAZARDS TO REDUCE BASH RISK								
OBJECTIVE 6.1: Control wildlife and manage habitat to reduce BASH risk.								
ACTION 6.1.1: NRM/IPMC to ensure vegetation on the airfield is maintained at a height between 7 and 14 inches to reduce attractiveness to wildlife. Vegetation height should be established prior to the bird breeding season and maintained at appropriate height throughout the bird breeding season to deter attractants for nuisance species.	CEV	NR	High	X	X	X	X	X
ACTION 6.1.2: NRM/IPMC to identify and remove and/or modify potential roosting, refuge, and foraging sites to reduce the attraction of birds and other animal species.	CEV	NR	Med	X	X	X	X	X
ACTION 6.1.3: NRM/IPMC to oversee and monitor the removal of bird/animal carcasses from the airfields to avoid attracting vultures and other scavengers.	CEV	NR	High	X	X	X	X	X
ACTION 6.1.4: NRM/IPMC to ensure any opportunities to control insects that attract hazardous wildlife will be evaluated and the safest measures for the environment will be used to control them if needed. Considerations would include all vectors such as vegetation modifications or possible treatments with insecticides to control mass infestations.	CEV	NR	Med	X	X	X	X	X
PROJECT 6.1.5: NRM/IPMC to monitor and evaluate mass insect infestations to determine long-term management solutions.	CEV	NR	Med		X	X	X	X
ACTION 6.1.6: NRM/IPMC to ensure vegetation is clear from runways and taxiways. Methods with the lowest risk and lowest effects will be implemented first. Vegetation should be manually removed from runways and taxiways several times a year and post-emergent herbicide may be applied in approved areas during the highest growing season for maximum efficiency.	CEV	NR	Med	X	X	X	X	X
ACTION 6.1.7: NRM/IPMC to oversee the BASH programs' implementation of the existing avian pyrotechnic or frightening device program to deter birds/wildlife from occupying the area.	CEV	NR	High	X	X	X	X	X

Project	Office of Primary Responsibility	Funding Source	Priority Level	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
ACTION 6.1.8: NRM to review, approve, monitor, track, and keep records of USFWS Depredation Permits or permit modifications to allow the take of birds that pose a hazard to human safety and equipment on or around the flight line.	CEV	NR	High	X	X	X	X	X
ACTION 6.1.9: NRM/IPMC to oversee the existing bird spike implementation program to deter birds from occupying perching locations. This includes regular assessment, monitoring, and tracking of existing bird spikes located on the Base. NRM/IPMC to ensure that bird deterrents are maintained.	CEV	NR	Med	X	X	X	X	X
ACTION 6.1.10: NRM to manage bare areas within the AMA. Bare areas should be seeded with native plants with the lowest seed production or non-native seed approved by NRM/IPMC within the existing associated vegetation that also has the lowest seed production.	CEV	NR	High	X	X	X	X	X
ACTION 6.1.11: NRM/IPMC to regularly assess wildlife control strategies for their effect on special-status species inhabiting the Base.	CEV	NR	High	X	X	X	X	X
ACTION 6.1.12: NRM to ensure that management strategies used by the BASH program are in compliance with laws, regulations, guidelines, and consultations and agreements with wildlife agencies.	CEV	NR	High	X	X	X	X	X
OBJECTIVE 6.2: Ensure that bird remains are shipped to the Smithsonian Institution as designated by USAF policy.								
ACTION 6.2.1: NRM to oversee that the species of all bird remains discovered on March ARB or on 452 AMW aircraft as a result of aircraft strikes with birds are investigated and identified.	CEV	NR	High	X	X	X	X	X
ACTION 6.2.2: In accordance with USAF policy (AFI 91-212), NRM to oversee and track that all bird remains encountered are sent to: Dr. Carla Dove Smithsonian Institution Feather Identification Lab E600, MRC 116 P.O. Box 37012 Washington, DC 20013-7012	CEV	NR	High	X	X	X	X	X

Project	Office of Primary Responsibility	Funding Source	Priority Level	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
OBJECTIVE 6.3: Prevent wildlife that pose a security concern to the flight mission from entering BASH threat areas.								
ACTION 6.3.1: NRM/IPMC to oversee and encourage that the perimeter fence is up to date with security measures and height and that BASH features are installed to prevent large wildlife or grazing animals from entering the airfield and to help control all other ground pests.	CEV	NR	Med	X	X	X	X	X
ACTION 6.3.2: NRM/IPMC to coordinate on all perimeter pest vector locations related to pest deterrence, such as fencing and culvert access, to prevent wildlife from entering the base. All adequate exclusion measures should be considered and installed, as feasible, at all outfall points to prevent the entry of wildlife onto the Base without adversely affecting flow. Vector management should ensure animal access opportunities such as culverts are secure from allowing access onto the Base. These can be secured by such things as culvert grill doors and pest access holes. Perimeter pest vectors should be monitored on a regular basis.	CEV	NR	Med	X	X	X	X	X
ACTION 6.3.3: Coordination for all perimeter pest vector locations may include coordinating with BOS contract to ensure maintenance and repair of all damaged portions of the perimeter fence line to adequately exclude wildlife entry through outfall points.	CEV	NR	Med	X	X	X	X	X
OBJECTIVE 6.4: Manage airfield wildlife and habitat to reduce BASH risk.								
ACTION 6.4.1: NRM to ensure seasonal wetland/vernal pool habitat is managed and maintained without increasing threats to airfield operations.	CEV	NR	High	X	X	X	X	X
ACTION 6.4.2: NRM to coordinate and manage perch and hide attractants, as feasible, for avian species. Such perch and hide attractants may include erect woody plants (caulescent shrubs and trees) and robust herbaceous vegetation or construction piles. All such perch and hide attractants should be removed/prevented around all vernal pools, drainages, and waterways in order to avoid encouragement of these wetland type habitats from becoming attractants.	CEV	NR	Med	X	X	X	X	X

Project	Office of Primary Responsibility	Funding Source	Priority Level	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
PROJECT 6.4.3: NRM to conduct annual surveys of seasonal wetlands/vernal pools to document active pools and wildlife use and determine the lowest risk and lowest effects way to prevent/minimize attractants.	CEV	NR	Med		X	X	X	X
ACTION 6.4.4: NRM to monitor burrowing owls on the airfield regularly to determine strike risk and risk mitigation strategies.	CEV	NR	High	X	X	X	X	X
ACTION 6.4.5: NRM/IPMC to survey and evaluate mass insect infestations to determine long-term management solutions.	CEV	NR	Med	X	X	X	X	X
GOAL 7: CLIMATE CHANGE MANAGEMENT – MINIMIZE IMPACTS OF CLIMATE CHANGE TO NATURAL RESOURCES								
OBJECTIVE 7.1: Research and develop management to address effects of climate change.								
PROJECT 7.1.1: NRM to conduct a review of the potential effects of climate change on natural resources on Base every 5 years. Results of the 5-year review will be compiled into a report that will include any recommended changes to natural resources management strategies based on the findings of the report.	CEV	NR	low					X
GOAL 8: DATA MANAGEMENT – MANAGE NATURAL RESOURCE DATA REQUIRED FOR PROGRAM MANAGEMENT								
OBJECTIVE 8.1: Maintain current natural resource data.								
ACTION 8.1.1: NRM to maintain and update natural resources GIS data layers.	CEV	NR	Med	X	X	X	X	X
ACTION 8.1.2: NRM to maintain and update species lists for March ARB, including flora/fauna inventories, EDRR weed list, and approved plant list for new projects or landscaping.	CEV	NR	Med	X	X	X	X	X
ACTION 8.1.3: NRM to maintain compliance calendar.	CEV	NR	Med	X	X	X	X	X
ACTION 8.1.4: NRM to update and maintain current applicable laws and regulations, including DoDIs and AFIs. Updates to be incorporated into annual INRMP and IPMP reviews and updates.	CEV	NR	High	X	X	X	X	X

Project		Office of Primary Responsibility	Funding Source	Priority Level	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
	ACTION 8.1.5: NRM to update and maintain the pest management, cultural resources management, natural resource management, and species and habitat folders that are used to guide the natural resources management program.	CEV	NR	Med	X	X	X	X	X
	ACTION 8.1.6: NRM to ensure the BASH Plan is current and coordinated with the NRM/IPMC.	CEV	NR	High	X	X	X	X	X
	ACTION 8.1.7: NRM to annually review and update as necessary all plans related to natural resources.	CEV	NR	High	X	X	X	X	X
	OBJECTIVE 8.2: Efficiently manage INRMP record keeping and reporting.								
	PROJECT 8.2.1: NRM to develop an INRMP records management system.	CEV	NR	Med		X			

Notes:
FY = Fiscal Year

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- Sikes Act
- eDASH Natural Resources Program Page
- Natural Resources Playbook
- DoDI 4715.03, *Natural Resources Conservation Program*
- AFI 32-1015, *Integrated Installation Planning*
- AFI 32-10112, *Installation Geospatial Information and Services (IGI&S)*

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USFWS 2002	U.S. Fish and Wildlife Service (USFWS). 2002. *Quino Checkerspot Butterfly (Euphydryas editha quino), Survey Protocol Information*. Carlsbad, CA. February.
USFWS 2005	United Fish and Wildlife Service (USFWS). 2005. *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon*. Region 1, U.S. Fish and Wildlife Service Portland, Oregon. December 15. https://www.fws.gov/sacramento/es/Recovery-Planning/Vernal-Pool/
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USFWS 2010	United Fish and Wildlife Service (USFWS). 2010. "Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to Remove the Stephens' Kangaroo Rat from the Federal List of Endangered and Threatened Wildlife." *Federal Register.* Vol. 75, No. 160. https://www.fws.gov/policy/library/2010/2010-20518.html
USFWS 2013a	U.S. Fish and Wildlife Service (USFWS). 2013. *Mountain Plover (Charadrius montanus)*. South Dakota Field Office. http://www.fws.gov/southdakotafieldoffice/MPLOVER.HTM
USFWS 2013b	U.S. Fish and Wildlife Service (USFWS). 2013. *San Jacinto Valley crownscale (Atriplex coronate var. notatior)*. Carlsbad Fish and Wildlife Office. March 27. https://www.fws.gov/carlsbad/TEspecies/SJVC.htm
USFWS 2015	U.S. Fish and Wildlife Service (USFWS). 2015. *Mountain Plover (Charadrius montanus)*. Mountain-Prairie Region. July 8. https://www.fws.gov/mountain-prairie/es/mountainPlover.php
USFWS 2017	U.S. Fish and Wildlife Service (USFWS). 2017. *U.S. Air Force Pollinator Conservation Reference Guide*. Air Force Civil Engineer Center, San Antonio, TX. 182 pp. plus Appendix A (Species maps and profiles) and Appendix B (Restoration and landscaping information).
USFWS 2019	U.S. Fish and Wildlife Service (USFWS). 2019. *Bald Eagle* (Haliaeetus leucocephalus). Midwest Region, U.S. Fish and Wildlife Service. March 4. http://www.fws.gov/midwest/Eagle/index.html
USFWS 2020a	U.S. Fish and Wildlife Service (USFWS). 2020. National Wetland Inventory Wetlands Mapper. https://www.fws.gov/wetlands/data/mapper.html
USFWS 2020b	U.S. Fish and Wildlife Service (USFWS). 2020. Environmental Conservation System Online. https://ecos.fws.gov/ecp/
USFWS 2020c	U.S. Fish and Wildlife Service (USFWS). 2020. *Endangered and Threatened Wildlife and Plants; Reclassification of Stephens' Kangaroo Rat From Endangered To Threatened With a Section 4(d) Rule*. Federal Register Vol. 85, No. 161. August 19. https://www.federalregister.gov/documents/2020/08/19/2020-16719/endangered-and-threatened-wildlife-and-plants-reclassification-of-stephens-kangaroo-rat-from
USFWS and NMFS 1998	U.S. Fish and Wildlife Service and National Marine Fisheries Service (USFWS and NMFS). 1998. *Endangered Species Consultation Handbook: Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act*. March.
USGCRP 2018	U.S. Global Change Research Project (USGCRP). 2018. *Fourth National Climate Assessment, Volume II: Impacts, Risks, and Adaptation in the United States.* Reidmiller, D. R., C. W. Avery, D. R. Easterling, K. E. Kunkel, K. L. M. Lewis, T. K. Maycock, and B. C. Stewart (eds.). Washington, DC. 1515 pp. doi: 10.7930/NCA4.2018. https://www.globalchange.gov/nca4

USGS 2003	U.S. Geological Survey (USGS). 2003. Principal Aquifers [map]. https://water.usgs.gov/ogw/aquifer/101514-wall-map.pdf
USMC 2020	U.S. Marine Corps (USMC). 2020. 12th Marine Corps District. https://www.mcrc.marines.mil/Units/12-Marine-Corps-District/
Wagner 2019	Wagner, Chris. 2019. *Ground Squirrel Control Survey and Evaluation Report*. March Air Reserve Base. November.
WBWG 2017	Western Bat Working Group (WBWG). 2017. *Western Bat Species*. http://wbwg.org/western-bat-species/
WRC RCA 2011	Western Riverside County (WRC) Regional Conservation Authority (RCA). 2011. *Vernal Pool Survey Report 2010*. Western Riverside County (WRC) Multiple Species Habitat Conservation Plan (MSHCP) Biological Monitoring Program. April 8. https://www.wrc-rca.org/archivecdn/AnnualReport_2010/AppendixA/RCA_2010_AR_TR_Monitor_Vernal_Pool.pdf
Wilkening et al. 2019	Wilkening, Jennifer, Wendy Pearson-Prestera, Ninad Avinash Mungi, and Sabuj Bhattacharyya. "Endangered Species Management and Climate Change: When Habitat Conservation Becomes a Moving Target." *Wildlife Society Bulletin*. Vol. 43, No. 1. pp. 11–20.
Xerces 2018	The Xerces Society. 2018. A Petition to the State of California Fish and Game Commission to List the Crotch bumble bee (*Bombus crotchii*), Franklin's bumble bee (*Bombus franklini*), Suckley cuckoo bumble bee (*Bombus suckleyi*), and western bumble bee (*Bombus occidentalis occidentalis*) as Endangered under the California Endangered Species Act. FGC - 670.1 (3/94). October 16. https://xerces.org/publications/policy-statements/california-esa-bumble-bee-petition-2018

12.0 ACRONYMS AND ABBREVIATIONS

12.1 Standard Acronyms (Applicable to all USAF installations)

- eDASH Acronym Library
- Natural Resources Playbook – Acronym Section
- U.S. EPA Terms & Acronyms

12.2 Installation Acronyms and Abbreviations

§	Section
°F	degree(s) Fahrenheit
452 AMW	452nd Air Mobility Wing
452 MSG/PK	Base Contracting Office
452 SFS	March ARB Security Forces
AF	Air Force
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFPD	Air Force Policy Directive
AFPMB	Armed Forces Pest Management Board
AFRC	Air Force Reserve Command
AFRES	Air Force Reserve
AHAS	Avian Hazard Advisory System
AICUZ	Air Installation Compatible Use Zone
AMA	Aircraft Movement Area
AMC	Air Mobility Command
AMW	Air Mobility Wing
APHIS	Animal and Plant Health Inspection Service
ARB	Air Reserve Base
ARW	Air Refueling Wing
AST	aboveground storage tank
BAM	Bird Avoidance Model
Base	March Air Reserve Base
BASH	Bird/Wildlife Aircraft Strike Hazard
BCC	Birds of Conservation Concern
BGEPA	Bald and Golden Eagle Protection Act
BMP	best management practice
BMW	Bombardment Wing
BO	Biological Opinion
BOS	base operating support
BRAC	Base Realignment and Closure
CA ANG	California Air National Guard
Cal-IPC	California Invasive Plant Council
CARB	California Air Resources Board
CDFA	California Department of Food and Agriculture
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife

CDWR	California Department of Water Resources
CE	Civil Engineer; Civil Engineering
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	California Endangered Species Act
CEV	Civil Engineering Environmental Flight
CFR	*Code of Federal Regulations*
cm	centimeter
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRPR	California Rare Plant Rank
CWA	Clean Water Act
DDT	dichlorodiphenyltrichloroethane
DoD	Department of Defense
DoDI	Department of Defense Instruction
EA	Environmental Assessment
ECOS	Environmental Conservation System Online
EDRR	Early Detection Rapid Response
EE	ecological economics
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EMWD	Eastern Municipal Water District
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPC	Environmental Protection Committee
ERP	Environmental Restoration Program
ESA	Endangered Species Act
ESOH	Environment, Safety, and Occupational Health
FE	Federal Endangered
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FONPA	Finding of No Practicable Alternative
FONSI	Finding of No Significant Impact
FP	Fully Protected
ft	foot (feet)
FT	Federal Threatened
FY	Fiscal Year
GCM	global climate model
GIS	Geographical Information System
GSU	Geographically Separated Unit
H	High priority
HAZMAT	hazardous materials
HAZWASTE	hazardous waste
HQ	Headquarters
HQ USAF/ILEV	Headquarters United States Air Force, Deputy Chief of Staff of Installation and Logistics, Environmental Division
I-	Interstate

ICRMP	Integrated Cultural Resources Management Plan
IDP	Installation Development Plan
INRMP	Integrated Natural Resources Management Plan
IPMC	Installation Pest Management Coordinator
IPMP	Integrated Pest Management Plan
JPA	Joint Powers Authority
M	Medium priority
MBTA	Migratory Bird Treaty Act
mm	millimeter
MSG	Mission Support Group
NEPA	National Environmental Policy Act
NEXRAD	Next Generation Weather Radar
NFA	No Further Action
No.	number
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRM	Natural Resources Manager
NWS	National Weather Service
OSD	Office of the Secretary of Defense
P.L.	Public Law
PA	Public Affairs Office
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	perchloroethene
Plan	Integrated Natural Resources Management Plan
POC	Point of Contact
POL	petroleum, oil, and lubricants
Porter-Cologne Act	California Porter-Cologne Water Quality Control Act
ppm	part(s) per million
QCB	Quino checkerspot butterfly
RCP	representative concentration pathway
Reference Guide	*U.S. Air Force (Air Force) Pollinator Conservation Reference Guide*
RWQCB	Regional Water Quality Control Board
SAC	Strategic Air Command
SC	State Candidate
SCAB	South Coast Air Basin
SDMMP	San Diego Management and Monitoring Program
SE	State Endangered
SecAF	Secretary of the Air Force
SHPO	California State Historical Preservation Officer
SKR	Stephens' kangaroo rat
SPCC	Spill Prevention, Control, and Countermeasure
Spill Plan	*March ARB Spill Prevention, Control, and Countermeasure (SPCC) Plan*
SSC	Species of Special Concern
ST	State Threatened

Strategy	*U.S. Air Force Pollinator Conservation Strategy*
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
T&E	threatened and endangered
TCE	trichloroethene
TPH	total petroleum hydrocarbons
U.S.	United States
U.S.C.	*United States Code*
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USGCRP	U.S. Global Change Research Project
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USMC	U.S. Marine Corps
UST	underground storage tank
WBWG	Western Bat Working Group
WEZ	Wildlife Exclusion Zone
WL	Watch List
WMWD	Western Municipal Water District

13.0 DEFINITIONS

13.1 Standard Definitions (Applicable to all USAF installations)

- Natural Resources Playbook – Definitions Section

13.2 Installation Definitions

- N/A

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14.0 ASSOCIATED PLANS

- Bird/Wildlife Aircraft Strike Hazard (BASH) Plan: Natural_Resource_Plans
- Integrated Cultural Resources Management Plan (ICRMP): Cultural_Resource_Plan
- Integrated Pest Management Plan (IPMP): Natural_Resource_Plans

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15.0 APPENDICES

Standard Appendices

Appendix A. Annotated Summary of Key Legislation Related To Design And Implementation Of The INRMP

Installation Appendices

Appendix B. USGS Quadrangle Map

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Appendix D. Jurisdictional Wetlands and Waters of the U.S. for March ARB

Appendix E. Plant Species Observed on March ARB

Appendix F. Wildlife Species Observed on March ARB

Appendix G. Composite Natural Resources Constraints on March ARB

Appendix H. Air Installation Compatible Use Zone Report for March ARB

Appendix I. Sample Annual Review and Coordination Certification Page

Appendix J. Agency Correspondence and Documentation for 2021 March ARB INRMP

Appendix K. Natural Resources References for March ARB

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APPENDIX A:

ANNOTATED SUMMARY OF KEY LEGISLATION RELATED TO DESIGN AND IMPLEMENTATION OF THE INRMP

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Appendix A. Annotated Summary of Key Legislation Related to Design and Implementation of the INRMP

Federal Public Laws and Executive Orders	
National Defense Authorization Act of 1989, Public Law (P.L.) 101-189; Volunteer Partnership Cost-Share Program	Amends two Acts and establishes volunteer and partnership programs for natural and cultural resources management on DoD lands.
Defense Appropriations Act of 1991, P.L. 101-511; Legacy Resource Management Program	Establishes the "Legacy Resource Management Program" for natural and cultural resources. Program emphasis is on inventory and stewardship responsibilities of biological, geophysical, cultural, and historic resources on DoD lands, including restoration of degraded or altered habitats.
EO 11514, *Protection and Enhancement of Environmental Quality*	Federal agencies shall initiate measures needed to direct their policies, plans, and programs to meet national environmental goals. They shall monitor, evaluate, and control agency activities to protect and enhance the quality of the environment.
EO 11593, *Protection and Enhancement of the Cultural Environment*	All federal agencies are required to locate, identify, and record all cultural resources. Cultural resources include sites of archaeological, historical, or architectural significance.
EO 11988, *Floodplain Management*	Provides direction regarding actions of federal agencies in floodplains, and requires permits from state, territory and federal review agencies for any construction within a 100-year floodplain and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for acquiring, managing and disposing of federal lands and facilities.
EO 11989, *Off-Road vehicles on Public Lands*	Installations permitting off-road vehicles to designate and mark specific areas/trails to minimize damage and conflicts, publish information including maps, and monitor the effects of their use. Installations may close areas if adverse effects on natural, cultural, or historic resources are observed.
EO 11990, *Protection of Wetlands*	Requires federal agencies to avoid undertaking or providing assistance for new construction in wetlands unless there is no practicable alternative, and all practicable measures to minimize harm to wetlands have been implemented and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities for (1) acquiring, managing, and disposing of federal lands and facilities; and (2) providing federally undertaken, financed, or assisted construction and improvements; and (3) conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.
EO 12088, *Federal Compliance with Pollution Control Standards*	This EO delegates responsibility to the head of each executive agency for ensuring all necessary actions are taken for the prevention, control, and abatement of environmental pollution. This order gives the U.S. Environmental Protection Agency (EPA) authority to conduct reviews and inspections to monitor federal facility compliance with pollution control standards. EO 13148 revoked Section 1-4 titled ''Pollution Control Plan.'' No other portions of this EO were revoked by EO 13148.
EO 12898, *Environmental Justice*	This EO requires certain federal agencies, including the DoD, to the greatest extent practicable permitted by law, to make environmental justice part of their missions by identifying and addressing disproportionately high and adverse health or environmental effects on minority and low-income populations.

Appendix A. Annotated Summary of Key Legislation Related to Design and Implementation of the INRMP

EO 13112, *Exotic and Invasive Species*	To prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause. March ARB is participating in the EDRR program as part of its effort to address invasive species issues pursuant to part 2(a)(2)(ii) of EO 13112.
EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*	The USFWS has the responsibility to administer, oversee, and enforce the conservation provisions of the Migratory Bird Treaty Act, which includes responsibility for population management (e.g., monitoring), habitat protection (e.g., acquisition, enhancement, and modification), international coordination, and regulations development and enforcement.
EO 13751, *Safeguarding the Nation for the Impacts of Invasive Species*	Amends EO 13112 by directing actions to continue coordinated federal prevention and control efforts related to invasive species. The amendment incorporates considerations of human and environmental health, climate change, technological innovation, and other emerging priorities into federal efforts to address invasive species, and strengthens coordinated, cost-efficient federal action.
United States Code	
Animal Damage Control Act (7 U.S.C. § 426-426b, 47 Stat. 1468)	Provides authority to the Secretary of Agriculture for investigation and control of mammalian predators, rodents, and birds. DoD installations may enter into cooperative agreements to conduct animal control projects.
Bald and Golden Eagle Protection Act of 1940, as amended; 16 U.S.C. § 668-668c	This law provides for the protection of the bald eagle (the national emblem) and the golden eagle by prohibiting, except under certain specified conditions, the taking, possession and commerce of such birds. The 1972 amendments increased penalties for violating provisions of the Act or regulations issued pursuant thereto and strengthened other enforcement measures. Rewards are provided for information leading to arrest and conviction for violation of the Act.
Clean Air Act, (42 U.S.C. § 7401–7671q, July 14, 1955, as amended)	This Act, as amended, is known as the Clean Air Act of 1970. The amendments made in 1970 established the core of the clean air program. The primary objective is to establish federal standards for air pollutants. It is designed to improve air quality in areas of the country which do not meet federal standards and to prevent significant deterioration in areas where air quality exceeds those standards.
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (Superfund) (26 U.S.C. § 4611–4682, P.L. 96-510, 94 Stat. 2797), as amended	Authorizes and administers a program to assess damage, respond to releases of hazardous substances, fund cleanup, establish clean-up standards, assign liability, and other efforts to address environmental contaminants. Installation Restoration Program guides cleanups at DoD installations.

Appendix A. Annotated Summary of Key Legislation Related to Design and Implementation of the INRMP

Endangered Species Act (ESA) of 1973, as amended; P.L. 93-205, 16 U.S.C. § 1531 et seq.	Protects threatened, endangered, and candidate species of fish, wildlife, and plants and their designated critical habitats. Under this law, no federal action is allowed to jeopardize the continued existence of an endangered or threatened species. The ESA requires consultation with the USFWS and the NOAA Fisheries (National Marine Fisheries Service) and the preparation of a biological evaluation or a biological assessment may be required when such species are present in an area affected by government activities.
Federal Aid in Wildlife Restoration Act of 1937 (16 U.S.C. § 669–669i, 50 Stat. 917) (Pittman-Robertson Act)	Provides federal aid to states and territories for management and restoration of wildlife. Fund derives from sports tax on arms and ammunition. Projects include acquisition of wildlife habitat, wildlife research surveys, development of access facilities, and hunter education.
Federal Environmental Pesticide Act of 1972	Requires installations to ensure pesticides are used only in accordance with their label registrations and restricted-use pesticides are applied only by certified applicators.
Federal Land Use Policy and Management Act, 43 U.S.C. § 1701–1782	Requires management of public lands to protect the quality of scientific, scenic, historical, ecological, environmental, and archaeological resources and values; as well as to preserve and protect certain lands in their natural condition for fish and wildlife habitat. This Act also requires consideration of commodity production such as timbering.
Federal Noxious Weed Act of 1974, 7 U.S.C. § 2801–2814	The Act provides for the control and management of non-indigenous weeds that injure or have the potential to injure the interests of agriculture and commerce, wildlife resources, or the public health.
Federal Water Pollution Control Act (Clean Water Act [CWA]), 33 U.S.C. § 1251–1387	The CWA is a comprehensive statute aimed at restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. Primary authority for the implementation and enforcement rests with the EPA.
Fish and Wildlife Conservation Act (16 U.S.C. § 2901–2911; 94 Stat. 1322, PL 96-366)	Installations encouraged to use their authority to conserve and promote conservation of nongame fish and wildlife in their habitats.
Fish and Wildlife Coordination Act (16 U.S.C. § 661 et seq.)	Directs installations to consult with the USFWS, or state or territorial agencies to ascertain means to protect fish and wildlife resources related to actions resulting in the control or structural modification of any natural stream or body of water. Includes provisions for mitigation and reporting.
Lacey Act of 1900 (16 U.S.C. § 701, 702, 32 Stat. 187, 32 Stat. 285)	Prohibits the importation of wild animals or birds or parts thereof, taken, possessed, or exported in violation of the laws of the country or territory of origin. Provides enforcement and penalties for violation of wildlife related Acts or regulations.
Leases: Non-excess Property of Military Departments, 10 U.S.C. § 2667, as amended	Authorizes DoD to lease to commercial enterprises federal land not currently needed for public use. Covers agricultural outleasing program.
Migratory Bird Treaty Act 16 U.S.C. § 703–712	The Act implements various treaties for the protection of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful without a valid permit.

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National Environmental Policy Act of 1969 (NEPA), as amended; P.L. 91-190, 42 U.S.C. § 4321 et seq.	Requires federal agencies to utilize a systematic approach when assessing environmental impacts of government activities. Establishes the use of environmental impact statements. NEPA proposes an interdisciplinary approach in a decision-making process designed to identify unacceptable or unnecessary impacts on the environment. The Council of Environmental Quality (CEQ) created Regulations for Implementing the National Environmental Policy Act [40 *Code of Federal Regulations* (CFR) Parts 1500–1508], which provide regulations applicable to and binding on all federal agencies for implementing the procedural provisions of NEPA, as amended.
National Historic Preservation Act, 16 U.S.C. § 470 et seq.	Requires federal agencies to take account of the effect of any federally assisted undertaking or licensing on any district, site, building, structure, or object included in or eligible for inclusion in the National Register of Historic Places (NRHP). Provides for the nomination, identification (through listing on the NRHP), and protection of historical and cultural properties of significance.
National Trails Systems Act (16 U.S.C. § 1241–1249)	Provides for the establishment of recreation and scenic trails.
National Wildlife Refuge Acts	Provides for establishment of National Wildlife Refuges through purchase, land transfer, donation, cooperative agreements, and other means.
National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. § 668dd–668ee)	Provides guidelines and instructions for the administration of Wildlife Refuges and other conservation areas.
Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. § 3001–13; 104 Stat. 3042), as amended	Established requirements for the treatment of Native American human remains and sacred or cultural objects found on federal lands. Includes requirements on inventory, and notification.
Rivers and Harbors Act of 1899 (33 U.S.C. § 401 et seq.)	Makes it unlawful for the USAF to conduct any work or activity in navigable waters of the United States without a federal permit. Installations should coordinate with the U.S. Army Corps of Engineers (USACE) to obtain permits for the discharge of refuse affecting navigable waters under National Pollutant Discharge Elimination System (NPDES) and should coordinate with the USFWS to review effects on fish and wildlife of work and activities to be undertaken as permitted by the USACE.
Sale of certain interests in land, 10 U.S.C. § 2665	Authorizes sale of forest products and reimbursement of the costs of management of forest resources.
Soil and Water Conservation Act (16 U.S.C. § 2001, P.L. 95-193)	Installations shall coordinate with the Secretary of Agriculture to appraise, on a continual basis, soil/water-related resources. Installations will develop and update a program for furthering the conservation, protection, and enhancement of these resources consistent with other federal and local programs.
Sikes Act (16 U.S.C. § 670a–670l, 74 Stat. 1052), as amended	Provides for the cooperation of DoD, the Departments of the Interior (USFWS), and the State Fish and Game Department in planning, developing, and maintaining fish and wildlife resources on a military installation. Requires development of an INRMP and public access to natural resources and allows collection of nominal hunting and fishing fees.

Appendix A. Annotated Summary of Key Legislation Related to Design and Implementation of the INRMP

DoD Policy, Directives, and Instructions	
DoD Instruction 4150.07 *DoD Pest Management Program* dated 26 December 2019	Implements policy, assigns responsibilities, and prescribes procedures for the DoD Integrated Pest Management Program.
DoD Instruction 4715.1E, *Environment, Safety, and Occupational Health (ESOH)*	Reissues DoD Directive 4715.1 and establishes policies on ESOH to sustain and improve the DoD mission and continues to authorize the Armed Forces Pest Management Board (AFPMB).
DoD Instruction (DoDI) 4715.03, *Natural Resources Conservation Program*	Implements policy, assigns responsibility, and prescribes procedures under DoDI 4715.1 for the integrated management of natural and cultural resources on property under DoD control.
DoD Directive 4715.21, *Climate Change Adaptation and Resilience*	Establishes policy and assigns responsibilities to provide the DoD with the resources necessary to assess and manage risks associated with the impacts of climate change.
Office of the Secretary of Defense (OSD) Policy Memorandum – 17 May 2005 – *Implementation of Sikes Act Improvement Amendments: Supplemental Guidance Concerning Leased Lands*	Provides supplemental guidance for implementing the requirements of the Sikes Act in a consistent manner throughout DoD. The guidance covers 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. INRMPs must address the resource management on all lands for which the subject installation has real property accountability, including leased lands. Installation commanders may require tenants to accept responsibility for performing appropriate natural resource management actions as a condition of their occupancy or use, but this does not preclude the requirement to address the natural resource management needs of these lands in the installation INRMP.
OSD Policy Memorandum – 1 November 2004 – *Implementation of Sikes Act Improvement Act Amendments: Supplemental Guidance Concerning INRMP Reviews*	Emphasizes implementing and improving the overall INRMP coordination process. Provides policy on scope of INRMP review, and public comment on INRMP review.
OSD Policy Memorandum – 10 October 2002 – *Implementation of Sikes Act Improvement Act: Updated Guidance*	Provides guidance for implementing the requirements of the Sikes Act in a consistent manner throughout DoD and replaces the 21 September 1998 guidance Implementation of the Sikes Act Improvement Amendments. Emphasizes implementing and improving the overall INRMP coordination process and focuses on coordinating with stakeholders, reporting requirements and metrics, budgeting for INRMP projects, using the INRMP as a substitute for critical habitat designation, supporting military training and testing needs, and facilitating the INRMP review process.
USAF Instructions and Directives	
32 CFR Part 989, *Environmental Impact Analysis Process (EIAP)*, and AFI 32-7061, *Environmental Impact Analysis Process*	Provides guidance and responsibilities in the EIAP for implementing INRMPs. Implementation of an INRMP constitutes a major federal action and therefore is subject to evaluation through an Environmental Assessment or an Environmental Impact Statement.
AFI 32-1015, *Integrated Installation Planning*	This publication establishes a comprehensive and integrated planning framework for development/redevelopment of Air Force installations.

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AFMAN 32-7003, *Environmental Conservation*	Implements AFPD 32-70, *Environmental Quality;* DoDI 4715.03, *Natural Resources Conservation Program*; and DoDI 7310.5, *Accounting for Sale of Forest Products*. It explains how to manage natural resources on USAF property in compliance with federal, state, territorial, and local standards.
AFMAN 32-7003, *Environmental Conservation*	This Manual implements AFPD 32-70, *Environmental Quality*, and DoDI 4710.1, *Archaeological and Historic Resources Management.* It explains how to manage cultural resources on USAF property in compliance with federal, state, territorial, and local standards.
AFI 32-10112 *Installation Geospatial Information and Services (IGI&S)*	This instruction implements DoDI 8130.01, Installation Geospatial Information and Services (IGI&S) by identifying the requirements to implement and maintain an Air Force Installation Geospatial Information and Services program and AFPD 32-10, *Installations and Facilities*.
AFPD 32-70, *Environmental Considerations in Air Force Programs and Activities*	Establishes policy to address the environmental considerations in all Air Force programs and activities using a management system framework. It also assigns duties and responsibilities, and establishes long-term goals and objectives, with specific programs in support of those objectives. It aims to create a culture where personnel incorporate environmental considerations into all we do, with environmental compliance, risk reduction, and continuous improvement serving as central tenets for sustainable Air Force operations.
Policy Memo for Implementation of Sikes Act Improvement Amendments, HQ USAF Environmental Office (USAF/ILEV) on January 29, 1999	Outlines the USAF interpretation and explanation of the Sikes Act and Improvement Act of 1997.

APPENDIX B:

USGS QUADRANGLE MAP

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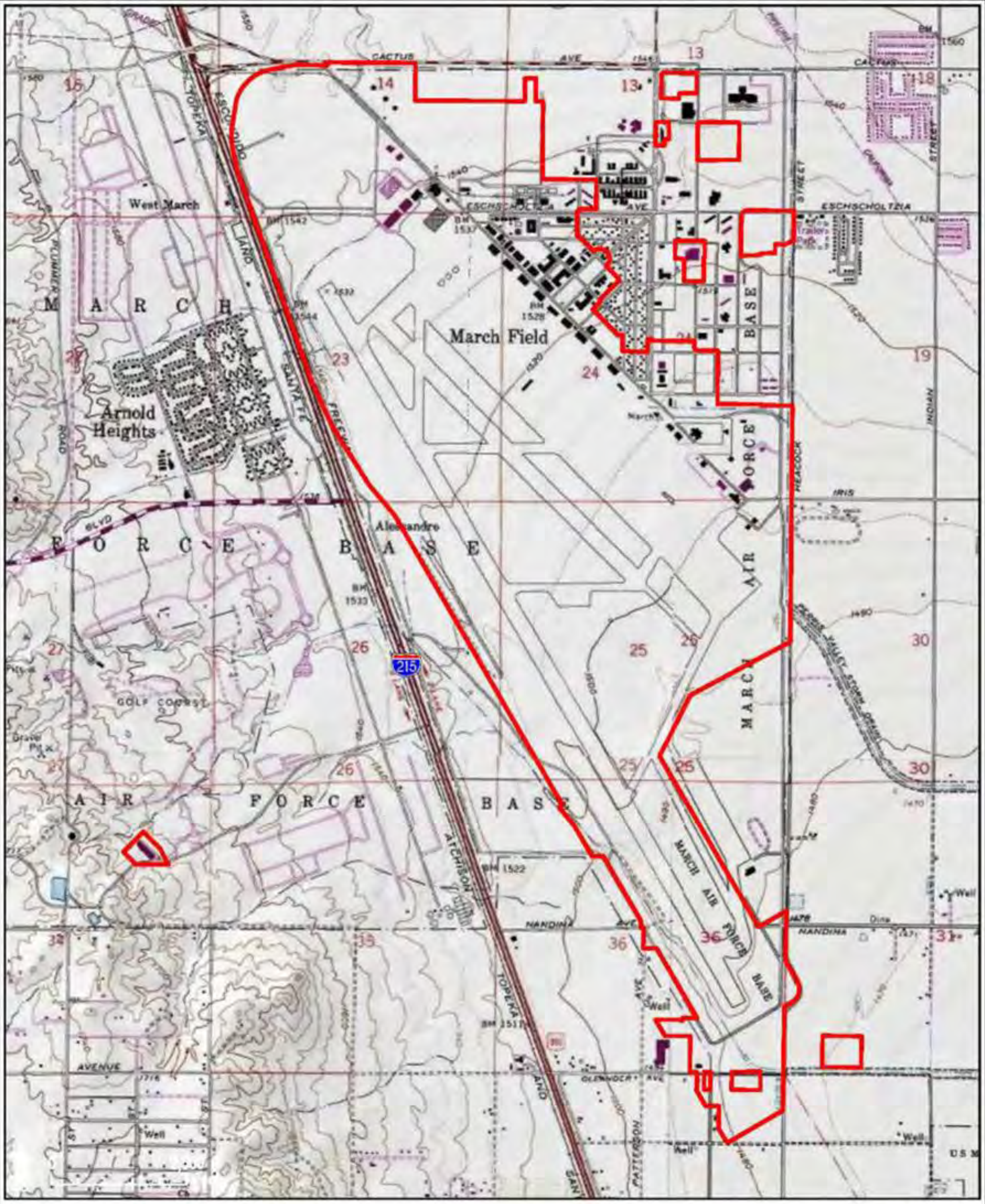

Legend

March ARB and Managed Air Force Lands

Appendix B
USGS 7.5 Minute Quadrangle Map of March ARB: Riverside East, Sunnymead, Steele Peak, and Perris
March Air Reserve Base
Integrated Natural Resources Management Plan
2021

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APPENDIX C:

PROPERTIES OF THE SOIL SERIES PRESENT ON MARCH ARB

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Appendix C. Properties of the Soil Series Present on March ARB

Name	Drainage and Permeability	Geographic Setting	Map Unit Name	Acreage
Exeter	Moderately well drained; very slow to medium runoff; moderately slow permeability above the duripan. Permeability of the duripan is very slow.	Exeter soils are on hummocky, undulating to gently rolling alluvial fans and stream terraces at elevations of 20 to 700 ft. Slopes range from 0 to 9 percent. The soils formed in alluvium mainly form granitic sources. In most areas the hummocky relief has been smoothed by leveling. The climate is dry subhumid with hot, dry summers and cool, moist winters. The mean annual precipitation is 7 to 20 inches. The average January temperature is 46°F; the average July temperature is 82°F; and the mean annual temperature is 62 to 65°F. The frost-free period is 250 to 300 days.	Exeter sandy loam, 0 to 2 percent slopes	221.2
			Exeter sandy loam, 2 to 8 percent slopes, eroded	12.6
			Exeter sandy loam, deep, 0 to 2 percent slopes	7.9
			Exeter sandy loam, deep, 2 to 8 percent slopes, eroded	10.4
Fallbrook	Well drained; medium to very rapid runoff; moderately slow permeability.	Fallbrook soils are gently rolling to very steep and are on round hills at elevations of 200 to 3,000 ft or as high as 3,500 ft on south facing slopes. They formed in material weathered from granite and closely related granitic rocks. Usually the rock is deeply weathered. Rock outcrops are common in some areas. The climate is dry subhumid with warm, dry summers and cool, moist winters. The mean annual precipitation is 12 to 18 inches. The average January temperature is 47 to 50°F; the average July temperature is about 70°F; and the average annual temperature is 60 to 66°F. The frost-free season is 250 to 320 days.	Fallbrook sandy loam, shallow, 5 to 8 percent slopes, eroded	0.6
			Fallbrook rocky sandy loam, shallow, 15 to 50 percent slopes, eroded	6.7
Greenfield	Well drained; slow to medium runoff; moderately rapid permeability.	Greenfield soils are on fans and terraces at elevations of 100 to 3,500 ft. Slopes range from 0 to 30 percent. The soils formed in moderately coarse and coarse textured alluvium or some wind deposited material derived from granitic and mixed sources. The climate is dry subhumid mesothermal with hot, dry summers and cool, moist winters. The mean annual precipitation is 9 to 20 inches. The mean annual temperature is 60 to 64°F; the average January temperature is 42 to 46°F; and the average July temperature is 76 to 80°F. The frost-free season averages about 200 to 325 days.	Greenfield sandy loam, 0 to 2 percent slopes	106.9

Appendix C. Properties of the Soil Series Present on March ARB

Name	Drainage and Permeability	Geographic Setting	Map Unit Name	Acreage
Hanford	Well drained; negligible to low runoff; moderately rapid permeability.	The Hanford soils are on stream bottoms, floodplains, and alluvial fans at elevations of 150 to 3,500 ft. Slopes range from 0 to 15 percent. The soils formed in deep, moderately coarse textured alluvium dominantly from granite and other quartz bearing rocks of similar texture. The climate is dry subhumid mesothermal with hot, dry summers and cool, moist winters. The mean annual precipitation is 9 to 20 inches. The mean annual temperature is 62 to 65°F; the mean January temperature is about 45°F; and the mean July temperature is about 81°F. The frost-free season is 200 to 280 days.	Hanford coarse sandy loam, 0 to 2 percent slopes	0.6
			Hanford fine sandy loam, 0 to 2 percent slopes	31.6
Monserate	Moderately well to well drained; slow to rapid runoff; permeability is moderately slow in the B2t horizon and very slow in the duripan.	The Monserate soils are on nearly level to moderately steep, old, dissected terraces and fans at elevations of 700 to 2,500 ft. The soils formed in alluvium derived principally from granitic rocks. The climate is dry subhumid mesothermal with long dry summers and mild moist winters. Mean annual precipitation is 12 to 18 inches. Average January temperature is 48 to 52°F, average July temperature is about 78°F, and the mean annual temperature is 62 to 65°F. The freeze-free season is 230 to 280 days.	Monserate sandy loam, 0 to 5 percent slopes	1510.1
Pachappa	General drainage in good. Surface runoff is very slow, and permeability is moderate. In places the soil is subject to occasional overflow and high water table. The soils appear to have developed under conditions of occasional high water table. Most areas are no longer so affected, but excess salts and exchangeable sodium are still present in places.	Nearly level to very gently undulating; the coarser textured types where exposed to wind are slightly hummocky and windblown. The Pachappa soils occur at elevations under 1,000 ft in a semiarid to dry subhumid mesothermal climate having a mean annual precipitation of 10 to 18 inches with hot, dry summers and cool, moist winters; an average January temperature of 45°F; an average July temperature of 80°F with a mean annual temperature of 61°F and an average frost free season of over 250 days.	Pachappa fine sandy loam, 0 to 2 percent slopes	18.3

Appendix C. Properties of the Soil Series Present on March ARB

Name	Drainage and Permeability	Geographic Setting	Map Unit Name	Acreage
Romona	Well-drained; slow to rapid runoff; moderately slow permeability.	The Ramona soils are nearly level to moderately steep. They are on terraces and fans at elevations of 250 to 3,500 ft. They formed in alluvium derived mostly from granitic and related rock sources. The climate is dry subhumid mesothermal with warm dry summers and cool moist winters. Mean annual precipitation is 10 to 20 inches. Average January temperature is 50°F, average July temperature is about 70°F, average annual temperature is 60 to 66°F. The frost-free season is 230 to 320 days.	Ramona sandy loam, 0 to 2 percent slopes, MLRA 19	226.3

Source: NRCS 2020a

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APPENDIX D:

JURISDICTIONAL WETLANDS AND WATERS OF THE U.S. FOR MARCH ARB

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REVISED FINAL

WETLAND HABITAT ASSESSMENT AND DELINEATION REPORT

MARCH AIR RESERVE BASE, CALIFORNIA

August 2010

Prepared for

Air Force Center for Environmental Excellence
Contract # FA8903-08-D-8779
Task Order # 0051
COR: Mr. Joseph Oliva, P.E. (AFCEE/ISA)
POC: Mr. Gerald Hass
March ARB

Prepared by

From Science to Solutions

Science Applications International Corporation
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Jessica Degner, Project Manager

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1.0 INTRODUCTION

SAIC conducted an assessment of potential wetlands and seasonally ponded areas on March Air Reserve Base (March ARB) in Riverside County, California to determine the boundaries of those features potentially subject to jurisdiction under Section 404 of the Clean Water Act (CWA) (jurisdictional wetlands and other Waters of the United States [U.S.]). The purpose of the survey and this report is to provide the necessary information to the U.S. Army Corps of Engineers (USACE) in support of a request for a formal jurisdictional determination of wetlands and other Waters of the U.S. within the survey area. This document has been updated to incorporate comments and observations from a site visit conducted on 23 March 2010 by representatives of the USACE, March ARB, and Science Applications International Corporation (SAIC). In general, wetland boundaries were not altered as a result of the site visit. However, isolated wetlands that require USACE jurisdictional determination were identified in the field and these updates have been incorporated into this report.

Plant names used in this report follow the Jepson Manual (Hickman 1993); a list of plant species identified during the wetlands survey is included in Appendix A. Appendix B includes copies of wetland delineation forms, and Appendix C includes representative photos taken during the surveys. Surveys were completed by SAIC scientists on 1, 2, and 3 April 2009.

All figures are included at the end of this report.

2.0 SITE DESCRIPTION

March ARB encompasses approximately 2,258 acres (914 hectares) in western Riverside County and is surrounded by the City of Riverside to the northwest, the City of Moreno Valley to the north and east, the City of Perris to the south, and unincorporated areas of Riverside County to the west (Figure 1). Interstate (I)-215 runs north-south along the western boundary of the Base cantonment area, which includes the runway, industrial and developed areas, and small areas of open space. March ARB has two active runways, oriented approximately northwest to southeast and generally parallel to I-215. The wetlands survey included grasslands in the vicinity of the runway and other undeveloped parcels within the cantonment area (Figure 2).

2.1 Climate

The average annual temperature at March ARB is 63ºF (17 ºC). The climate is characterized by hot summers and moderate winters, light annual rainfall, light to moderate winds, and humidity averaging 57 percent. July is the hottest month, with an average maximum temperature of 93ºF (34 ºC). January is the coolest month, with an average high of 63ºF (17 ºC) and an average low of 39ºF (4 ºC). Precipitation is markedly greater in the winter months, from November through April. The mean average rainfall at March ARB is about 10 inches (25 centimeters [cm]) per year (AFRC 2005). The surveys occurred during the spring, which is typically wettest part of the year. However, rainfall during the 2009 rainy season fell mostly between November 2008 and March 2009 and totaled about 11 inches (30 cm) (http://www.wunderground.com/).

2.2 Topography and Drainage Patterns

March ARB is situated on an alluvial plain in the San Jacinto watershed of the Santa Ana Basin, which is located at the northern end of the Perris Plain. The topography of the main cantonment area of March ARB is relatively flat, with a slope of less than one percent to the southeast. Elevations range from a height of approximately 1,521 feet (464 meters) above mean sea level (msl) in the northwestern portion of the Base to approximately 1,465 feet (447 meters) msl in the southeastern corner (AFRC 2005).

March ARB has natural and man-made surface drainages as well as an underground storm sewer system. In general, drainage travels in a southeasterly direction (Figure 3). All drainage from the main cantonment area discharges into Heacock Channel to the east and into Harley Knox Boulevard Channel to the south. Both of these channels flow into the Perris Valley Storm Drain and eventually into the San Jacinto River, approximately six miles southeast of the March ARB (AFRC 2005).

Drainage from March ARB is divided into two watersheds, Watershed 1 and Watershed 2 (Figure 3). Watershed 1 collects drainage from the runway and taxiway surfaces, vegetated areas surrounding the runway, and the March ARB Museum. Storm drainage within Watershed 1 is transported via unlined open channels, punctuated by occasional underground culverts lying under runways and roadways, and discharges to the Harley Knox Boulevard Channel at the southern boundary of the Base (Figure 3, Discharge Serial Number 003). The channels vary in size, ranging from shallow ditches to large canals (AFRC 2005). There is one main drainage channel along the west side of the runway which also receives water from outside the cantonment area, including Watershed 3 (WS-3 on Figure 3) and two large culverts under I-215 (Figure 5). The culverts under I-215 and the drainage in Watershed 3 appear to be associated with natural, intermittent drainage channels that flow from the east to west, and into the drainage channel on the west side of the runway and joins the Harley Knox Boulevard Channel.

Storm water drainage in Watershed 2 consists of a variety of channels; including shallow ditches, underground storm lines, street gutters, and lined and unlined channels and swales. All features discharge into Heacock Channel on the eastern boundary of the Base (Figure 3, Discharge Serial Numbers 001 and 002). Discharge Serial No. 002 primarily originates from within the main cantonment area with some contribution from areas outside of March ARB. Discharge Serial No. 001 also receives drainage from Watershed 2. Most of the drainage discharging to this outfall originates from the flight line and associated parking aprons and taxiways. Storm water travels primarily via underground storm drainage lines, which receive storm water from an extensive system of storm sewer inlets. All drainage flowing to Discharge Serial No. 001 is directed through a large oil/water separator prior to being discharged into Heacock Channel (AFRC 2005). In addition, there is a flood control channel along Cactus Avenue on the northern boundary of the Base within Watershed 2 (Figure 4). Although no storm drains or channels direct water to this feature, surface water from the immediate vicinity likely flows into the Cactus Avenue flood control channel.

2.3 Soils

Soils on the western portion of the Base, which includes the cantonment area, are Monserate-Arlington-Exeter association derived from granitic alluvium. Most of the survey area has Monserate soils which have a distinct surface layer of brown and yellowish-red sandy loam about

10 inches (25.4 cm) thick underlain by a reddish-brown sandy clay loam subsoil. The southern part of the survey area is a mosaic of soil types that are predominately Monserate and Exeter soils, which have a surface layer of brown sandy loam about 16 inches (40.6 cm) thick underlain by a layer of brown heavy loam subsoil. These soils have a surface layer of sandy loam to loam, are well drained, have fine to medium grain size, slope gently, and occur on alluvial fans, terraces, and valleys (AFRC 2005).

3.0 METHODS

3.1 Definitions

As defined under Section 404 of the CWA, wetlands are areas that are "inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Wetlands generally include swamps, marshes, bogs, and similar areas (U.S. Environmental Protection Agency [USEPA], 40 CFR 230.3 and USACE, 33 CFR 328.3).

Jurisdictional wetlands are a subset of Waters of the U.S. which include, in addition to wetlands as defined above, areas subject to the ebb and flow of the tide and areas that are within the limits of ordinary high water. Waters are currently described as any areas that might be considered waterways, either for commerce or recreation, even on a limited scale. Frequently, the term "wetlands and other Waters of the U.S." is used when describing areas under USACE jurisdiction.

3.2 Regulatory Setting

Federal wetlands and other Waters of the U.S. have legal protection in accordance with Section 404 of the CWA (33 U.S.C. Section 1344). The USACE generally requires the issuance of a permit, or coverage under an existing Nationwide Permit (NWP), for all actions that have the potential to degrade or modify these features.

Section 401 of the CWA (33 U.S.C. 1341) requires any applicant for a federal license or permit to conduct any activity that may result in a discharge of a pollutant into Waters of the U. S. to obtain certification from the State in which the discharge originates. As a result, proposed fill in jurisdictional features requires coordination with the appropriate Regional Water Quality Control Board (RWQCB) that administers Section 401 and provides certification. The RWQCB also plays a role in review of water quality and wetland issues, including avoidance and minimization of impacts. Section 401 certification is required prior to issuance of a Section 404 permit.

Wetlands may also be subject to jurisdiction of the California Department of Fish and Game (CDFG) in accordance with CDFG Code Sections 1600-1607. The CDFG regulates activities that will alter the flow, bed, channel, or bank of streams and lakes by issuing Streambed Alteration Agreements. Wetlands under jurisdiction of the USACE may or may not be included in the area covered by a Streambed Alteration Agreement obtained from the CDFG.

3.3 Sampling Protocol

SAIC biologists conducted surveys on 1, 2, and 3 April 2009, to determine the boundaries of likely Section 404 jurisdictional wetlands and other Waters of the U.S. The survey area included open fields in the cantonment area, including areas around the airfield and support facilities. The survey area was divided into numbered sections for the purpose of conducting the 2009 wetland delineation surveys (Figures 4-12). A previous wetland delineation survey was conducted by SAIC in an area north and west of the western runway on 24 and 25 August 2006 (identified as Area 13). Area 13 was revisited during the 2009 survey to confirm the survey results and to revise wetland forms to comply with the Arid West Supplement (USACE 2008).

Surveys were conducted by walking meandering transects throughout the survey area. Areas that had hydrological features such as changes in topography, surface sediments, wetland vegetation, or defined flow channels (including locations of culverts) were identified as potential wetlands or other Waters of the U.S. Wetland delineations using the USACE Manual (Environmental Laboratory 1987) and the Arid West Regional Supplement (USACE 2008) were performed at locations containing potential wetlands. This approach requires sites to meet a set of criteria for each of three parameters (wetland soils, hydrology, and vegetation) to be considered a jurisdictional wetland. Wetland data sheets are provided in Appendix B. Positive indicators of wetland conditions in all three parameters are normally present in wetlands, as defined below.

- *Hydrophytic vegetation* is defined as macrophytic vegetation that is adapted to, and occurs in, areas where soils are frequently or permanently saturated of sufficient duration to exert a controlling influence on the plant species present. Plant species adjacent to the delineation pit were identified and included following the "50/20 rule," meaning that plant species in each layer of the vegetation (herb, shrub, tree, and vine) were included in order of abundance until at least 50 percent of the total vegetation cover was accounted for, and all species with at least 20 percent relative cover were included. Plants are assigned a Wetland Indicator Status (WIS) based on their frequency of occurrence in wetland habitats, following the 1988 National List of Plant Species that Occur in Wetlands (available at http://www.nwi.fws.gov/bha/). The categories are defined as:
    - UPL (Obligate Upland) = Occur in wetlands in another region, but almost always occur in uplands in the region specified;
    - FAC (Facultative) = Equally likely to occur in wetlands or nonwetlands (estimated probability 34-66 percent);
    - FACW (Facultative Wetland) = Usually occur in wetlands (estimated probability 67-99 percent), but occasionally found in nonwetlands;
    - FACU (Facultative Upland) = Usually occur in nonwetlands (estimated probability 67-99 percent), but occasionally found in wetlands (estimated probability 1-33 percent);
    - OBL (Obligate Wetland) = Occur almost always (estimated probability >99 percent) under natural conditions in wetlands; and
    - NI (No Indicator) = Information insufficient to determine wetland indicator status.

    An (*) following a regional indicator identifies tentative assignments based on limited information from which to determine the indicator status. A (+) or (-) is used with the Facultative Indicator categories to more specifically define the regional frequency of occurrence in wetlands. A (+) indicates plants more frequently found in wetlands and a (-) indicates plants less frequently found in wetlands. Species without a WIS are not included on the National List of Plant Species that Occur in Wetlands.

The hydrophytic vegetation parameter is met when at least one of the following tests is fulfilled:

- The prevalent vegetation (more than 50 percent of the dominant plant species) is typically adapted to areas having wetland hydrology and hydric soil conditions and rated OBL, FACW, or FAC;
- The prevalence index, which is a value determined by accounting for the relative cover and wetland indicator status and ranges from one (only OBL species present) to five (only UPL species present), is less than or equal to three; and
- Vegetation has morphological adaptations to growing in inundated or saturated conditions. A list of plant species observed during the wetland delineation surveys is provided in Appendix A along with their WIS.

- *Hydric soils*, which are indicative of wetlands, are defined as soils that are sufficiently ponded, flooded, or saturated throughout the growing season to produce anaerobic conditions that favor the growth of hydrophytic vegetation (USACE 1987). Hydric soils are identified based on observable properties that result from prolonged saturated-anaerobic conditions. To assess whether hydric soil was present at each sample point, a soil pit was excavated to a depth of 12 inches (30.5 cm) (when possible), and soil attributes (including color, mottling, texture, grain size, structure, streaking, and degree of saturation) were recorded on the delineation forms. Soil colors were assessed using Munsell Soil Color Charts (Munsell Color 1992). Other than direct observation of saturated conditions, low chroma (dark) soil colors are among the most conspicuous indicators of hydric soils.
- *Wetland hydrology* refers to inundation and/or saturation of the soil by flooding or a shallow water table for a prolonged period during the growing season, such that the character of the soil and vegetation are substantially different from areas that do not experience inundation/saturation in this manner. The identification of wetland hydrology follows the USACE Manual (Environmental Laboratory 1987). Geomorphic features associated with flooding (e.g., channels and shorelines) and sediment deposits are among the indicators of wetland hydrology.

Waters of the U.S. were determined with consideration of recent guidance from USEPA and USACE on implementing the Supreme Court's decision in the consolidated cases Rapanos v. United States and Carabell v. United States (USEPA and USACE 2007). Under that decision, the USACE will assert jurisdiction over Traditional Navigable Waters (TNWs), wetlands adjacent to TNWs, relatively permanent non-navigable tributaries to TNWs that flow at least seasonally (typically defined as supporting continuous flow for at least three months), and wetlands that abut such tributaries. The USACE may also assert jurisdiction over tributaries to features that do not have seasonal flow only if there is a specific nexus for doing so, such as if the flow characteristics and functions of the tributary significantly affect the chemical, physical, and biological integrity of downstream navigable waters, or if adjacent wetlands are present. The USACE will not assert jurisdiction over swales and erosional features.

Wetland boundaries and limits of other Waters of the U.S. were mapped electronically using a Trimble Geo XT2005 sub-meter Differential Global Positioning System (GPS) unit and plotted in the field on ortho-rectified aerial photos.

4.0 RESULTS

Wetland features identified during surveys included several drainage channels, swales, and small areas that supported wetland vegetation and/or other indications of seasonal ponding (including those within or adjacent to drainages and swales isolated features) (Table 4-1). Associated wetland features are depicted in Figures 4 through 12 and are described in greater detail below.

Table 4-1. Areas Surveyed

Survey Area	Acreage	Notes	Figure Number
1	36.7	No wetland or drainage features present.	5 & 6
2	36.8	No wetland features, several storm drains and one shallow drainage swale observed; no wetland vegetation or indications of seasonal ponding in drainage.	5 & 6
3	22.8	Shallow drainage swale and storm drains observed in this area. Wetland vegetation and indications of seasonal ponding (#28, Pit 10) present in small portion of swale.	7 & 11
4	97.4	Shallow drainage swale with no obvious outlet observed in this area. Wetland vegetation and indications of seasonal ponding (#27, Pit 11) present in small portion of swale	6 & 7
5A	105.5	Several areas of wetland vegetation and indications of seasonal ponding observed (#18 – 25); one vernal pool (#25, Pit 12). Also, small drainage swales, two appear to the result of past grading (based on topography nearby landscape features).	4
5B	7.2	No wetland features or drainage swales observed with the exception of the northern boundary where the Cactus Avenue flood control channel is partly within the Base boundary (#26).	4
6A	5.6	No wetland or drainage features present.	11
6B	2.3	No wetland or drainage features present.	11
6C	2.3	No wetland or drainage features present.	11
6D	4.8	No wetland or drainage features present.	11
6E	3.9	No wetland or drainage features present.	11
6F, 6G	17.0	Shallow drainage swale and culverts present, no wetland vegetation or indications of seasonal ponding in drainage. One small area with wetland vegetation, shallow surface water, and saturated soils observed adjacent to a fence (#29, Pit 6).	11 & 12
7	130.5	Shallow drainage swale with culverts present, no wetland vegetation or indications of seasonal ponding in drainage.	7, 8 & 12
8	19.1	Shallow drainage swale with culverts present, no wetland vegetation or indications of seasonal ponding in drainage.	12
9	12.0	One small area of wetland vegetation with indication of seasonal ponding observed (#30).	12
10	42.9	Shallow drainage swale and culverts present, one small area of wetland vegetation with indication of seasonal ponding observed at south end of drainage (#31, Pit 8).	9 & 10
11A	0.9	Long, shallow depression adjacent to pavement with wetland vegetation and indications of seasonal ponding (#32, Pit 7). No obvious outlet for surface water in this area.	9 & 10
11B	0.8	Shallow drainage swale, continues from adjacent parcel, and empties through a culvert into Heacock Channel, which is outside the survey boundary.	10
11C	17.7	Shallow drainage swale with no wetland vegetation or indications of seasonal ponding.	10
11D	2.3	No wetlands or drainage features present.	10
12	13.6	No wetlands or drainage features present.	10
Total: 582 acres surveyed in 2009.			
13	370 acres	Area surveyed in 2006 and revisited in 2009. Large drainage present and seasonal ponds #1 – 17. Wetland pits #1-5, 9.	5, 6, 7, 8, 9 & 10

4.1 Seasonally Ponded Areas

Vegetation Indicators: All potential wetlands found during the surveys were small depressions that supported wetland vegetation and had indications of seasonal and/or temporary ponding (seasonal ponds). Some of the ponds were located within or adjacent to drainages and swales, and some were isolated (a sub-set of the isolated ponds had characteristics typical of vernal pools). One wetland plant species commonly observed was dwarf woolly marbles (*Psilocarphus brevissimus* var. *brevissimus*), a small, annual herbaceous plant that is found in seasonal/vernal pool habitats in western Riverside County (CDFG 1998). Dwarf woolly marbles is an obligate wetland plant species, meaning it is almost always found in wetland habitats in this region. Other wetland plant species observed in the seasonally ponded areas included popcorn flower (*Plagiobothrys canescens* and *P. bracteateus*), sand spurrey (*Spergularia marina*), annual hair grass (*Deschampsia danthonioides*), sand pygmy weed (*Crassula connata*), and plantain species (*Plantago coronopus, P. erecta,* and *P. lanceolata*). Appendix A includes a list of the plant species found during surveys and their WIS.

Soil Indicators: Soils were difficult to assess because they were very hard and compacted, probably a result of both soil type and long-term seasonal mowing. For all wetland features, the soil pit was typically dug to four to 6 inches (15.2 cm) before hitting an impervious layer. A pit was also dug in an area that supported only upland grasses and had cracked surface soils (Pit #13). Pit #13 was also difficult to dig, although the cracks in the surface were much deeper than those observed in the seasonal pond areas. All soils on the site were sandy loams, 10 YR, with a value of four and chroma of three or four, which does not meet the criterion for hydric soils. However, seasonally ponded, depressional wetlands may lack hydric soil indicators due to limited saturation depth, saline conditions, or other factors. Most are perched systems, with water ponding above a restrictive soil layer, such as a hardpan or clay layer that is at or near the surface. Also, soils with reddish parent material, such as those on March ARB, may not exhibit the low chroma indicator typical of wetland soils (USACE 2008a).

The wetlands on March ARB typically were found within concave surface features (e.g., depression or swale) on a level or nearly level area (e.g., zero- to three-percent slope), and had reddish soils with an impervious layer close to the soil surface. In accordance with the Arid West Regional Supplement (USACE 2008), the soils are considered hydric if there are also positive indicators for both wetland vegetation and hydrology. The upland sampling point (Pit #13) also had reddish soils (7.5 YR) and was difficult to dig due to hard soils near the surface. However, for this point, only upland vegetation was present and there were no positive indicators for wetland hydrology.

Hydrology Indicators: All but one of the small seasonally ponded areas were dry at the time of the surveys, although surface water was observed in the northeastern portion of March ARB within the Heacock Channel (eastern boundary) and Cactus Street (northern boundary) flood control channels. The most common positive indicator of wetland hydrology was soil surface cracks with sediment deposits and some areas supported a biotic or salt crust on the soil surface. Water poured into the soil pits did not readily absorb (photo 1, Appendix C), with the exception of the upland pit (#13).

Description of Seasonally Ponded Areas: None of the drainages or seasonal ponds on March ARB are identified on the National Wetlands Inventory (NWI). According to the Cowardin Classification System (Cowardin et al 1979), which is used by the NWI, the seasonally ponded areas would be classified as palustrine (P), unconsolidated bottom primarily sand (UB2), with emergent

(EM), non-persistent or annual vegetation (EM2), and a non-tidal, seasonally flooded/saturated water regime (E): i.e. PUB2EM2-E. The wetlands within the flood control channels are similar, although these have more persistent emergent vegetation (EM1) and are seasonally flooded (PUB2EM1-C). Several of the isolated seasonal ponds had characteristics typical of vernal pools (i.e., vegetation zones in rings and a hard layer within the top few inches of the soil surface).

Figures 4 through 12 depict the potential wetlands mapped during the surveys (referred to as ponds in this report), which were assigned a number (#1 though 32). Features that supported similar characteristics and occurred in the same survey area are grouped in the discussion below.

#1 to 7 (Area 13) – Seasonal Ponds Associated with Main Drainage Feature (within or adjacent to potential Waters of the U.S, likely jurisdictional): Several areas of potential seasonal ponding were observed at the southern end of the main drainage channel in Area 13 (Figure 10). In the areas where the channel had a defined bed and banks, Bermuda grass was present at the base of the channel. In the areas where there was no discernable channel, small depressions where sediment had collected were present but most lacked vegetation or supported sparse upland vegetation common in the adjacent grasslands. However, dwarf woolly marbles was observed in a narrow band between the unvegetated depressions and the upland grasses, especially where the drainage was more like a series of small swales rather than defined bed and banks (Photo 2, Appendix C). In 2006, a wetland delineation was conducted at two of these areas including the lowest point in the drainage channel, just north of the bridge at the southern boundary of the study area (#1, Pit 2) and in an area where dwarf wooly marbles was the dominant plant species (#4, Pit 1). An additional wetland delineation pit was conducted in 2009 (#1, Pit 9). The depressions that support wooly marbles (#1 to 7) have positive indicators for both hydric vegetation and wetland hydrology and because they are distinct concave depressions, met the criteria for determination of wetlands (Photo 3, Appendix C). These features are within the main drainage channel in Area 13, which may also be considered a Water of the U. S. (refer to Section 4.2, Drainages below).

#8, 9, 11, 12, 13, and 14 (Area 13) – Seasonal Ponds/Vernal Pools: Six features were identified during the surveys in 2006, and confirmed in 2009, where dwarf woolly marbles was the dominant plant species (Figures 7 and 9). Other indications that these areas could support seasonal ponding included cracked soil surface (an indication of repeated saturation and drying), and topography (slight depressions in the open grassland). All of these areas were similar in appearance and plant species composition and a wetland delineation sampling was performed at Pond #14 (Pit 5, Appendix B; Photo 4, Appendix C). Wooly marbles was the dominant plant species with Bermuda grass, a facultative wetland plant species, and bur clover (*Medicago polymorpha*), a common weedy upland herbaceous plant. The soils included a shallow layer of sediment over a hard layer that could not be dug with a shovel. The presence of surface flow patterns or the settling of sediment in relative low areas on the surface indicates these sites periodically support surface water. Additionally, the presence of wooly marbles, an obligate wetland plant species, indicates that surface water or saturated conditions are present at these locations for sufficient time to support this vernal pool plant species. Although these features met all three criteria for determination of wetlands, Ponds 11, 12, 13, and 14 are isolated wetlands with no connection to the drainages or swales in the vicinity and, under the current USACE guidance, are not likely to be jurisdictional wetlands (USACE concurrence is required and jurisdictional determination has been requested for wetlands 11, 12, 13 and 14).Ponds 8 and 9 are separate from the main drainage channel, but are close enough that it is likely they have surface water connection to the main drainage channel during periods of high rainfall or surface water runoff, and would therefore meet the definition of USACE jurisdictional wetlands.

#10 (Area 13) – Seasonal Pond in Drainage, Disturbed (likely jurisdictional): Site #10 is within the main drainage channel in a large concrete and asphalt swale, where the hard surface is cracked and broken and sediment and debris have collected (Figure 9). In 2006, wetland plant species were observed in this area, including umbrella sedge (*Cyperus eragrostis*) and cocklebur (*Xanthium strumarium*), and two narrow-leaved willow (*Salix exigua*) saplings growing in the drainage at the edge of the wetland vegetation. The same observations were made during the 2009 surveys. It is likely the flow of water is interrupted and water collects at this location because of the breaks in the hard lining surface. A wetland sample point was conducted at this location (Pit 3, Appendix B) and soils indicted a sediment layer (about 4 inches [10.2 cm] thick) over a layer of gravel and sandy loam. The soil pit was dug to a depth of 10 inches (25.4 cm) because the sandy loam layer was impenetrable, similar to the other seasonally ponded areas. Since this site occurs within a depression in the channel, supports wetland vegetation, and has positive indicators of wetland hydrology, it met the criteria for determination of wetlands.

#15 and 16 (Area 13) – Wetland Vegetation in Concrete-lined Channel (not likely jurisdictional): Sediment has collected in portions of the concrete-lined canal and a few small patches of wetland vegetation, primarily curly dock (*Rumex crispis*) and umbrella sedge, are present (Figures 5 and 6). These patches of wetland vegetation are growing in sediment deposits on top of the concrete and were not considered wetlands (Photo 5, Appendix C).

#17 (Area 13) – Man-made Basin (not likely jurisdictional): This is an open basin with three concrete walls and a gravel base located in the northeastern part of Area 13 (Figure 5; Photo 6, Appendix C). This feature receives water from a culvert under the road and directs it to the main drainage channel north of the runway. Sediment has collected on the gravel surface, and a dense stand of Bermuda grass (*Cynodon dactylon*), a non-native perennial grass species, has established in the basin. As Bermuda grass is a facultative wetland indicator species, this area was further investigated for determination of wetlands (Pit 4, Appendix B). The presence of sediments in the basin is a positive indicator of wetland hydrology and the surface soils also met the criterion for wetland soils. However, the surface soils were 4 inches (10.2 cm) deep over a gravel base and subsoils could not be determined. This site was considered a problem area because it is a man-made feature. Although it partially meets the criteria for determination of wetlands (based on surface soils), it is a man-made structure for the purpose of water conveyance and it is expected the gravel layer, beneath the sediment, is permeable. If the structure was removed, it is not likely the wetland vegetation, hydrology, and soils would persist. This man-made feature is not likely a jurisdictional wetland.

#18, 19, 20, 21, 22, 23, 24, and 25 (Area 5a) – Seasonal Ponds/Vernal Pools, (isolated, not likely jurisdictional): Eight distinct features were identified during the surveys in 2009, where dwarf woolly marbles, popcorn flower, sand spurrey, or annual hair grass (or a combination of these species) was the dominant plant species (Figure 4). Other indications that these areas could support seasonal ponding included cracked soil surface (an indication of repeated saturation and drying), and topography (slight depressions in the open grassland). All of these areas were similar in appearance and plant species composition; a wetland sample pit was excavated at Pond #25 (Pit 12, Appendix B). Wooly marbles was the dominant plant species with sand spurrey, annual hair grass, and popcorn flower also present. All four of these species are obligate wetland plants. The surface soils were cracked with a hard layer at 4 inches (10.2 cm) depth that could not be dug with a shovel. Pond #25 was an isolated wetland with distinct bands of vegetation, characteristic of a natural vernal pool (Photo 7, Appendix C). The other seasonal ponds are located adjacent to paved or dirt roads and may be the result of grading or mowing (Photo 8, Appendix C). These sites appear to be supported by runoff from these roads. Based on the local topography, some of these seasonal ponds may have surface water connection to each other during periods of high rainfall or runoff; however, none of the ponds in this area appear connected to any of the drainages or swales in the vicinity. Therefore, under the current USACE guidance, these areas are not likely to be jurisdictional wetlands (USACE concurrence is required, but has not been requested for these wetlands).

#26 (Area 5B) – Cactus Street Flood Control Channel (likely jurisdictional): The Cactus Street Flood Control Channel (Figure 4) is mostly outside the northern boundary of the Base and was previously identified as a USACE jurisdictional wetland in the March ARB Integrated Natural Resources Management Plan (INRMP) (AFRC 2005). A small portion of the wetland is located within the Base at the northeastern corner of Area 5B (Photo 9, Appendix C). Outside the installation boundary fence, the channel has surface water and supports cattails (*Typha* sp.), sedges (*Carex* sp.), and other perennial, emergent plant species. Inside the installation boundary fence, soils are saturated and support Bermuda grass and English plantain. The Cactus Street Flood Control Channel was previously identified as a jurisdictional wetland (AFRC 2005) since the area within the installation boundary fence is connected to the channel, all of the wetlands associated with the Cactus Street Flood Control Channel are likely jurisdictional.

#27 (Area 4), #28 (Area 3), and # 31 (Area 10) – Seasonal Ponds/Vernal Pools in Drainage Swales (likely jurisdictional): All of these features had similar characteristics and were located within shallow drainage swales in open grassy areas surrounding the runways. These areas are frequently mowed to keep the vegetation down for fire control and safety. All four of these features were shallow concave depressions within the swale that supported wetland vegetation. The other portions of the swales were vegetated with upland grasses and forbs. Wetland delineations were conducted at most of these features to determine hydric vegetation and soils. Pond #27 (Figure 6; Pit 11, Appendix B) was disturbed with many tire tracks, indicting the area had been saturated in the past. The vegetation at this site was dominated by cut-leaf plantain (*Plantago coronopus*) and sand spurrey. Within the swale outside the mapped wetland boundary, the soils were not disturbed and the swale was dominated by upland annual grasses. Pond #28 (Figures 7 and 10; Pit 10, Appendix B) was a very shallow swale parallel to a paved area dominated by sand spurrey. The depression was slight and the wetland vegetation and cracked soils surface was primarily used to map this feature. Outside the wetland boundary, the swale was only slightly visible on the ground surface but there were several storm drains within the feature. Pond #31 (Figure 9; Pit 8, Appendix B) was within a distinct, shallow concave depression in a long drainage swale; storm drains were also present in the swale. This area was dominated by goldfields (*Lasthenia californica*), sand spurrey, and annual hair grass, and met the criterion for hydric vegetation. Outside the wetland boundary, the swale was dominated by upland grasses and forbs and was fairly indistinct from the adjacent grassland. All of the wetlands described above are associated with drainage swales that are connected to the March ARB storm drain system, which joins the Perris Valley Storm Drain and discharges into the San Jacinto River. Therefore, these areas are likely jurisdictional wetlands.

#29 (Area 6G) – Seasonal Pond (not likely jurisdictional): Pond #29 (Pit 6, Appendix B) was a small, isolated depression with shallow surface water adjacent to a fence and a paved area (Figure 11). The vegetation consisted of upland grasses and forbs similar to the adjacent grassland. There was algae and dead vegetation on the water surface which had dried along the edges of the ponded water. At 6 inches (15.2 cm) soil depth, there was a gravel layer that was typical of road base material. The presence of the upland vegetation may be an indication of recent and periodic flooding due to runoff from the adjacent pavement. The paved area is located in the southeastern corner of the airfield and is used for equipment parking and maintenance. Although the ponded water was in a depression, the area had no positive indicators for wetland vegetation or hydric soils and does not meet the criteria for determination of wetlands.

#30 (Area 9) – Seasonal Pond (not likely jurisdictional): This is a very small, isolated depression that did not support wetland vegetation but did have a cracked soil surface with a layer of salt crust indicating periodic surface water (Figure 12). There were several scattered burrows in and adjacent to the depression area. This pond did not appear to be associated with any drainage swale or other drainage feature and is likely an isolated depression. Since no wetland vegetation was present, this site was not considered a wetland and is not likely jurisdictional.

#32 (Area 11A) – Seasonal Pond/Vernal Pool (isolated, not likely jurisdictional): Pond #32 (Pit 7, Appendix B) is located within a long swale adjacent and parallel to a paved area (Figure 9). This site did not appear to be part of a drainage system; however, the site included an isolated swale area that may be supported by runoff from the paved road and adjacent grasslands. No storm drains were observed in the swale area. The wetland was dominated by wooly marbles, an obligate wetland plant species, and upland grasses and forbs. The isolated feature met all three criteria for determination of wetlands, but because it is isolated, would not likely be jurisdictional.

4.2 Drainage Features

With the exception of a large drainage in Area 13, all of the drainages within the survey area are shallow swales vegetated with common upland grassland species.

Area 13 Drainage (likely Waters of the U.S.): Area 13 has a large drainage channel that is located north of the runways and parallels the western boundary of the air strip (Figures 5 through 10). The drainage channel within Area 13 collects water from the runway and taxiway surfaces, unpaved areas surrounding the runway, the March ARB Air Museum, and offsite sources, before discharging collected water into the Perris Valley Storm Drain located on the southeastern corner of March ARB (AFRC 2005). The drainage channel consists of segments of unlined open channels and swales, concrete canals and swales, and underground culverts. Some parts of the drainage were well defined, with a narrow bed and banks, and some areas were shallow and swale like with limited features. The drainage could not be discerned in the field along some segments, because it was underground in culverts or swales were shallow and indistinct.

The Area 13 drainage begins as an open concrete basin (Photo 6, Appendix C) located on the northeastern side of the runways and flows east to west for about 4,000 feet (122 meters) (there is a culvert at this basin and some of the runoff into the basin may flow into the storm drain system that is within the cantonment area). On the northwestern runway boundary, the main drainage channel turns south and flows north to south, parallel to the runway. North of the runway, the drainage channel is open and very shallow with intermittent areas of concrete, asphalt, and grassy swales. Where I-215 abuts the installation boundary fence, the drainage channel turns and flows into a steep concrete canal. Two large culverts are located under I-215, which appear to originate in natural, intermittent drainages east of I-215, empty into the concrete channel (Photo 5, Appendix C). The canal ends at a large culvert and the drainage channel disappears (i.e., is within an underground culvert).

The main drainage channel is visible again south of the March ARB Air Museum (Figure 9). At this location there is a large open concrete and asphalt swale and channel located on the western portion of the survey area that appears to convey offsite flows into the Area 13 drainage. Sections of the concrete swale are cracked and broken, and debris and sediment have collected in these areas. South of the concrete swale, the drainage is a shallow un-lined channel. At some locations, a defined channel was observed and mapped in the field and in other areas, there was no discernable channel and the drainage consisted of a series of small depressions in the grassland in line with the expected direction of flow (Areas #1 to #7 on Figure 7; Photo 3, Appendix C).

The water eventually flows under a bridge through the drainage channel located south of Area 13 along the western boundary of Area 12, which is identified as the Harley Knox Boulevard Channel in Figure 3 (Appendix C : Photo 1, depicts the bridge at the south end of Area 13, and Photo 10 is the Harley Knox Boulevard Channel). At this location, the channel is earth-lined for about 900 feet (275 meters), with distinct bed and banks and small areas with surface water. The edges of these ponded areas supported wooly marbles and sand spurrey on the lower banks that graded into upland annual species on the mid to upper banks. To the south, the channel was lined with concrete and eventually discharges into the Perris Valley Storm Drain at the southern portion of March ARB. Although portions of the site drainage are not well-defined, the drainage may be a jurisdictional Waters of the U.S. because it supports seasonal flood flows from natural sources, includes man-made as well as natural hydrological features (culverts, concrete canals, and swales), and eventually empties into the San Jacinto River.

Area 5A Drainage Features (not likely jurisdictional): Two isolated drainage features were identified in Area 5A (Figure 4). These features appeared to be swales, but after further investigation were determined to be isolated features because they did not have any observable inlet or outlet, and collected water only from the surrounding grassland. The dominant vegetation within these areas were upland grasses, and although very small, scattered patches of woolly marble, popcorn flower, and annual hair grass were also present (Photo 11, Appendix C). These areas were mapped based on the distribution of the patches of wetland plant species. Both features were located adjacent to dirt roads and other fill features, and may have been formed by past grading activities (visible in Figure 4). Due to the prevalence of upland vegetation, these areas did not meet the criteria for determination of wetlands and because they appear to be isolated (do not discharge into other drainage swales or drainage features in the vicinity), are not likely jurisdictional.

Other Drainage Swales (likely jurisdictional): Several shallow drainage swales are present within the open grasslands on March ARB (Figures 4 to 12). Outside of the wetland areas and drainage features already discussed, these drainage swales are vegetated with upland grasses and are periodically mowed (Photo 12, Appendix C). All of these features are man-made and include or end at culverts and storm drains designed to collect and convey water from adjacent areas (Photos 13 and 14, Appendix C). All of the storm water collected in these swales originates from runoff within the March ARB and empties into the offsite storm drain system, which eventually joins the Perris Valley Storm Drain, discharging into the San Jacinto River. Therefore these drainages are likely jurisdictional wetlands.

5.0 DISCUSSION

As stated in Section 1.0, the purpose of this survey and report is to provide information to the USACE in support of a request for a formal jurisdictional determination. A Base-wide survey was conducted in 1991 to identify and delineate jurisdictional wetlands. The USACE identified and delineated approximately 3.3 acres (1.34 hectares) of jurisdictional wetlands in the northeastern portion of March ARB along the Heacock Channel (eastern boundary) and Cactus Street (northern boundary) flood control channels. Small vernal pools were also identified in the Perris Valley Storm Drain near the perimeter roads at the southern end of the runways (AFRC 2005). These areas were not revisited for this survey, although it was noted that both areas still supported surface water and wetland vegetation.

It is expected that the main drainage in Area 13 would be considered a Water of the U.S. because there is connection (significant nexus) with outside water sources and the storm drain system is connected with the San Jacinto River, which is likely considered a TNW. The other shallow drainage swales (with the exception of the two drainage swales in Area 5A [Figure 4]) may also be considered jurisdictional Waters of the U.S. because although they do not originate from natural sources, they are connected to the same storm water system. Wetlands within or adjacent to jurisdictional Waters of the U.S. would also fall under the jurisdiction of the USACE. Isolated wetlands, such as vernal pools, are currently exempt from USACE jurisdiction, although this determination may be changed with introduction of the Clean Water Restoration Act (CWRA) in April 2009 (http://online.nwf.org/site/PageNavigator/Campaign%20Sites/CWRA_MainPage).

Table 5-1 provides a summary of the wetland features including the size and types of feature and likely jurisdictional status. The table is for summary purposes only; it is the responsibility of the USACE to determine jurisdiction of the wetlands on March ARB.

Table 5-1. Likely[1] Jurisdictional Determination (JD) for Wetlands Identified on March ARB (2009 Surveys)

Number	Area		Description	Likely JD[2]
	ft²	*m²*		
1	2485	227	Series of seasonal ponds in main drainage in Area 13.	Yes
2	487	45	Seasonal pond in main drainage in Area 13.	Yes
3	2609	242	Seasonal pond in main drainage in Area 13.	Yes
4	2453	227	Seasonal pond in main drainage in Area 13.	Yes
5	1633	151	Seasonal pond in main drainage in Area 13.	Yes
6	2450	227	Seasonal pond in main drainage in Area 13.	Yes
7	6897	640	Isolated seasonal pond/vernal pool in Area 13.	No
8	1132	105	Isolated seasonal pond/vernal pool in Area 13.	Yes
9	2721	252	Isolated seasonal pond/vernal pool in Area 13.	Yes
10	164	15	Disturbed seasonal pond in main drainage in Area 13.	Yes
11	1341	124	Isolated seasonal pond/vernal pool in Area 13.	No
12	3946	366	Isolated seasonal pond/vernal pool in Area 13.	No
13	2557	237	Isolated seasonal pond/vernal pool in Area 13.	No
14	2755	255	Isolated seasonal pond/vernal pool in Area 13.	No
15 & 16	348	342	Wetland vegetation in sediment in concrete-line channel in Area 13.	No
17	5689	528	Man-made basin.	No
18	141	13	Isolated seasonal pond/vernal pool in Area 5A.	No
19	136	12	Isolated seasonal pond/vernal pool in Area 5A.	No
20	5685	527	Isolated seasonal pond/vernal pool in Area 5A.	No
21	2423	224	Isolated seasonal pond/vernal pool in Area 5A.	No

Table 5-1. Likely[1] Jurisdictional Determination (JD) for Wetlands identified on March ARB (2009 Surveys) (continued)

Number	Area		Description	Likely JD[2]
	ft²	*m²*		
22	740	68	Isolated seasonal pond/vernal pool in Area 5A.	No
23	1971	183	Isolated seasonal pond/vernal pool in Area 5A.	No
24	6754	627	Isolated seasonal pond/vernal pool in Area 5A.	No
25	2998	278	Isolated seasonal pond/vernal pool in Area 5A.	No
26	1999	185	Cactus Street Flood Control Channel.	Yes
27	1053	97	Seasonal pond in drainage swale in Area 4.	Yes
28	2220	206	Seasonal pond in drainage swale in Area 3.	Yes
29	427	39	Isolated seasonal pond (non-wetland) in Area 6G.	No
30	342	31	Isolated seasonal pond (non-wetland) in Area 9.	No
31	1814	168	Seasonal pond in drainage swale in Area 10.	Yes
32	4942	458	Isolated seasonal pond/vernal pool in 11A.	No

Notes:
1. Likely Jurisdictional Determination (JD) provided for information only; it is the responsibility of the USACE to determine jurisdiction of wetlands and Waters of the U.S.
2. Currently, the USACE does not have jurisdiction over isolated wetlands; however, this determination may be changed by the CWRA.

The largest wetland feature is Pond #7, which is associated with the main drainage in Area 13 (Figure 10) and is 7,000 square feet (s.f.) (650 square meters [m^2]) or 0.16 acre (0.06 hectare). The smallest wetland feature is Pond #19, which is an isolated seasonal pond in Area 5A (Figure 4), and is 136 s.f. (12 m^2) or 0.003 acre (0.001 hectare).

Several of the isolated wetlands on March ARB have characteristics typical of vernal pools. Vernal pools are unique seasonal wetlands that form shallow depressions underlain by a hard substrate near the surface that restricts percolation of water. Vernal pools typically support a unique assemblage of plants and animals specifically adapted to these habitats, including several threatened and endangered species. Direct precipitation is typically the primary water source for vernal pools, but runoff and groundwater in seasonally perched water tables are also important sources of water. Depending on the size of the depression, the amount of rainfall and climate conditions following rainfall, a pool will remain inundated for a week to several months before drying. Because of the drastic seasonal change from wet to dry, only plants and animals specifically suited to seasonal wetland conditions occupy this habitat type. As noted above, vernal pools typically support a large number of regional and localized endemic species including many federally and state listed rare, threatened, and endangered species such as vernal pool fairy shrimp (CDFG 1998). Fairy shrimp have been previously identified on March ARB and surveys were conducted in 1995 to determine the species of fairy shrimp located on the Base. The surveys were determined to be inconclusive, although the USFWS proposed critical habitat for one species of fairy shrimp on the Base based on the survey findings (AFRC 2005).

Additional surveys for vernal pool fairy shrimp were conducted in 2006 and 2007 within Area 13 based on the results of the 2006 wetland delineation survey. The vernal pool fairy shrimp study looked at 10 seasonally ponded areas that had the greatest potential to support fairy shrimp species. The isolated shallow depressions that supported dwarf wooly marbles, a plant species associated with vernal pools and flats, were identified as having the highest potential to support the vernal pool fairy shrimp (Areas #8, 9, 11, 12, 13, 14; Figures 7 and 9). In addition, Areas #1, 4, 7 and 10 (Figures 9 and 10) within the main drainage channel in Area 13 were also investigated, as these appeared to be the deepest areas with the potential to hold surface water for the longest period of time. A dry season survey was conducted in 2006 and a wet season survey was conducted in 2008. No federally listed fairy shrimp were found in any of the pools during these surveys. The data and results from these surveys were submitted to USFWS in separate letter reports (SAIC 2008a,b).

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7.0 ACRONYMS

AFRC	Air Force Reserve Command
CDFG	California Department of Fish and Game
cm	centimeters
DGPS	Differential Global Positioning System
GPS	Global Positioning System
I	Interstate
INRMP	Integrated Natural Resources Management Plan
JD	Jurisdictional Determination
March ARB	March Air Reserve Base
m^2	square meters
msl	mean sea level
NWI	National Wetlands Inventory
NWP	Nationwide Permit
RWQCB	Regional Water Quality Control Board
s.f.	square feet
TNWs	Traditional Navigable Waters
U.S.	United States
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WIS	Wetland Indicator Status

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FIGURES

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No Scale

Source: March AFRC 2005

Figure 1. March ARB Location Map

Figure 2: Wetland Survey Area on March ARB in 2006 and 2009

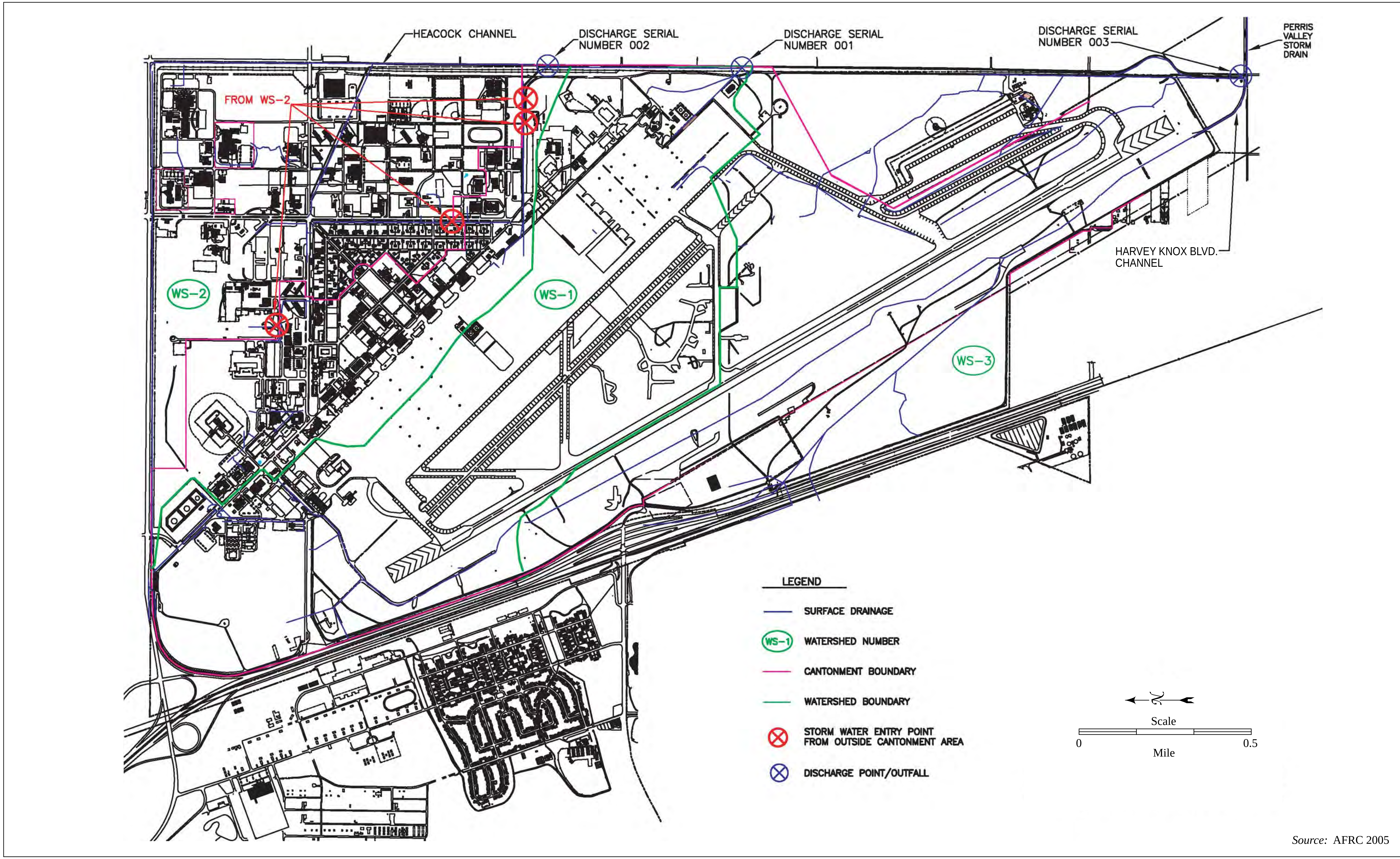

Figure 3. March ARB Facility Map

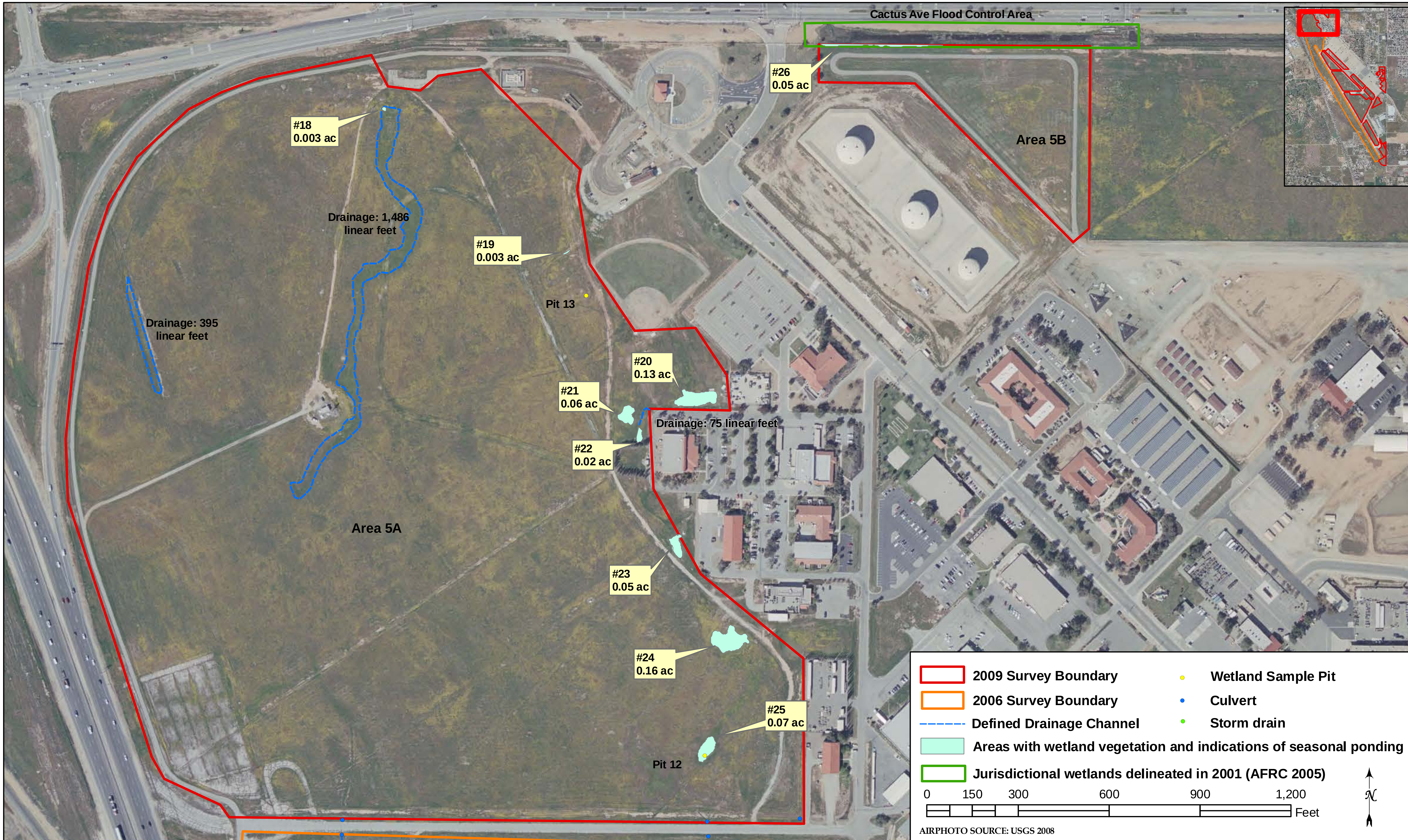

Figure 4. Drainage Channels and Seasonal Ponded Areas on March ARB (2006 and 2009 surveys)

Figure 5. Drainage Channels and Seasonal Ponded Areas on March ARB (2006 and 2009 surveys)

Figure 6. Drainage Channels and Seasonal Ponded Areas on March ARB (2006 and 2009 surveys)

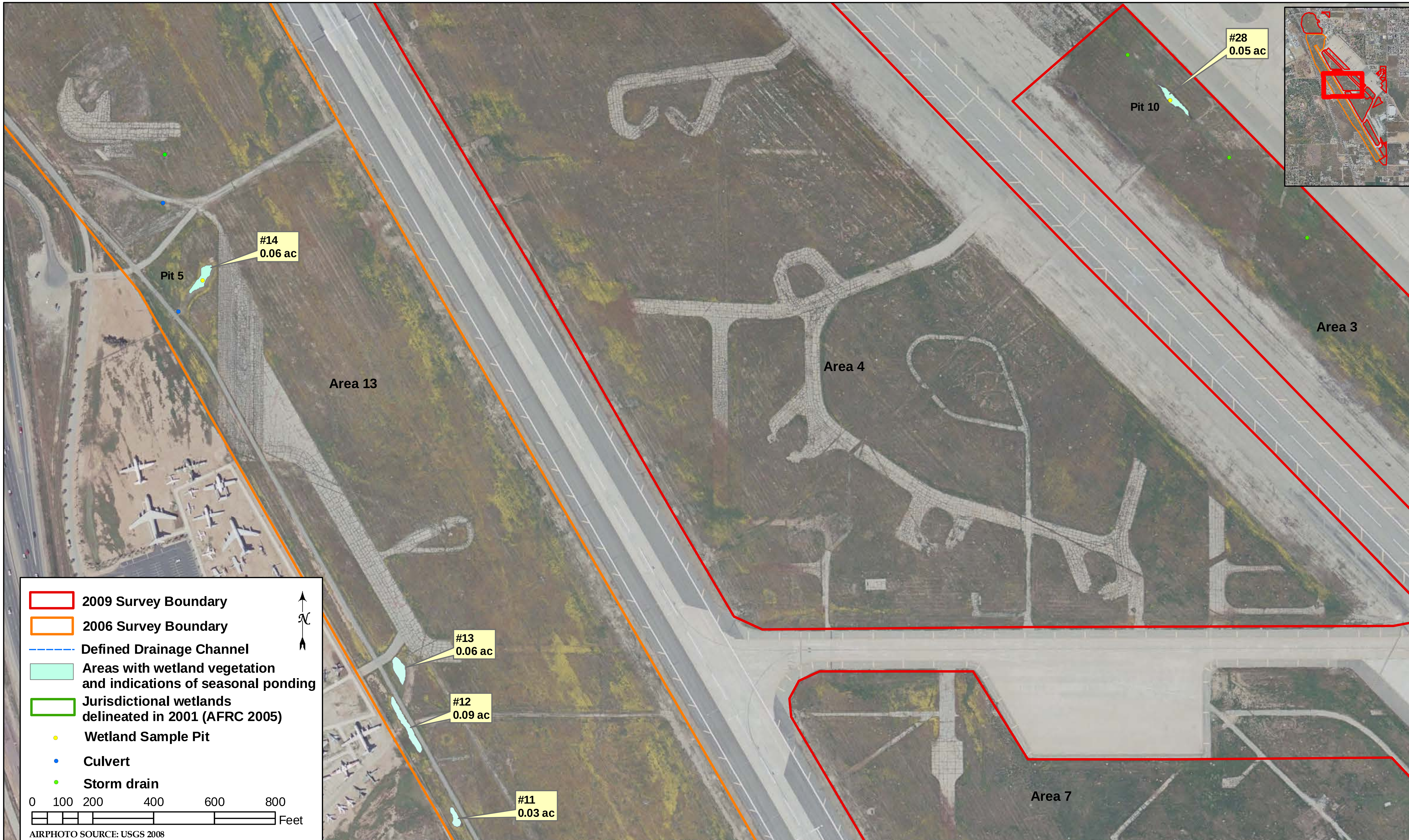

Figure 7. Drainage Channels and Seasonal Ponded Areas on March ARB (2006 and 2009 surveys)

Figure 8. Drainage Channels and Seasonal Ponded Areas on March ARB (2006 and 2009 surveys)

Figure 9. Drainage Channels and Seasonal Ponded Areas on March ARB (2006 and 2009 surveys)

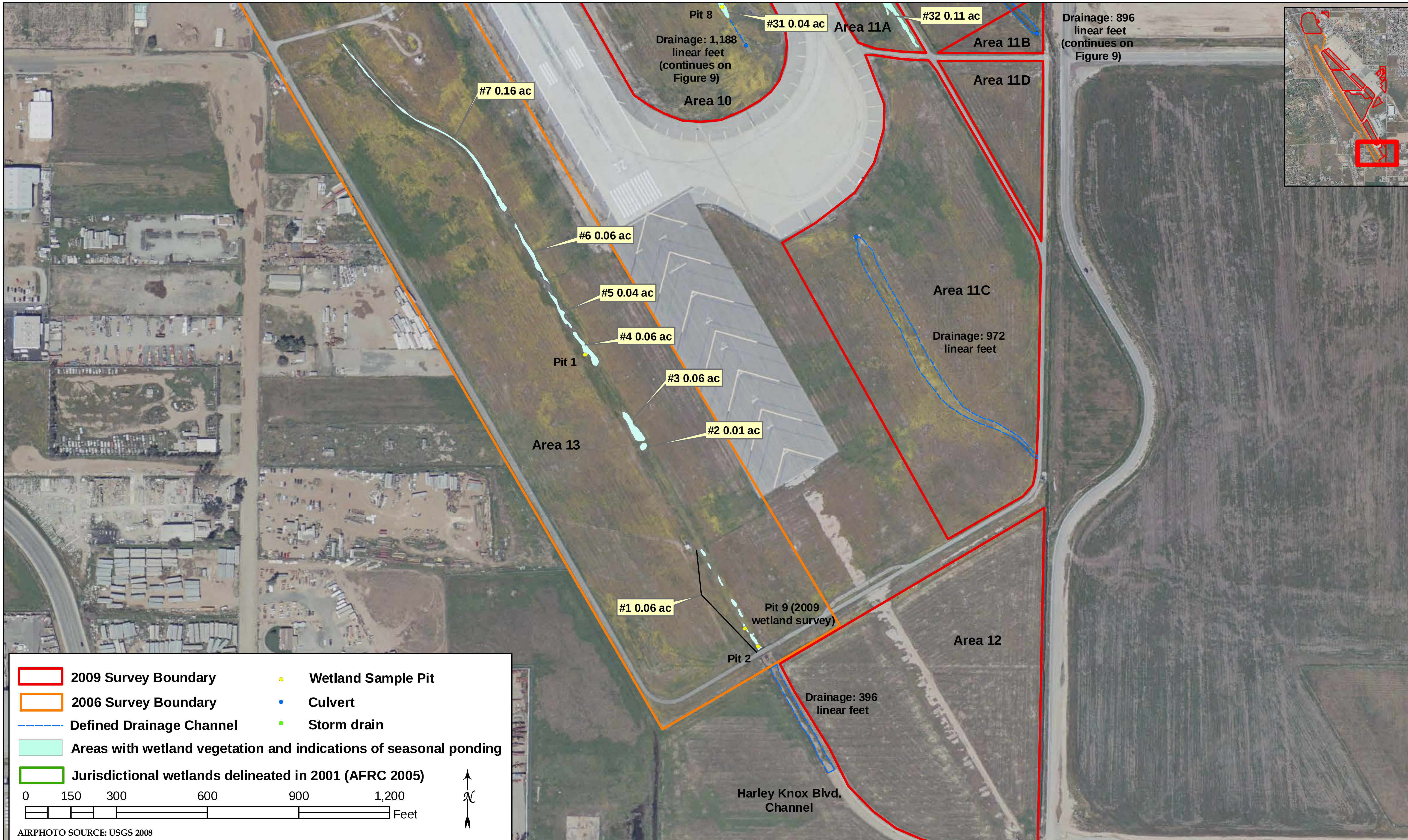

Figure 10. Drainage Channels and Seasonal Ponded Areas on March ARB (2006 and 2009 surveys)

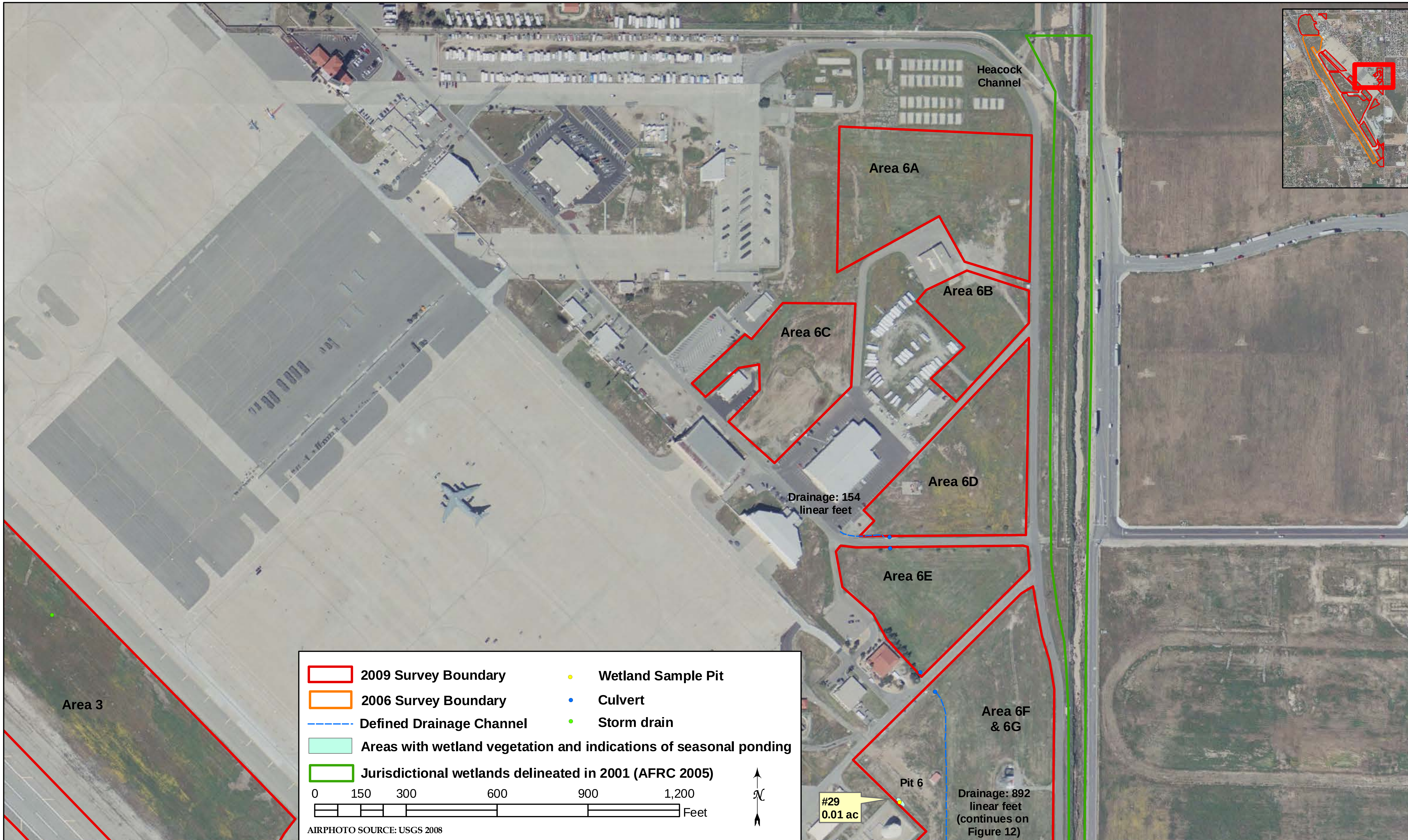

Figure 11. Drainage Channels and Seasonal Ponded Areas on March ARB (2006 and 2009 surveys)

Figure 12. Drainage Channels and Seasonal Ponded Areas on March ARB (2006 and 2009 surveys)

APPENDIX A

Plant List

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Table A-1. Plants Observed during Surveys on March ARB

Species Name	Common Name	Wetland Indicator Status
Amaranthus albus	Amaranth	FACU
Ambrosia psilostachya	Western ragweed	FAC
Amsinkia menziesii	Fiddleneck	
Astragalus trichopodus var. trichopodus	Loco weed	
Atriplex semibaccata	Australian saltbush	FAC
Avena barbata	Slender wild oat	
Brassica nigra	Black mustard	NI
Bromus diandrus	Ripgut brome	
Bromus hordaceus	Soft chess	
Bromus madritensis ssp. *rubens*	Red brome	
Centaurea melitensis	Tocalote	
Chamaesyce albomarginata	Rattlesnake weed (spurge)	
Chenopodium album	Pigweed	
Convolvulus arvensis	Field bindweed	
Cotula australis	Australian waterbuttons	NI
Crassula connata (=C. erecta)	Sand pygmy weed	FAC
Cryptantha intermedia	Common forget-me-not	
Cynodon dactylon	Bermuda grass	FAC
Cyperus eragrostis	Umbrella sedge	FAC+
Deschampsia danthonioides	Annual hair grass	FACW
Eleocharis palustris	Creeping spikerush	OBL
Eremocarpus setigerus	Dove weed	
Ericameria palmeri	Palmer's goldenbush	
Eriogonum fasciculatum	Leafy buckwheat	
Erodium botrys	Long-beaked filaree	
Erodium cicutarium	Red-stemmed filaree	
Erodium moschatum	White-stemmed filaree	
Heliotropium curassavicum	Heliotrope	OBL
Hemizonia kellogii	Tarweed	
Hemizonia paniculata	San Diego tarweed	
Heterotheca grandiflora	Telegraph weed	
Hirshfeldia incana	Perennial mustard	
Hordeum marinum	Mediterranean barley	
Isocoma menziesii	Goldenbush	
Lasthenia californica	Goldfields	
Lepidium nitidum	Shining pepperweed	
Leptochloa uninervia	Mexican sprangletop	FACW
Lessingia filaginifoloia	California aster	
Lolium multiflorum	Italian ryegrass	FAC*
Lotus purshianus	Spanish lotus	
Lupinus nanus	Lupine	
Lythrum hyssopifolia	Hyssop loosestrife	FACW
Malva parviflora	Cheeseweed	
Medicago polymorpha	Bur clover	
Nassella pulchra	Purple needlegrass	
Paspalum dilatatum	Dallis grass	FAC

Table A-1. Plants Observed during Surveys on March ARB (continued)

Species Name	Common Name	Wetland Indicator Status
Plagiobothrys canescens	Popcorn flower	FAC
Plagiobothrys bracteateus	Bracted popcorn flower	OBL
Plantago coronopus	Cut-leaf plantain	FAC
Plantago erecta	California plantain	
Plantago lanceolata	English plantain	FAC-
Psolocarphus brevissimus var. brevissimus	Dwarf wooly marbles	OBL
Rumex crispus	Curly dock	FACW-
Salix exigua	Narrow-leaved willow	OBL
Salsola tragus	Russian thistle	
Sisymbrium irio	London rocket	
Solanum elaeagnifolium	White horse-nettle	
Spergularia marina	Sand spurrey	OBL
Trifolium hirtum	Rose clover	
Xanthium strumarium	Cocklebur	FAC+

Notes:
Scientific names follow the Jepson Manual (Hickman, 1993).
Wetland Indicator Status (Environmental Laboratory, 1988):
FAC (Facultative) = Equally likely to occur in wetlands or nonwetlands (estimated probability 34-66%).
FACW (Facultative Wetland) = Usually occur in wetlands (estimated probability 67-99%), but occasionally found in nonwetlands.
FACU (Facultative Upland) = Usually occur in nonwetlands (estimated probability 67-99%), but occasionally found in wetlands (estimated probability 1-33%).
OBL (Obligate Wetland)= Occur almost always (estimated probability >99%) under natural conditions in wetlands.
* = following a regional Indicator identifies tentative assignments based on limited information from which to determine the indicator status.
+ or - = used with the Facultative Indicator categories to more specifically define the regional frequency of occurrence in wetlands. A (+) indicates plants more frequently found in wetlands and a (-) indicates plants less frequently found in wetlands.

APPENDIX B

Wetland Delineation Forms

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WETLAND DETERMINATION DATA FORM – Arid West Region

Rv 3-Apr.-09

Project/Site: MARCH ARB City/County: Riverside Co Sampling Date: 8-24-06

Applicant/Owner: DoD State: CA Sampling Point: PIT 1

Investigator(s): L. Brown, C. von der Heide Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Alluvial Plain Local relief (concave, convex, none): drainage Slope (%): 0

Subregion (LRR): LRR C Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: Monserate NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.)

Are Vegetation X, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil X, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ______	**Is the Sampled Area within a Wetland?** Yes X No ______
Hydric Soil Present?	Yes X No ______	
Wetland Hydrology Present?	Yes X No ______	

Remarks: Although no soil indictors, hydric vegetation and wetland hydrology present in area with concave surface & hard layer near surface – seasonal pond / vernal pool.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: Ø)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: Ø)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3')			
1. PSILOCARPHUS BREV	10	YES	OBL
2. HORDEUM MARINUM	5	YES	—
3. PLANTAGO LANCEOLATA	5	YES	FAC-
4.			
5.			
6.			
7.			
8.			
= Total Cover	20		
Woody Vine Stratum (Plot size: Ø)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 80 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ______ (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	10	x 1 = 10
FACW species		x 2 =
FAC species	5	x 3 = 15
FACU species		x 4 =
UPL species	5	x 5 = 25
Column Totals:	20 (A)	(B)

Prevalence Index = B/A = 25/25 = 1

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

X Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ______

Remarks: Vegetation is frequently mowed. Psilocarphus is obligate wetland species. N

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR/3	100	n/a				loamy clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- X Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: hard, clayey
Depth (inches): 4"

Hydric Soil Present? Yes X No ___

Remarks: below 4" soil is very hard, cracked soil surface. Soils are somewhat reddish, [illegible] feature with [illegible] layer near surface – seasonal pond / vernal pool.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- X Salt Crust (B11) (slight)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ✓ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Depression in isolated part of drainage.

Rv-3 Apr 09

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: March ARB City/County: Riverside Co Sampling Date: 8-24-06

Applicant/Owner: DoD State: CA Sampling Point: PIT 2

Investigator(s): L. Brown, C. van der Heide Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Alluvial Plain Local relief (concave, convex, none): drainage Slope (%): ______

Subregion (LRR): LRR C Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: Monserate NWI classification: N/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ______ (If no, explain in Remarks.)

Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______

Are Vegetation ______, Soil X, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ______ No X	Is the Sampled Area within a Wetland? Yes ______ No X
Hydric Soil Present?	Yes X No ______	
Wetland Hydrology Present?	Yes X No ______	

Remarks: Depression in drainage, although no positive soil indicators, area supports seasonal ponding and has hard layer near surface – however, vegetation does not meet criteria so area is not a wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ∅)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: ∅)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3')			
1. Brassica nigra	5	Y	NI
2. Amaranthus albus	41	Y	FACU
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover	5		
Woody Vine Stratum (Plot size: ∅)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 95 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	______	x 1 =	______
FACW species	______	x 2 =	______
FAC species	______	x 3 =	______
FACU species	______	x 4 =	______
UPL species	______	x 5 =	______
Column Totals:	______ (A)		______ (B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ______ No 0

Remarks: drainage ditch, lowest point [illegible] where vegetation is still present.

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 4/3							loamy clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: hard Soil
Depth (inches): 6"

Hydric Soil Present? Yes X No ___

Remarks: drainage under bridge (road) has deep banks at this location - hard layer at 6" with sediments on surface

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ✓ Sediment Deposits (B2) (**Riverine**)
- ✓ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Standing water present in rainy season (per base personnel).

WETLAND DETERMINATION DATA FORM – Arid West Region

Rev. 3-Apr-09

Project/Site: March ARB City/County: Riverside Co Sampling Date: 8-24-06

Applicant/Owner: DoD State: CA Sampling Point: Pit 3

Investigator(s): L. Brown, C. Von der Heide Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Alluvial Plain Local relief (concave, convex, none): drainage Slope (%): 0

Subregion (LRR): LRR C Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: Monserate NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No X

Are Vegetation ____, Soil X, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes X No ____	
Wetland Hydrology Present?	Yes X No ____	

Remarks: Area is in drainage near man-made swale. Water appears to collect and sediments (sand with clayey surface)

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: Ø)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: Ø)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3')			
1. Cyperus eragrostis	10	Y	FACW
2. Xanthium strumarium	5	Y	FAC+
3. Hordeum marinum	2	N	—
4.			
5.			
6.			
7.			
8.			
= Total Cover	15		
Woody Vine Stratum (Plot size: Ø)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 75 % Cover of Biotic Crust 10

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- X Dominance Test is >50%
- __ Prevalence Index is ≤3.0[1]
- __ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- __ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: Mowed grassland, small willow is close to plot. Willow is also cut during mowing. Dried algal or vegetation mat on surface.

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/3							Clayey
4-7	10YR 4/3							sandy gravel
7-10	10YR 4/3							sandy loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ✓ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic. ✓✓

Restrictive Layer (if present):
Type: hard Soil
Depth (inches): 10"

Hydric Soil Present? Yes X No ___

Remarks: Area is a depression (concave) in a drainage. Soils are somewhat disturbed over hard layer with ~~surface~~ surface layer of sediments.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- X Salt Crust (B11)
- X Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ✓ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Rev: 3-Apr-09

Project/Site: MARCH ARB City/County: Riverside Co Sampling Date: 8-25-06

Applicant/Owner: DoD State: CA Sampling Point: PIT 4

Investigator(s): L. Brown, C. van der Heide Section, Township, Range: ______

Landform (hillslope, terrace, etc.): drainage - artificial Local relief (concave, convex, none): flat Slope (%): 0%

Subregion (LRR): LRR C Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: Monserate NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation X, Soil X, or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes ___ No X

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___ No X	Is the Sampled Area within a Wetland? Yes ___ No X
Hydric Soil Present?	Yes ___ No X	
Wetland Hydrology Present?	Yes X No ___	

Remarks: man-made basin w/ concrete sides at culvert. Area appears to collect runoff from paved areas. Basin is shaded most of the day (from buildings).

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 0)	Absolute % Cover	Dominant Species?	Indicator Status
1.			FAC
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 0)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: ___)			
1. CYNODON DACTYLON	70	Y	FAC
2. PASPALUM DILATUM	5	N	FAC
3. HORDEUM MARINUM	20	Y	—
4.			
5.			
6.			
7.			
8.			
= Total Cover	95		
Woody Vine Stratum (Plot size: 0)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 5 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: Vegetation is periodically cut.

Sampling Point: 4

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/1							Silt
4-8	N/A							Sand and gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: GRAVEL
Depth (inches): 4"

Hydric Soil Present? Yes ___ No X

Remarks: Artificial surface area collects sediments. Surface was moist at time of survey, but not saturated. Unable to get color on gravel layer [illegible] dig below it.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ✓ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Surface was moist, but not saturated. Sediment on surface indicates surface water present at times. Sediment likely remains saturated, although gravel layer would be permeable

Rev. 3-APR-09

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: MARCH ARB City/County: RIVERSIDE Co Sampling Date: 8-25-06

Applicant/Owner: DoD State: CA Sampling Point: PIT 5

Investigator(s): L. Brown, C. van der HEIDE Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ALLUVIAN PLAIN Local relief (concave, convex, none): CONCAVE Slope (%): 1%

Subregion (LRR): LRR C Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: Monserato NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation X, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil X, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	Is the Sampled Area within a Wetland? Yes X No ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks: Vernal pool, not connected to drainage.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 0)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 0)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3')			
1. PSILOCARPHUS BREV	30	Y	OBL
2. MEDICAGO POLY	5	Y	NI
3. HORDEUM MARINUM	3	N	FAC
4. LASTHENIA	2	N	—
5.			
6.			
7.			
8.			
= Total Cover	40		
Woody Vine Stratum (Plot size: 0)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 20 % Cover of Biotic Crust 40

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	30	x 1 = 30
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species	5	x 5 = 25
Column Totals:	35 (A)	(B)

Prevalence Index = B/A = 65/35 = 1.86

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks: Mowed grassland.

SOIL

Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
1-3	10YR 4/3							Sandy loam
3-5	5YR 4/4							loamy sand

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- X Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: hard soil

Depth (inches): 5"

Hydric Soil Present? Yes X No ___

Remarks: lower layer appears [illegible] very red and obvious layers - unable to dig through hard layer below 5"

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- X Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- X Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: dried algal mat or vegetation on soil surface.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: March ARB City/County: Riverside Co Sampling Date: Apr 1, 2009

Applicant/Owner: DoD State: CA Sampling Point: 6

Investigator(s): L. Brown, C. van der Heide Section, Township, Range: ______

Landform (hillslope, terrace, etc.): DRAINAGE Local relief (concave, convex, none): concave Slope (%): 0

Subregion (LRR): LRRC Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: Kra NWI classification: N/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation X, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ___ No X

Are Vegetation ___, Soil X, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No X	Is the Sampled Area within a Wetland?	Yes ___ No X
Hydric Soil Present?	Yes ___	No X		
Wetland Hydrology Present?	Yes X	No ___		

Remarks:
surface water present, soils are disturbed - adjacent to pavement and fence, water probably from runoff - no wetland vegetation

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 0)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 0)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3 ft)			
1. Hordium marinum	45	Y	
2. Erodium cicutarium	10	Y	
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover	50		
Woody Vine Stratum (Plot size: 0)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 10 % Cover of Biotic Crust 40

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species	50	x 5 = 250
Column Totals:	50 (A)	250 (B)

Prevalence Index = B/A = 250/50 = 5

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks:
Hirschfelia incana also nearby. Area is mowed grassland.

SOIL

Sampling Point: 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/3	—					gravely loam	Hard imported gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- X Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: gravel
Depth (inches): 6"

Hydric Soil Present? Yes ______ No X

Remarks:
Hard layer with large peices of gravel that appear imported. Area is adjacent to fence and pavement.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- X Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ______ Depth (inches): 2-3"
Water Table Present? Yes ______ No ______ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ______ No ______ Depth (inches): ______

Wetland Hydrology Present? Yes X No ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Algal mat or dead vegetation on water surface and on edge of saturated area.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: MARCH ARB City/County: Riverside Co Sampling Date: 1-Apr-08
Applicant/Owner: DoD State: CA Sampling Point: Pit 7
Investigator(s): L. Brown, C. van der Heide Section, Township, Range: ______
Landform (hillslope, terrace, etc.): Drainage swale Local relief (concave, convex, none): CONCAVE Slope (%): 0 2
Subregion (LRR): LRR C Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: Monserate NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil X, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland? Yes X No ____
Hydric Soil Present?	Yes X No ____	
Wetland Hydrology Present?	Yes X No ____	

Remarks: depression in drainage swale area supports woolly marbles (OBL plant species)

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 0)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 0)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3')			
1. Psilocarpus	50%	Yes	OBL
2. Hordeum	20%	YES	–
3. Erodium	15%	NO	–
4. Vulpia	10%	NO	–
5.			
6.			
7.			
8.			
= Total Cover	90%		
Woody Vine Stratum (Plot size: 0)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 5% % Cover of Biotic Crust 5%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	50	x 1 = 50
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species	20	x 5 = 100
Column Totals:	50 (A)	100 (B)

Prevalence Index = B/A = 100/50 = 2

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ✓ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: GPS boundaries of OBL sp (Psilocarpus). Biotic crust is very thin layer of algae dried on surface.

SOIL

Sampling Point: 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 3/4	100						Sandy Silt

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- __ Histosol (A1)
- __ Histic Epipedon (A2)
- __ Black Histic (A3)
- __ Hydrogen Sulfide (A4)
- __ Stratified Layers (A5) (**LRR C**)
- __ 1 cm Muck (A9) (**LRR D**)
- __ Depleted Below Dark Surface (A11)
- __ Thick Dark Surface (A12)
- __ Sandy Mucky Mineral (S1)
- __ Sandy Gleyed Matrix (S4)
- __ Sandy Redox (S5)
- __ Stripped Matrix (S6)
- __ Loamy Mucky Mineral (F1)
- __ Loamy Gleyed Matrix (F2)
- __ Depleted Matrix (F3)
- __ Redox Dark Surface (F6)
- __ Depleted Dark Surface (F7)
- __ Redox Depressions (F8)
- __ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- __ 1 cm Muck (A9) (**LRR C**)
- __ 2 cm Muck (A10) (**LRR B**)
- __ Reduced Vertic (F18)
- X Red Parent Material (TF2)
- __ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic. ✓

Restrictive Layer (if present):

Type: hard soil

Depth (inches): 10"

Hydric Soil Present? Yes X No ____

Remarks: Soil is hard but able to dig to 10". Soil is somewhat reddish, water poured in pit does not drain.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- __ Surface Water (A1)
- __ High Water Table (A2)
- __ Saturation (A3)
- __ Water Marks (B1) (**Nonriverine**)
- __ Sediment Deposits (B2) (**Nonriverine**)
- __ Drift Deposits (B3) (**Nonriverine**)
- X Surface Soil Cracks (B6)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Water-Stained Leaves (B9)
- X Salt Crust (B11)
- X Biotic Crust (B12)
- __ Aquatic Invertebrates (B13)
- __ Hydrogen Sulfide Odor (C1)
- __ Oxidized Rhizospheres along Living Roots (C3)
- __ Presence of Reduced Iron (C4)
- __ Recent Iron Reduction in Tilled Soils (C6)
- __ Thin Muck Surface (C7)
- __ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- __ Water Marks (B1) (**Riverine**)
- __ Sediment Deposits (B2) (**Riverine**)
- __ Drift Deposits (B3) (**Riverine**)
- __ Drainage Patterns (B10)
- __ Dry-Season Water Table (C2)
- __ Crayfish Burrows (C8)
- __ Saturation Visible on Aerial Imagery (C9)
- __ Shallow Aquitard (D3)
- __ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ________

Water Table Present? Yes ____ No X Depth (inches): ________

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ________

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Thin layer of algae and salt crust in parts (very thin).

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: March ARB City/County: Riverside Sampling Date: Apr 1, 2009

Applicant/Owner: DoD State: CA Sampling Point: 8

Investigator(s): L. Brown, C. van der Heide Section, Township, Range: ______

Landform (hillslope, terrace, etc.): drainage swale Local relief (concave, convex, none): Concave Slope (%): 0

Subregion (LRR): LRR C Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: Monserate NWI classification: N/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation X, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil X, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	Is the Sampled Area within a Wetland? Yes X No ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: Ø)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: Ø)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3 ft)			
1. Lasthenia (goldfields)	30	Yes	—
2. Spergularia (small white flr)	5	YES	OBL
3. Hair grass	10	YES	OBL
4. Xanthium strum	2	No	FAC+
5.			
6.			
7.			
8.			
= Total Cover	40		
Woody Vine Stratum (Plot size: Ø)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 30 % Cover of Biotic Crust 30

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ✓ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks: Mowed grass land

SOIL

Sampling Point: 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/4						Clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ✓ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: hard soil

Depth (inches): 4"

Hydric Soil Present? Yes X No ___

Remarks:

Water poured into pit does not absorb. Soils are somewhat reddish with hard layer in top few inches.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- X Biotic Crust (B12) – very thin!
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Tire marks & footprints show that seasonal wetness occurs.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: March ARB City/County: Riverside Co Sampling Date: April 3, 2009

Applicant/Owner: D.D State: CA Sampling Point: 9

Investigator(s): L Brown C van der Heide Section, Township, Range: ______

Landform (hillslope, terrace, etc.): Drainage Local relief (concave, convex, none): Concave Slope (%): 0

Subregion (LRR): LRR C Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: Monserate NWI classification: N/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation X, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil X, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?** Yes X No ___
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks: hard layer in top few inches with indicators of wetland vegetation and hydrology.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 0)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 0)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3 ft)			
1. Wholly marbles	30	X	OBL
2. Crassula connata	25	X	FAC
3. Spergularia	10	No	OBL
4. Cotula australis	10	No	—
5.			
6.			
7.			
8.			
= Total Cover	65		
Woody Vine Stratum (Plot size: 0)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 35 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

X Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ___

Remarks: Mowed grassland, plot is in a shallow drainage swale

SOIL

Sampling Point: 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 4/3	100	none				Sandyloam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- X Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic. ✓✓

Restrictive Layer (if present):
Type: hard soil
Depth (inches): 6"

Hydric Soil Present? Yes X No ___

Remarks:
Soils very compacted. very difficult to dig deeper than 6". Soils are reddish with hard layer in top few inches and obligate wetland plants.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Water poured in hole does not drain

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: March ARB City/County: Riverside Co Sampling Date: April 2, 2009
Applicant/Owner: DoD State: CA Sampling Point: 10
Investigator(s): L Brown, C van der Heide Section, Township, Range: ______
Landform (hillslope, terrace, etc.): drainage Local relief (concave, convex, none): Concave Slope (%): 0
Subregion (LRR): LRR C Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: Monserate NWI classification: N/a
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil X, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	Is the Sampled Area within a Wetland? Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____	
Wetland Hydrology Present?	Yes ✓ No ____	

Remarks: soils are very compacted and impervious in top few inches. Obligate wetland plants present.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 0)	Absolute % Cover	Dominant Species?	Indicator Status
1.	0		
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 0)			
1.	0		
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3ft)			
1. Spurgularia	30	YES	OBL
2. Hordeum marinum	10	YES	—
3. Lolium multiflorum	2	No	Fac
4. Lasthenia	2	No	—
5.			
6.			
7.			
8.			
= Total Cover	40		
Woody Vine Stratum (Plot size: 0)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 60 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	30	x 1 = 30
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species	10	x 5 = 50
Column Totals:	40 (A)	50 (B)

Prevalence Index = B/A = 50/40 = 1.25

Hydrophytic Vegetation Indicators:

- __ Dominance Test is >50%
- ✓ Prevalence Index is ≤3.0[1]
- __ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- __ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ____

Remarks: Mowed grassland

SOIL

Sampling Point: 10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/3	100	—				sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- _✓_ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: hard soil
Depth (inches): 4"

Hydric Soil Present? Yes _X_ No ___

Remarks:
Soils are very compacted. hard to dig deeper than 4", somewhat reddish with positive indications of wetland vegetation & hydrology

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- _X_ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches): ___
Water Table Present? Yes ___ No _X_ Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No _X_ Depth (inches): ___

Wetland Hydrology Present? Yes _X_ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: March ARB City/County: Riverside Co Sampling Date: April 2, 2009

Applicant/Owner: DoD State: CA Sampling Point: 11

Investigator(s): L Brown C. vanderHeide Section, Township, Range: ______

Landform (hillslope, terrace, etc.): drainage Local relief (concave, convex, none): Concave Slope (%): 0

Subregion (LRR): LRR C Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: Monserate NWI classification: N/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation X, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil X, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____	**Is the Sampled Area within a Wetland?** Yes ✓ No ____
Hydric Soil Present?	Yes ✓ No ____	
Wetland Hydrology Present?	Yes ✓ No ____	

Remarks: Area is in drainage, hard, cracked soil surface with obvious signs of periodic saturation (deep tire tracks) only in area with wetland vegetation (not in all of drainage).

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 0)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 0)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3 ft)			
1. Plantago coronopus	20	Yes	FAC
2. Hordeum marinum	5	No	—
3. Lolium multiflorum	5	No	FAC
4. Spergularia mar	15	Yes	OBL
5. Erodium cic	5	No	—
6.			
7.			
8.			
= Total Cover	40		
Woody Vine Stratum (Plot size: 0)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 60 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	15	x 1 = 15
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species	20	x 5 = 100
Column Totals:	35 (A)	105 (B)

Prevalence Index = B/A = 105/35 = 2.3

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ✓ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks: Mowed grassland.

SOIL

Sampling Point: 11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/3	100	—				Sandyloam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- X Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: hard layer
Depth (inches): 4"

Hydric Soil Present? Yes X No ___

Remarks:
Soils compacted and disturbed, unable to dig more than 4" ~~to~~ Deep tire tracks thru area. Reddish soils with hard layer in top few inches.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Water poured in hole does not drain.
no crust or organic layer.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: MARCH ARB City/County: Riverside Co Sampling Date: 3-APR-09

Applicant/Owner: DoD State: CA Sampling Point: PIT 12

Investigator(s): L. Brown, C. van der Hei[illegible] Section, Township, Range: ______

Landform (hillslope, terrace, etc.): ALLUVIAL Plain Local relief (concave, convex, none): Concave Slope (%): 0

Subregion (LRR): LRR C Lat: ______ Long: ______ Datum: ______

Soil Map Unit Name: Monserate NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation X, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil X, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ___	Is the Sampled Area within a Wetland? Yes ✓ No ___
Hydric Soil Present?	Yes ✓ No ___	
Wetland Hydrology Present?	Yes ✓ No ___	

Remarks: Obligate wetland plants in concave area with hard soil layer in top few inches – Vernal Pool, isolated

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 0)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: 0)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3')			
1. Psilocarphus	40	Yes	OBL
2. Plagiobothrys bract.	15	Yes	OBL
3. Spergularia mar	2	No	OBL
4. Hair grass	5	No	OBL
5.			
6.			
7.			
8.			
= Total Cover			
Woody Vine Stratum (Plot size: 0)			
1.			
2.			
= Total Cover	55		

% Bare Ground in Herb Stratum 3 % Cover of Biotic Crust 42

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

__ Prevalence Index is ≤3.0[1]

__ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

__ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No ___

Remarks: Mowed grassland at N. end of runway – mowed less frequently than areas adjacent to runways. Open area (safety zone?).

SOIL

Sampling Point: 12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-4"	10YR 4/3	100%	—				Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- _X_ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- _X_ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):
Type: hard layer
Depth (inches): 4"

Hydric Soil Present? Yes ✓ No ___

Remarks: Soils very hard & compacted difficult to dig hole. Reddish soils with hard layer in top few inches

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- _X_ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- _X_ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches): ___
Water Table Present? Yes ___ No _X_ Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No _X_ Depth (inches): ___

Wetland Hydrology Present? Yes _X_ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Water poured in hole does not drain.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: March ARB City/County: Riverside Co Sampling Date: 3-Apr-09
Applicant/Owner: DoD State: ______ Sampling Point: Pit 13
Investigator(s): L. Brown, C. van der Heide Section, Township, Range: ______
Landform (hillslope, terrace, etc.): Alluvial Plain Local relief (concave, convex, none): Flat Slope (%): 0
Subregion (LRR): LRR C Lat: ______ Long: ______ Datum: ______
Soil Map Unit Name: Monserate NWI classification: N/a

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation X, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ___ No ___
Are Vegetation ___, Soil X, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___ No X	Is the Sampled Area within a Wetland? Yes ___ No X
Hydric Soil Present?	Yes ___ No X	
Wetland Hydrology Present?	Yes ___ No X	

Remarks: Pit dug in upland to compare with wetlands in area. Soils are reddish with hard layer near surface

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: Ø)			
1.			
2.			
3.			
4.			
= Total Cover			
Sapling/Shrub Stratum (Plot size: Ø)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			
Herb Stratum (Plot size: 3')			
1. LEPIDIUM NITIDUM	15	Yes	—
2. HORDEUM MAR	10	Yes	—
3. FILAGO	2	NO	—
4. LASTHENIA	3	NO	—
5.			
6.			
7.			
8.			
= Total Cover	30		
Woody Vine Stratum (Plot size: ______)			
1.			
2.			
= Total Cover			

% Bare Ground in Herb Stratum 70 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species		x 5 =
Column Totals:	(A)	(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

- ___ Dominance Test is >50%
- ___ Prevalence Index is ≤3.0[1]
- ___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: Mowed grassland

SOIL

Sampling Point: 13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3	7.5 YR 4/3	100%					Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ✓ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic. None

Restrictive Layer (if present):

Type: hard layer

Depth (inches): 3"

Hydric Soil Present? Yes ___ No X

Remarks: Soil is blocky, many cracks, water in pit was absorbed quickly (mostly due to cracks). Cracks are deep, although soils still difficult to dig through.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Soil cracks are very deep, blocky soils in grassland area - not just on surface. No indicators of wetland hydrology, surface is very flat.

APPENDIX C

Photographs

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Photo 1 (April 2009): Wetland delineation soil pits were difficult to dig due to hard layer within the top few inches. Water poured into pits did not readily absorb, as depicted in the above photo.

Photo 2 (April 2009): Series of seasonal ponds (#1) within main drainage channel in Survey Area 13.

Photo 3 (April 2009): Depressions in drainage swale that is part of the main drainage feature through Survey Area 13 support hydrophytic vegetation and meet the criteria for determination of wetlands.

Photo 4 (April 2009): Isolated seasonal pond/vernal pool (#14) in Survey Area 13.

Photo 5 (October 2006): Concrete lined channel in the main drainage in Survey Area 13. Debris and sediment collected at the base of the channel and patches of wetland plants had established on top of the sediment. Water flows into an underground culvert at the end of this channel (slightly visible in the shadow).

Photo 6 (April 2009): Open concrete basin (Pond #17) at the beginning of the main drainage channel through Survey Area 13. Sediment collected over the gravel base and wetland plants (dominated by Bermuda grass) are growing in the sediment. This is man-made feature and did not meet the criteria for determination of wetlands

Photo 7 (April 2009): Isolated seasonal pond/vernal pool (#25) in Survey Area 5A.

Photo 8 (April 2009): Other isolated seasonal ponds adjacent to and within disturbed areas in Survey Area 5A.

Photo 9 (April 2009): The Cactus Avenue Flood Control Channel is outside the March ARB northern boundary fence, but a portion of the channel in Survey Area 5B is fairly flat and wetland vegetation (green band of plants along the fence line in the photo) and saturated soils extend into Survey Area 5A.

Photo 10 (April 2009): The main drainage that flows through Survey Area 13 at the southern end of March ARB connects with the Harley Knox Boulevard Channel and discharges into the Perris Valley Storm Drain. At this location, the channel changed from dirt with defined bed and banks to a concrete-lined channel.

Photo 11 (April 2009): Isolated swale in Survey Area 5A.

Photo 12 (April 2009): Narrow drainage swale in Survey Area 1.

Photos 13 (above) and 14 (below) (April 2009): Shallow drainage swale adjacent to runway in Survey Area 3. Runoff from the pavement goes into the drainage swale (Photo 13) and is directed into storm drains within the swale (Photo 14). The swales are dominated by upland grasses and forbs and are periodically mowed.

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GLENN LUKOS ASSOCIATES
Regulatory Services

January 15, 2014

Melissa Perez
Albert A. Webb Associates
3788 McCray Street
Riverside, California 92506

SUBJECT: Jurisdictional Delineation Report for the Heacock Channel Improvement Project, City of Moreno Valley, Riverside County, California.

Dear Ms. Perez:

This letter report summarizes our preliminary findings of U.S. Army Corps of Engineers (Corps), Regional Water Quality Control Board (Regional Board), and California Department of Fish and Wildlife (CDFW) jurisdiction for the above-referenced property.

The Heacock Channel Improvement Project (the "Project") is located in the City of Moreno Valley, Riverside County, California [Exhibit 1 – Regional Map]. The Project is located approximately at 33°54'8.10" north latitude and 117°14'38.29" west longitude within Section 24, Township 3 South, Range 4 West, and is generally bounded by Cactus Avenue to the north, Revere Place to the south, Heacock Street to the east, and the March Air Reserve Base (MARB) to the west. The Project site contains one blue-line drainage (as depicted on the U.S. Geological Survey (USGS) topographic maps San Bernardino, California (dated 1967 and photorevised in 1988) [Exhibit 2 – Vicinity Map].

On June 11, 2013, regulatory specialists of Glenn Lukos Associates, Inc. (GLA) examined the Project site to determine the potential limits of (1) Corps jurisdiction pursuant to Section 404 of the Clean Water Act (CWA), (2) Regional Board jurisdiction pursuant to Section 401 of the CWA and Section 13260 of the California Water Code (CWC), the Porter-Cologne Act, and (3) CDFW jurisdiction pursuant to Division 2, Chapter 6, Sections 1600-1616 of the Fish and Game Code. Enclosed are 125-scale maps [Exhibit 3A & 3B] that depict the areas of potential Corps and CDFW jurisdiction. Photographs to document the topography, vegetative communities, and general widths of each of the waters are provided as Exhibit 4. A soil map is provided as Exhibit 5.

The Project site contains approximately 2.69 acres of potential Corps and Regional Board jurisdiction, of which 0.57 consists of jurisdictional wetlands. The Project site contains approximately 4.82 acres of CDFW jurisdiction, of which 3.51 acres consists of riparian vegetation. Jurisdictional areas at the Project site contain approximately 10,754 linear feet of streambed.

I. METHODOLOGY

Prior to beginning the field delineation, an aerial photograph and the previously cited USGS topographic map, were examined to determine the locations of potential areas of Corps, CDFW, and Regional Board jurisdiction. Suspected jurisdictional areas were field checked for the presence of definable channels and/or wetland vegetation, soils and hydrology. Potential wetland habitats on the site were evaluated using the methodology set forth in the *U.S. Army Corps of Engineers 1987 Wetland Delineation Manual*[1] (Wetland Manual) and the 2008 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)*[2]. The OHWM was evaluated using the methodology set forth in the 2008 *Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States*[3]. While in the field the limits of Corps, CDFW, and Regional Board jurisdiction were recorded onto a 125-scale color aerial photograph using visible landmarks and a global positioning system unit.

The Soil Conservation Service (SCS)[4] has mapped the following soil types as occurring in the general vicinity of the project site [Exhibit 5 – Soil Map]:

Exeter Sandy Loam, 0 to 2 Percent Slopes (EnA), and Exeter Sandy Loam, deep, 0 to 2 Percent Slopes (EpA)

The Exeter series consists of moderately deep to a duripan, moderately well drained soils. These soils formed in alluvium primarily from granitic materials. Slopes are typically associated with alluvial fans and stream terraces and are 0 to 9 percent. Vegetation typically associated with the Exeter soils includes annual grasses and forbs. In a typical profile, the surface layer is brown (10YR 5/3 when dry, 7.5YR 3/2 when moist) loam about 7 inches thick. The underlying layers are stratified and range from dark yellowish brown (10YR 4/4 when dry, 10YR 3/4 when moist)

[1] Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, U.S. Army Engineer Waterways Experimental Station, Vicksburg, Mississippi.
[2] U.S. Army Corps of Engineers. 2008. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0). Ed. J.S. Wakeley, R.W. Lichevar, and C.V. Noble. ERDC/EL TR-08-28. Vicksburg, MS: U.S. Army Engineer Research and Development Center.
[3] U.S. Army Corps of Engineers. 2008. A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States. R.W. Lichevar, and S.M. McColley. ERDC/CRREL TR-08-12. Hanover, NH: Cold Regions Research and Engineering Laboratory, U.S. Army Engineer Research and Development Center.
[4] SCS is now known as the National Resource Conservation Service or NRCS.

to brown (7.5YR 4/4 when dry, 5YR 3/4 when moist) in color and from hard, and friable to slightly sticky in texture. Depth to the duripan in the Exeter soils is from 20 to 40 inches. Exeter soils are used for irrigated cropland, for cattle production and for building site development.

Greenfield Sandy Loam, deep, 0 to 2 Percent Slopes (GyA)

The Greenfield series are deep, well-drained soils on alluvial fans. Slopes range from 0 to 30 percent. These soils developed in moderately coarse textured alluvium from granitic and mixed rock sources. Vegetation typically associated with Greenfield soils includes annual grasses, forbs, shrubs, and scattered oak trees. In a typical profile, the surface layer is pale brown (10YR 6/3 when dry, 10YR 4/3 when moist) coarse sandy loam about 23 inches thick. The next layer is light yellowish brown (10YR 6/4 when dry, 10YR 4/4 when moist) sandy loam that occurs to a depth of about 47 inches. Underlying this and extending to a depth of more than 50 inches is a sandy loam of a similar color, but with a weak subangular blocky structure. The Greenfield soils are typically used for dryland grain and pasture.

Hanford Coarse Sandy Loam, 0 to 2 Percent Slopes (HoA) and Hanford Fine Sandy Loam, 0 to 2 Percent Slopes (HgA)

The Hanford series are very deep, moderately well drained soils on stream bottoms, flood plains, and alluvial fans. Slopes range from 0 to 15 percent. These soils developed in moderately coarse textured alluvium predominately from granitic materials. Vegetation typically associated with the Hanford series soils include annual grasses and associated herbaceous plants. In a typical profile, the surface layer ranges in color from pale brown to dark brown (10YR 6/3 when dry, 10YR 4/3 when wet). Structure is weak, fine and granular, slightly hard and very friable to a depth of 12 inches. The next layer is comprised of a fine sandy loam that varies from a pale brown (10YR 6/3) to light yellowish brown (10YR 6/4) in color and progresses from a neutral pH to slightly alkaline as it increases in depth from 12 to 60 inches. The Hanford soils are typically used for growing a wide range of fruits, vegetables, and general farm crops. They are also utilized for urban development and dairies.

Monserate Sandy Loam, 0 to 5 Percent Slopes (MmB)

The Monserate series is a member of the fine-loamy, mixed, thermic family of Typic Durixeralfs, which usually consist of slightly acidic, sandy loam surface layers, and sandy clay loam subsurface layers underlain by silica-cemented duripans. Slopes range from 0 to 5 percent. Vegetation typically associated with Monserate soils includes annual grasses, forbs, widely spaced oak, and shrubs on eroded slopes. In a typical profile, the surface layer varies from brown (7.5YR 5/4 when dry, 5YR 3/4 when moist) to dark reddish brown (2.5YR 3/4) sandy loam about 10 inches thick. The next layer is light reddish brown (5YR 4/4 when dry, 2.5YR 3/4 when moist) sandy clay loam that occurs to a depth of about 45 inches. Underlying this and extending to a depth of around 70 inches is a loamy coarse sand that varies from dark yellowish brown (10YR 3/4 when dry, 5YR 3/4 when moist) to yellowish brown (10YR 5/4 when dry, 5YR 3/4 when moist). The Monserate soils are typically used for growing grain, hay, pasture, as well as some citrus, field, and truck crops when irrigation water is available.

Ramona Sandy Loam, 0 to 2 Percent Slopes (RaA)

The Ramona series is a member of the fine-loamy, mixed, thermic family of Typic Haploxeralfs, which usually consist of slightly to moderately acidic, sandy loam surface layers, and sandy clay loam subsurface layers underlain by neutral, sandy loam horizons. Vegetation typically associated with Ramona soils includes annual grasses, forbs, chamise, or chaparral. In a typical profile, the surface layers are comprised of a brown (10YR 5/3 when dry, 10YR 3/3 when moist) sandy loam to fine sandy loam, to a depth of approximately 23 inches. The next layer varies in from a brown (7.5YR 5/4 when dry, 5YR 3/4 when moist) loam, a light reddish brown (5YR 4/4 when dry, 5YR 3/4 when moist) sandy clay loam, to a yellowish red (5YR 5/6 when dry, 5YR 4/6 when wet) sandy clay loam that occurs to a depth of about 68 inches. Underlying this and extending to a depth of around 74 inches is a dark brown (7.5YR 5/6 when dry, 7/5YR 4/4 when moist) fine sandy loam. The Ramona soils are typically used for growing grain, hay, pasture, irrigated citrus, olives, truck crops, and deciduous fruits.

None of these soil units are identified as hydric in the SCS's publication, Hydric Soils of the United States[5]. The evaluation for the presence of hydric soils was made in accordance with the Regional Supplement (Version 2.0).

It is important to note that under the Arid West Supplement, the presence of mapped hydric soils is no longer dispositive for the presence of hydric soils. Rather, the presence of hydric soils must now be confirmed in the field.

[5] United States Department of Agriculture, Soil Conservation Service. 1991. Hydric Soils of the United States, 3rd Edition, Miscellaneous Publication Number 1491. (In cooperation with the National Technical Committee for Hydric Soils.)

II. JURISDICTION

A. Army Corps of Engineers

Pursuant to Section 404 of the Clean Water Act, the Corps regulates the discharge of dredged and/or fill material into waters of the United States. The term "waters of the United States" is defined in Corps regulations at 33 CFR Part 328.3(a) as:

(1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
(2) All interstate waters including interstate wetlands;
(3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect foreign commerce including any such waters:
  (i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
  (ii) From which fish or shell fish are or could be taken and sold in interstate or foreign commerce; or
  (iii) Which are used or could be used for industrial purpose by industries in interstate commerce...
(4) All impoundments of waters otherwise defined as waters of the United States under the definition;
(5) Tributaries of waters identified in paragraphs (a) (1)-(4) of this section;
(6) The territorial seas;
(7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) (1)-(6) of this section.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 123.11(m) which also meet the criteria of this definition) are not waters of the United States.

(8) Waters of the United States do not include prior converted cropland.[6] Notwithstanding the determination of an area's status as prior converted cropland by

[6] The term "prior converted cropland" is defined in the Corps' Regulatory Guidance Letter 90-7 (dated September 26, 1990) as "wetlands which were both manipulated (drained or otherwise physically altered to remove excess water from the land) and cropped before 23 December 1985, to the extent that they no longer exhibit important

> any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with the EPA.

In the absence of wetlands, the limits of Corps jurisdiction in non-tidal waters, such as intermittent streams, extend to the OHWM which is defined at 33 CFR 328.3(e) as:

> *...that line on the shore established by the fluctuation of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.*

1. Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers, et al.

Pursuant to Article I, Section 8 of the U.S. Constitution, federal regulatory authority extends only to activities that affect interstate commerce. In the early 1980s the Corps interpreted the interstate commerce requirement in a manner that restricted Corps jurisdiction on isolated (intrastate) waters. On September 12, 1985, EPA asserted that Corps jurisdiction extended to isolated waters that are used or could be used by migratory birds or endangered species, and the definition of "waters of the United States" in Corps regulations was modified as quoted above from 33 CFR 328.3(a).

On January 9, 2001, the Supreme Court of the United States issued a ruling on *Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers, et al.* (SWANCC). In this case the Court was asked whether use of an isolated, intrastate pond by migratory birds is a sufficient interstate commerce connection to bring the pond into federal jurisdiction of Section 404 of the Clean Water Act.

The written opinion notes that the court's previous support of the Corps' expansion of jurisdiction beyond navigable waters (*United States v. Riverside Bayview Homes, Inc*.) was for a wetland that abutted a navigable water and that the court did not express any opinion on the question of the authority of the Corps to regulate wetlands that are not adjacent to bodies of open water. The current opinion goes on to state:

---

wetland values. Specifically, prior converted cropland is inundated for no more than 14 consecutive days during the growing season…." [Emphasis added.]

> *In order to rule for the respondents here, we would have to hold that the jurisdiction of the Corps extends to ponds that are not adjacent to open water. We conclude that the text of the statute will not allow this.*

Therefore, we believe that the court's opinion goes beyond the migratory bird issue and says that no isolated, intrastate water is subject to the provisions of Section 404(a) of the Clean Water Act (regardless of any interstate commerce connection). However, the Corps and EPA have issued a joint memorandum which states that they are interpreting the ruling to address only the migratory bird issue and leaving the other interstate commerce clause nexuses intact.

2. Rapanos v. United States and Carabell v. United States

On June 5, 2007, the U.S. Environmental Protection Agency (EPA) and Corps issued joint guidance that addresses the scope of jurisdiction pursuant to the Clean Water Act in light of the Supreme Court's decision in the consolidated cases *Rapanos v. United States* and *Carabell v. United States* ("Rapanos"). The chart below was provided in the joint EPA/Corps guidance.

For project sites that include waters other than Traditional Navigable Waters (TNWs) and/or their adjacent wetlands or Relatively Permanent Waters (RPMs) tributary to TNWs and/or their adjacent wetlands as set forth in the chart below, the Corps must apply the significant nexus standard, that includes the data set forth in the *Approved Jurisdictional Determination Form.*

For "isolated" waters or wetlands, the joint guidance also requires an evaluation by the Corps and EPA to determine whether other interstate commerce clause nexuses, not addressed in the SWANCC decision are associated with isolated features on project sites for which a jurisdictional determination is being sought from the Corps.

The agencies will assert jurisdiction over the following waters:

- Traditional navigable waters
- Wetlands adjacent to traditional navigable waters
- Non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months)
- Wetlands that directly abut such tributaries

The agencies will decide jurisdiction over the following waters based on a fact-specific analysis to determine whether they have a significant nexus with a traditional navigable water:

- Non-navigable tributaries that are not relatively permanent
- Wetlands adjacent to non-navigable tributaries that are not relatively permanent
- Wetlands adjacent to but that do not directly abut a relatively permanent non-navigable

tributary

The agencies generally will not assert jurisdiction over the following features:

- Swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent or short duration flow)
- Ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water

The agencies will apply the significant nexus standard as follows:

- A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical and biological integrity of downstream traditional navigable waters
- Significant nexus includes consideration of hydrologic and ecologic factors

3. Corps Preliminary Jurisdictional Determination

A *Corps Preliminary Jurisdictional Determination Form* may be used to concede Corps jurisdiction where all streambeds within the project area are considered Corps jurisdictional waters. The project would be able to move forward pursuant to Corps Regulatory Guidance Letter (RGL) 08-02, issued on June 26, 2008, which allows the Corps to issue preliminary jurisdictional determinations (Preliminary JD) for a project. A Preliminary JD allows a project to move forward by setting aside/voluntarily waiving questions regarding CWA jurisdiction over drainages on site in the interest of expeditiously obtaining a Section 404 Permit.

As stated in RGL 08-02:

> *While a landowner, permit applicant, or other affected party can elect to request and obtain an approved JD, he or she can also decline to request an approved JD, and instead obtain a Corps individual or general permit authorization based on either a preliminary JD, or, in appropriate circumstances (such as authorizations by non-reporting nationwide general permits), no JD whatsoever. The Corps will determine what form of JD is appropriate for any particular circumstance based on all the relevant factors, to include, but not limited to, the applicant's preference, what kind of permit authorization is being used (individual permit versus general permit), and the nature of the proposed activity needing authorization.*

The Corps typically completes Preliminary JDs within 60 days of receipt of the request for such a determination. If the Corps project manager cannot complete the Preliminary JD within the 60-day timeframe, they must provide their supervisor, who would also provide the applicant, with a schedule to complete the determination (i.e., unlike the Rapanos significant nexus guidelines, there is a specific timeframe to complete the Preliminary JD and move forward with the jurisdictional determination, without uncertainty, and the EPA will not be involved with the Preliminary JD process as the Corps is not required to coordinate with the EPA to review Preliminary JDs).

4. Wetland Definition Pursuant to Section 404 of the Clean Water Act

The term “wetlands” (a subset of “waters of the United States”) is defined at 33 CFR 328.3(b) as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support...a prevalence of vegetation typically adapted for life in saturated soil conditions." In 1987 the Corps published a manual to guide its field personnel in determining jurisdictional wetland boundaries. The methodology set forth in the 1987 Wetland Delineation Manual and the Arid West Supplement generally require that, in order to be considered a wetland, the vegetation, soils, and hydrology of an area exhibit at least minimal hydric characteristics. While the manual and Supplement provide great detail in methodology and allow for varying special conditions, a wetland should normally meet each of the following three criteria:

- more than 50 percent of the dominant plant species at the site must be typical of wetlands (i.e., rated as facultative or wetter in the National List of Plant Species that Occur in Wetlands[7]);

- soils must exhibit physical and/or chemical characteristics indicative of permanent or periodic saturation (e.g., a gleyed color, or mottles with a matrix of low chroma indicating a relatively consistent fluctuation between aerobic and anaerobic conditions); and

- Whereas the 1987 Manual requires that hydrologic characteristics indicate that the ground is saturated to within 12 inches of the surface for at least five percent of the growing season during a normal rainfall year, the Arid West Supplement does not include a quantitative criteria with the exception for areas with “problematic hydrophytic vegetation”, which require a minimum of 14 days of ponding to be considered a wetland.

[7] Reed, P.B., Jr. 1988. National List of Plant Species that Occur in Wetlands. U.S. Fish and Wildlife Service Biological Report 88(26.10).

B. Regional Water Quality Control Board

Subsequent to the SWANCC decision, the Chief Counsel for the State Water Resources Control Board issued a memorandum that addressed the effects of the SWANCC decision on the Section 401 Water Quality Certification Program.[8] The memorandum states:

> *California's right and duty to evaluate certification requests under section 401 is pendant to (or dependent upon) a valid application for a section 404 permit from the Corps, or another application for a federal license or permit. Thus if the Corps determines that the water body in question is not subject to regulation under the COE's 404 program, for instance, no application for 401 certification will be required…*
>
> *The SWANCC decision does not affect the Porter Cologne authorities to regulate discharges to isolated, non-navigable waters of the states….*
>
> *Water Code section 13260 requires "any person discharging waste, or proposing to discharge waste, within any region that could affect the waters of the state to file a report of discharge (an application for waste discharge requirements)." (Water Code § 13260(a)(1) (emphasis added).) The term "waters of the state" is defined as "any surface water or groundwater, including saline waters, within the boundaries of the state." (Water Code § 13050(e).) The U.S. Supreme Court's ruling in SWANCC has no bearing on the Porter-Cologne definition. While all waters of the United States that are within the borders of California are also waters of the state, the converse is not true—waters of the United States is a subset of waters of the state. Thus, since Porter-Cologne was enacted California always had and retains authority to regulate discharges of waste into any waters of the state, regardless of whether the COE has concurrent jurisdiction under section 404. The fact that often Regional Boards opted to regulate discharges to, e.g., vernal pools, through the 401 program in lieu of or in addition to issuing waste discharge requirements (or waivers thereof) does not preclude the regions from issuing WDRs (or waivers of WDRs) in the absence of a request for 401 certification….*

In this memorandum the SWRCB's Chief Counsel has made the clear assumption that fill material to be discharged into isolated waters of the United States is to be considered equivalent to "waste" and therefore subject to the authority of the Porter Cologne Water Quality Act.

---

[8] Wilson, Craig M. January 25, 2001. Memorandum addressed to State Board Members and Regional Board Executive Officers.

However, while providing a recounting of the Act's definition of waters of the United States, this memorandum fails to also reference the Act's own definition of waste:

> *"Waste" includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal.*

The lack of inclusion of a reference to "fill material," "dirt," "earth" or other similar terms in the Act's definition of "waste," or elsewhere in the Act, suggests that no such association was intended. Thus, the Chief Counsel's memorandum signals that the SWRCB is attempting to retain jurisdiction over discharge of fill material into isolated waters of the United States by administratively expanding the definition of "waste" to include "fill material" without actually seeking amendment of the Act's definition of waste (an amendment would require action by the state legislature). Consequently, discharge of fill material into waters of the State not subject to the jurisdiction of the Corps pursuant to Section 404 of the Clean Water Act <u>may</u> require authorization pursuant to the Porter Cologne Act through application for waste discharge requirements (WDRs) or through waiver of WDRs, despite the lack of a clear regulatory imperative.

C. <u>California Department of Fish and Wildlife</u>

Pursuant to Division 2, Chapter 6, Sections 1600-1603 of the California Fish and Game Code, the CDFW regulates all diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake, which supports fish or wildlife.

CDFW defines a "stream" (including creeks and rivers) as "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having surface or subsurface flow that supports or has supported riparian vegetation." CDFW's definition of "lake" includes "natural lakes or man-made reservoirs."

CDFW jurisdiction within altered or artificial waterways is based upon the value of those waterways to fish and wildlife. CDFW Legal Advisor has prepared the following opinion:

- Natural waterways that have been subsequently modified and which have the potential to contain fish, aquatic insects and riparian vegetation will be treated like natural waterways...

- Artificial waterways that have acquired the physical attributes of natural stream courses and which have been viewed by the community as natural stream courses, should be treated by [CDFW] as natural waterways...

- Artificial waterways without the attributes of natural waterways should generally not be subject to Fish and Game Code provisions...

Thus, CDFW jurisdictional limits closely mirror those of the Corps. Exceptions are CDFW's exclusion of isolated wetlands (those not associated with a river, stream, or lake), the addition of artificial stock ponds and irrigation ditches constructed on uplands, and the addition of riparian habitat supported by a river, stream, or lake regardless of the riparian area's federal wetland status.

IV. RESULTS

A. <u>Corps Jurisdiction</u>

The Project site contains approximately 2.69 acres of potential Corps jurisdiction, of which 0.57 acre consists of wetlands, representing a total of 10,764 linear feet of streambed. Nearly all areas of jurisdiction are associated with the Heacock Channel, though a very small portion is associated with the Cactus Avenue Channel, which connects to the Heacock Channel from the west. The locations of potential Corps jurisdictional waters are depicted on the enclosed map [Exhibit 3]. Potential Corps jurisdiction is summarized in Table 1 below.

The Heacock Channel consists of a linear, incised channel that runs the length of the Project site, parallel to and west of Heacock Street. The feature originates offsite to north where the channel is concrete-lined and collects nuisance flows from adjacent, existing urban development. The Heacock Channel also receives flows from the Cactus Avenue Channel at the northern end. The Heacock Channel flows southward through the Project site, from Cactus Avenue to a point approximately 500 feet north of Revere Place, for a total length of approximately 10,764 linear feet. The ordinary high water mark (OHWM) within Heacock Channel ranges from approximately 10 feet to 30 feet wide, with physical flow indicators consisting of bent vegetation and the destruction of terrestrial vegetation, the presence of litter and debris, sediment deposits, a change in soil characteristics,, and defined channels with shelving.

Approximately 2.12 acres of non-wetland waters are associated with the Project site. Vegetation in non-wetland areas is dominated by upland species such as red brome (*Bromus madritensis* ssp. *rubens*; NI), common fiddleneck (*Amsinckia intermedia*, UPL), red-stemmed filaree (*Erodium cicutarium*, UPL), ripgut brome (*Bromus diandrus*, UPL), tocalote (*Centaurea melitensis*), rattlesnake weed (*Daucus pusillus*), prickly lettuce (*Lactuca serriola,* FAC), wild radish

(*Raphanus sativus*, UPL), black mustard (*Brassica nigra*, UPL), lamb's quarters (*Chenopodium album*, UPL), Russian thistle (*Salsola tragus*, UPL), castor bean (*Ricinus communis*, UPL), and horehound (*Marrubium vulgare*, UPL).

Approximately 0.57 acre of wetlands is associated with the Project site. Vegetation in wetland areas is comprised of various dominant riparian species including black willow (*Salix gooddingii*, OBL), red willow (*Salix laevigata*, OBL), arroyo willow (*Salix lasiolepsis*, FACW), sandbar willow (*Salix exigua*, FACW), mule fat (*Baccharis salicifolia*, FACW), blue elderberry (*Sambucus nigra caerulea*, FAC), and tamarisk (*Tamarix sp.*, FAC). Dominant species of the understory include facultative and obligate wetland species such as hoary nettle (*Urtica dioica holosericea*), white water cress (*Nasturtium officinale*, OBL), southern cattail (*Typha domingensis*, OBL), and western sunflower (*Helianthus annuus*, FAC).

Table 1. Summary of Corps Jurisdiction

Drainage Feature	Non-Wetland Waters (Acres)	Wetlands (Acres)	Total Corps Jurisdiction	Length of Drainage (Linear Feet)
Heacock Channel	2.12	0.57	2.69	10,764
Total	**2.12**	**0.57**	**2.69**	**10,764**

B. Regional Water Quality Control Board Jurisdiction

The onsite drainage features have been determined to be potential Corps jurisdictional waters subject to regulation pursuant to Section 401 and 404 of the CWA and do not need to be addressed separately pursuant to Section 13260 of the CWC, the Porter-Cologne Act.

C. CDFW Jurisdiction

The Project site contains approximately 4.82 acres of potential CDFW jurisdiction, of which 3.51 acres supports riparian vegetation. Areas of potential CDFW jurisdiction include that of potential Corps jurisdiction discussed above, in addition to riparian vegetation that extends beyond the Corps' OHWM. The boundaries of potential CDFW jurisdiction are depicted on Exhibit 3. Total potential CDFW jurisdiction is summarized in Table 2 below.

Table 2. Summary of CDFW Jurisdiction

Drainage Features	Unvegetated Streambed (Acres)	Riparian Vegetation (Acres)	Total CDFW Jurisdiction	Length of Drainage (Linear Feet)
Heacock Channel	1.31	3.51	4.82	10,764
Total	**1.31**	**3.51**	**4.82**	**10,764**

If you have any questions about this letter report, please contact either Glenn Lukos or David Moskovitz at (949) 837-0404.

Sincerely,

GLENN LUKOS ASSOCIATES, INC.

David F. Moskovitz
Regulatory Specialist

s:0640-36b.JD.docx

Source: ESRI World Street Map

N

0 2 4 8 Miles

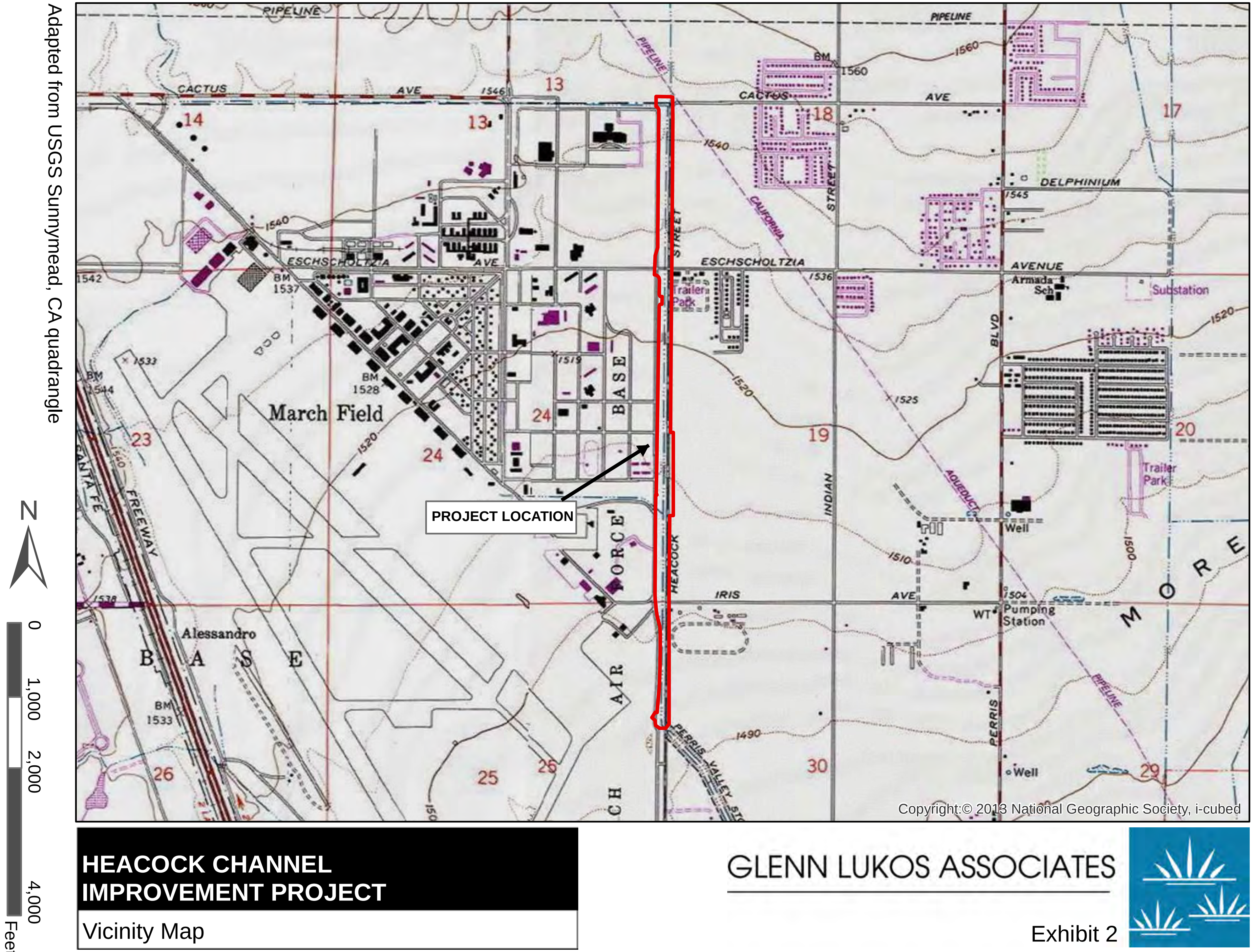
HEACOCK CHANNEL IMPROVEMENT PROJECT

Regional Map

GLENN LUKOS ASSOCIATES

Exhibit 1

Adapted from USGS Sunnymead, CA quadrangle



HEACOCK CHANNEL IMPROVEMENT PROJECT

Vicinity Map

GLENN LUKOS ASSOCIATES

Exhibit 2

Legend

- Project Boundary
- Matchline
- Corps/RWQCB Non-Wetland Waters
- Corps/RWQCB Wetland
- Width in Feet (W indicates wetland width)

N

0 200 400 800
Feet

1 inch = 400 feet

Aerial Photo: ESRI Basemaps
Reference Elevation Datum: State Plane 6 NAD 83
Map Prepared by: K. Kartunen, GLA
Date Prepared: November 6, 2013

HEACOCK CHANNEL IMPROVEMENT PROJECT

Corps/RWQCB Jurisdictional Delineation Map

GLENN LUKOS ASSOCIATES

Exhibit 3A

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Legend

- Project Boundary
- Matchline
- CDFW Unvegetated Streambed
- CDFW Riparian
- Width in Feet (R indicates riparian width)

N

0 200 400 800
Feet

1 inch = 400 feet

Aerial Photo: ESRI Basemaps
Reference Elevation Datum: State Plane 6 NAD 83
Map Prepared by: K. Kartunen, GLA
Date Prepared: November 6, 2013

HEACOCK CHANNEL IMPROVEMENT PROJECT

CDFW Jurisdictional Delineation Map

GLENN LUKOS ASSOCIATES

Exhibit 3B

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Photograph 1: View looking north, just south of Cactus Avenue. Photo depicts southern willow scrub riparian habitat within Heacock Channel.

Photograph 2: View looking south from Cactus Avenue. The photo depicts ruderal/disturbed upland areas adjacent to Heacock Channel.

Photograph 3: View looking north, between Cactus Avenue and Meyer Drive. The photo depicts emergent wetland vegetation within Heacock Channel.

Photograph 4: View looking northeast, just north of Meyer Drive. The photo represents area of unvegetated streambed within Heacock Channel upstream of Meyer Drive.

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Exhibit 4

HEACOCK CHANNEL IMPROVEMENT PROJECT

Site Photographs

Photograph 5: View of Heacock Channel downstream of Meyer Drive depicting willow riparian vegetation mixed with non-native vegetation (e.g., eucalyptus trees).

Photograph 6: Representative view of emergent vegetation in downstream portions of Heacock Channel.

Photograph 7: Representative view of southern willow scrub in downstream portions of Heacock Channel.

Photograph 8: View of unvegetated streambed at the downstream of end of Heacock Channel.

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Exhibit 4

HEACOCK CHANNEL IMPROVEMENT PROJECT

Site Photographs

Legend

- Project Boundary
- Matchline
- EnA - Exeter sandy loam, 0 to 2 percent slopes
- EpA - Exeter sandy loam, deep, 0 to 2 percent slopes
- GyA - Greenfield sandy loam, 0 to 2 percent slopes
- HcA - Hanford coarse sandy loam, 0 to 2 percent slopes
- HgA - Hanford fine sandy loam, 0 to 2 percent slopes
- MmB - Monserate sandy loam, 0 to 5 percent slopes
- RaA - Ramona sandy loam, 0 to 2 percent slopes

N

0 200 400 800
Feet

1 inch = 400 feet

Aerial Photo: ESRI Basemaps
Reference Elevation Datum: State Plane 6 NAD 83
Map Prepared by: K. Kartunen, GLA
Date Prepared: November 6, 2013

HEACOCK CHANNEL IMPROVEMENT PROJECT

Soils Map

GLENN LUKOS ASSOCIATES

Exhibit 5

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GLENN LUKOS ASSOCIATES
Regulatory Services

May 12, 2015

Ms. Tracy Zinn
T&B Planning, Inc.
17542 East 17th Street, Suite 100
Tustin, California 92780

SUBJECT: Jurisdictional Delineation of the Moreno Valley Logistics Center Project Study Area, an 89.5-Acre Property Located in the City of Moreno Valley, Riverside County, California.

Dear Ms. Zinn:

This letter report summarizes our findings of U.S. Army Corps of Engineers (Corps), Santa Ana Regional Water Quality Control Board (Regional Board), and California Department of Fish and Wildlife (CDFW) jurisdiction for the above-referenced property.[1]

The Moreno Valley Logistics Center Project Study Area (Study Area) is located at Latitude 33.878275º and Longitude –117.237434º within Section 30, Township 3 South, and Range 3 West within the City of Moreno Valley, Riverside County, California [Exhibit 1]. The Study Area comprises approximately 89.50 acres of land and a segment of the Perris Valley Storm Drain (PVSD) that bifurcates the property. The Study Area is generally bounded by undeveloped land and a warehouse building to the north, Cardinal Avenue and the Perris Valley Storm Drain [PVSD] to the south, Indian Street to the east, and Heacock Street and the March Air Reserve Base to the west. The Study Area is traversed by one blue-line stream, the PVSD (as depicted on the U.S. Geological Survey (USGS) topographic maps Sunnymead, California (dated 1967 and photorevised in 1980) and Perris, California (dated 1967 and photorevised in 1979) [Exhibit 2].

[1] This report presents our best effort at estimating the subject jurisdictional boundaries using the most up-to-date regulations and written policy and guidance from the regulatory agencies. Only the regulatory agencies can make a final determination of jurisdictional boundaries. If a final jurisdictional determination is required, GLA can assist in getting written confirmation of jurisdictional boundaries from the agencies.

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On January 15, 2015, regulatory specialists from Glenn Lukos Associates, Inc. (GLA) examined the Study Area to determine the limits of Corps jurisdiction pursuant to Section 404 of the Clean Water Act (CWA), Regional Board jurisdiction pursuant to Section 401 of the CWA and Section 13260 of the California Water Code (CWC) [the Porter-Cologne Act], and CDFW jurisdiction pursuant to Division 2, Chapter 6, Sections 1600-1616 of the Fish and Game Code. Enclosed is a 300-scale map [Exhibit 3], which depicts the limits of Corps, Regional Board, and CDFW jurisdiction. Photographs to document the topography, vegetative communities, and general widths of each of the waters are provided as Exhibit 4 and a soils map is included as Exhibit 5.

Potential Corps and Regional Board jurisdiction associated with the Study Area totals 8.55 acres, none of which consists of jurisdictional wetlands. A total of 3,990 linear feet of streambed is present.

Potential CDFW jurisdiction associated with the Study Area totals 11.97 acres, none of which consists of vegetated riparian habitat. A total of 3,990 linear feet of streambed is present.

I. METHODOLOGY

Prior to beginning the field delineation a 200-scale color aerial photograph, a 200-scale topographic base map of the property, and the previously cited USGS topographic map were examined to determine the locations of potential areas of Corps, Regional Board, and CDFW jurisdiction. Suspected jurisdictional areas were field checked for the presence of definable channels and/or wetland vegetation, soils and hydrology. Suspected wetland habitats on the site were evaluated using the methodology set forth in the U.S. Army Corps of Engineers 1987 Wetland Delineation Manual[2] (Wetland Manual) and the 2008 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region Version 2.0[3] (Arid West Supplement). Lateral limits of non-wetland waters were identified using field indicators of an Ordinary High Water Mark (OHWM).[4] While in the field jurisdiction areas were recorded onto

[2] Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. Vicksburg, MS: U.S. Army Engineer Waterways Experimental Station.

[3] U.S. Army Corps of Engineers. 2008. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0). Ed. J.S. Wakeley, R.W. Lichevar, and C.V. Noble. ERDC/EL TR-08-28. Vicksburg, MS: U.S. Army Engineer Research and Development Center and Engineering Laboratory.

[4] U.S. Army Corps of Engineers. 2008. A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States. R. W. Lichvar and S. M. McColley. ERDC/CRREL TR-08-12. Hanover, NH: U.S. Army Engineer Cold Regions Research and Engineering Laboratory.

a 200-scale color aerial photograph using visible landmarks. Other data were recorded onto wetland data sheets.

The Soil Conservation Service (SCS)[5] has mapped the following soil types as occurring within the general vicinity of the Study Area:

Exeter Sandy Loam, 0 to 2 Percent Slopes (EnA), Exeter Sandy Loam, Deep, 0 to 2 Percent Slopes (EpA), Exeter Very Fine Sandy Loam, Deep, 0 to 5 Percent Slopes (EyB)

The soils of the Exeter Series have slopes of 0 to 8 percent, and they lie in basins and on alluvial fans. These soils are well drained and developed in alluvium from moderately coarse granite materials. The upper 16 inches of soil consist of brown (10YR 5/3 and 10YR 4/3) sandy loam when dry and dark brown (10YR 3/3) sandy loam when moist. The soils of the Exeter Series are used for dryland grain and pasture, for irrigated alfalfa, potatoes, citrus, grapes, and for home sites.

Greenfield Sandy Loam, 0 to 2 Percent Slopes (GyA)

The soils of the Greenfield Series are deep, well drained soils that formed in moderately coarse and coarse textured alluvium derived from granitic and mixed rock sources. Greenfield soils occur on alluvial fans and terraces and have slopes of 0 to 30 percent. The upper 23 inches consist of pale brown (10YR 6/3) coarse sandy loam when dry and dark brown (10YR 4/3) coarse sandy loam when moist. The soils of the Greenfield Series are used for the production of a wide variety of irrigated field, forage and fruit crops and also for growing dryland grain and pasture. Principal vegetation on uncultivated areas consists of annual grass, forbs, some shrubs and scattered oak trees.

Hanford Coarse Sandy Loam, 0 to 2 Percent Slopes (HcA)

The soils of the Hanford Series consist of well drained and somewhat excessively drained soils on alluvial fans and slopes supporting this soil range from 0 to 15 percent. The Hanford Series developed in alluvium made up of granitic materials. The upper 18 inches consist of grayish brown (10YR 5/2) coarse sandy loam when dry and very dark grayish brown (10YR 3/2) coarse sandy loam when moist. The soils of the Hanford Series are used for dryland grain and pasture, for irrigated alfalfa, potatoes, and truck crops, and for home sites.

[5] SCS is now known as the National Resource Conservation Service or NRCS.

None of the soils within the Study Area are identified as hydric in the SCS's publication, Hydric Soils of the United States[6]; nor are any of these soils listed as hydric in the Soil Survey for Western Riverside County, California.

It is important to note that under the Arid West Supplement, the presence of mapped hydric soils is no longer dispositive for the presence of hydric soils. Rather, the presence of hydric soils must now be confirmed in the field.

II. JURISDICTION

A. Corps Jurisdiction

Pursuant to Section 404 of the CWA, the Corps regulates the discharge of dredged and/or fill material into waters of the United States. The term "waters of the United States" is defined in Corps regulations at 33 CFR Part 328.3(a) as:

> *(1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters, which are subject to the ebb and flow of the tide;*
> *(2) All interstate waters including interstate wetlands;*
> *(3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect foreign commerce including any such waters:*
>
> > *(i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or*
> > *(ii) From which fish or shell fish are or could be taken and sold in interstate or foreign commerce; or*
> > *(iii) Which are used or could be used for industrial purpose by industries in interstate commerce...*
>
> *(4) All impoundments of waters otherwise defined as waters of the United States under the definition;*
> *(5) Tributaries of waters identified in paragraphs (a) (1)-(4) of this section;*

[6] United States Department of Agriculture, Soil Conservation Service. 1991. Hydric Soils of the United States, 3rd Edition, Miscellaneous Publication Number 1491. (In cooperation with the National Technical Committee for Hydric Soils.)

> *(6) The territorial seas;*
> *(7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) (1)-(6) of this section.*

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 123.11(m) which also meet the criteria of this definition) are not waters of the United States.

> *(8) Waters of the United States do not include prior converted cropland.*[7] *Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding CWA jurisdiction remains with the U.S. Environmental Protection Agency (EPA).*

In the absence of wetlands, the limits of Corps jurisdiction in non-tidal waters, such as intermittent streams, extend to the ordinary high water mark (OHWM) which is defined at 33 CFR 328.3(e) as:

> *...that line on the shore established by the fluctuation of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.*

1. Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers, et al.

Pursuant to Article I, Section 8 of the U.S. Constitution, federal regulatory authority extends only to activities that affect interstate commerce. In the early 1980s the Corps interpreted the interstate commerce requirement in a manner that restricted Corps jurisdiction on isolated (intrastate) waters. On September 12, 1985, EPA asserted that Corps jurisdiction extended to isolated waters that are used or could be used by migratory birds or endangered species, and the definition of "waters of the United States" in Corps regulations was modified as quoted above from 33 CFR 328.3(a).

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[7] The term "prior converted cropland" is defined in the Corps' Regulatory Guidance Letter 90-7 (dated September 26, 1990) as "wetlands which were both manipulated (drained or otherwise physically altered to remove excess water from the land) and cropped before 23 December 1985, to the extent that they no longer exhibit important wetland values. Specifically, prior converted cropland is <u>inundated for no more than 14 consecutive days</u> during the growing season…." [Emphasis added.]

On January 9, 2001, the Supreme Court of the United States issued a ruling on *Solid Waste Agency of Northern Cook County v. United States Army Corps of Engineers, et al.* (SWANCC). In this case the Court was asked whether use of an isolated, intrastate pond by migratory birds is a sufficient interstate commerce connection to bring the pond into federal jurisdiction of Section 404 of the CWA.

The written opinion notes that the court's previous support of the Corps' expansion of jurisdiction beyond navigable waters (*United States v. Riverside Bayview Homes, Inc*.) was for a wetland that abutted a navigable water and that the court did not express any opinion on the question of the authority of the Corps to regulate wetlands that are not adjacent to bodies of open water. The current opinion goes on to state:

In order to rule for the respondents here, we would have to hold that the jurisdiction of the Corps extends to ponds that are not adjacent to open water. We conclude that the text of the statute will not allow this.

Therefore, we believe that the court's opinion goes beyond the migratory bird issue and says that no isolated, intrastate water is subject to the provisions of Section 404(a) of the CWA (regardless of any interstate commerce connection). However, the Corps and U.S. Environmental Protection Agency (EPA) have issued a joint memorandum, which states that they are interpreting the ruling to address only the migratory bird issue and leaving the other interstate commerce clause nexuses intact.

2. Rapanos v. United States and Carabell v. United States

On June 5, 2007, the EPA and Corps issued joint guidance that addresses the scope of jurisdiction pursuant to the CWA in light of the Supreme Court's decision in the consolidated cases *Rapanos v. United States* and *Carabell v. United States* ("Rapanos"). The chart below was provided in the joint EPA/Corps guidance.

For project sites that include waters other than TNWs and/or their adjacent wetlands or Relatively Permanent Waters (RPWs) tributary to TNWs and/or their adjacent wetlands as set forth in the chart below, the Corps must apply the significant nexus standard, that includes the data set forth in the *Approved Jurisdictional Determination Form*.

For "isolated" waters or wetlands, the joint guidance also requires an evaluation by the Corps and EPA to determine whether other interstate commerce clause nexuses, not addressed in the SWANCC decision are associated with isolated features on project sites for which a jurisdictional determination is being sought from the Corps. The information pertaining to isolated waters is also included on the *Approved Jurisdictional Determination Form*.

The agencies will assert jurisdiction over the following waters:

- Traditional navigable waters
- Wetlands adjacent to traditional navigable waters
- Non-navigable tributaries of traditional navigable waters that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months)
- Wetlands that directly abut such tributaries

The agencies will decide jurisdiction over the following waters based on a fact-specific analysis to determine whether they have a significant nexus with a traditional navigable water:

- Non-navigable tributaries that are not relatively permanent
- Wetlands adjacent to non-navigable tributaries that are not relatively permanent
- Wetlands adjacent to but that do not directly abut a relatively permanent non-navigable tributary

The agencies generally will not assert jurisdiction over the following features:

- Swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent or short duration flow)
- Ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water
-

The agencies will apply the significant nexus standard as follows:

- A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical and biological integrity of downstream traditional navigable waters
- Significant nexus includes consideration of hydrologic and ecologic factors

3. Corps Preliminary Jurisdictional Determination

A *Corps Preliminary Jurisdictional Determination Form* may be used to concede Corps jurisdiction where all streambeds within the project area are considered Corps jurisdictional waters. The project would be able to move forward pursuant to Corps Regulatory Guidance Letter (RGL) 08-02, issued on June 26, 2008, which allows the Corps to issue preliminary jurisdictional determinations (Preliminary JD) for a project. A Preliminary JD allows a project

to move forward by setting aside/voluntarily waiving questions regarding CWA jurisdiction over drainages onsite in the interest of allowing expeditiously obtaining a Section 404 Permit.
As stated in RGL 08-02:

While a landowner, permit applicant, or other affected party can elect to request and obtain an approved JD, he or she can also decline to request an approved JD, and instead obtain a Corps individual or general permit authorization based on either a preliminary JD, or, in appropriate circumstances (such as authorizations by non-reporting nationwide general permits), no JD whatsoever. The Corps will determine what form of JD is appropriate for any particular circumstance based on all the relevant factors, to include, but not limited to, the applicant's preference, what kind of permit authorization is being used (individual permit versus general permit), and the nature of the proposed activity needing authorization.

The Corps typically completes Preliminary JDs within 60 days of receipt of the request for such a determination. If the Corps project manager cannot complete the Preliminary JD within the 60-day timeframe, they must provide their supervisor, who would also provide the applicant, with a schedule to complete the determination (i.e., unlike the Rapanos significant nexus guidelines, there is a specific timeframe to complete the Preliminary JD and move forward with the jurisdictional determination, without uncertainty, and the EPA will not be involved with the Preliminary JD process as the Corps is not required to coordinate with the EPA to review Preliminary JDs).

4. Wetland Definition Pursuant to Section 404 of the Clean Water Act

The term “wetlands” (a subset of “waters of the United States”) is defined at 33 CFR 328.3(b) as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support...a prevalence of vegetation typically adapted for life in saturated soil conditions." In 1987 the Corps published a manual to guide its field personnel in determining jurisdictional wetland boundaries. The methodology set forth in the 1987 Wetland Delineation Manual and the Arid West Supplement generally require that, in order to be considered a wetland, the vegetation, soils, and hydrology of an area exhibit at least minimal hydric characteristics. While the manual and Supplement provide great detail in methodology and allow for varying special conditions, a wetland should normally meet each of the following three criteria:

- more than 50 percent of the dominant plant species at the site must be typical of wetlands (i.e., rated as facultative or wetter in the National List of Plant Species that Occur in Wetlands[8]);

- soils must exhibit physical and/or chemical characteristics indicative of permanent or periodic saturation (e.g., a gleyed color, or mottles with a matrix of low chroma indicating a relatively consistent fluctuation between aerobic and anaerobic conditions); and

- Whereas the 1987 Manual requires that hydrologic characteristics indicate that the ground is saturated to within 12 inches of the surface for at least five percent of the growing season during a normal rainfall year, the Arid West Supplement does not include a quantitative criteria with the exception for areas with "problematic hydrophytic vegetation", which require a minimum of 14 days of ponding to be considered a wetland.

B. Regional Water Quality Control Board

Subsequent to the SWANCC decision, the Chief Counsel for the State Water Resources Control Board issued a memorandum that addressed the effects of the SWANCC decision on the Section 401 Water Quality Certification Program.[9] The memorandum states:

California's right and duty to evaluate certification requests under section 401 is pendant to (or dependent upon) a valid application for a section 404 permit from the Corps, or another application for a federal license or permit. Thus if the Corps determines that the water body in question is not subject to regulation under the COE's 404 program, for instance, no application for 401 certification will be required…

The SWANCC decision does not affect the Porter Cologne authorities to regulate discharges to isolated, non-navigable waters of the states….

Water Code section 13260 requires "any person discharging waste, or proposing to discharge waste, within any region that could affect the waters of the state to file a report of discharge (an application for waste discharge requirements)." (Water Code § 13260(a)(1) (emphasis added).) The term "waters of the state" is defined as "any surface water or groundwater, including saline waters, within the boundaries of the state." (Water Code § 13050(e).) The U.S. Supreme

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[8] Reed, P.B., Jr. 1988. National List of Plant Species that Occur in Wetlands. U.S. Fish and Wildlife Service Biological Report 88(26.10).

[9] Wilson, Craig M. January 25, 2001. Memorandum addressed to State Board Members and Regional Board Executive Officers.

Court's ruling in SWANCC has no bearing on the Porter-Cologne definition. While all waters of the United States that are within the borders of California are also waters of the state, the converse is not true—waters of the United States is a subset of waters of the state. Thus, since Porter-Cologne was enacted California always had and retains authority to regulate discharges of waste into any waters of the state, regardless of whether the COE has concurrent jurisdiction under section 404. The fact that often Regional Boards opted to regulate discharges to, e.g., vernal pools, through the 401 program in lieu of or in addition to issuing waste discharge requirements (or waivers thereof) does not preclude the regions from issuing WDRs (or waivers of WDRs) in the absence of a request for 401 certification….

In this memorandum the SWRCB's Chief Counsel has made the clear assumption that fill material to be discharged into isolated waters of the United States is to be considered equivalent to "waste" and therefore subject to the authority of the Porter Cologne Water Quality Act. However, while providing a recounting of the Act's definition of waters of the United States, this memorandum fails to also reference the Act's own definition of waste:

"Waste" includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal.

The lack of inclusion of a reference to "fill material," "dirt," "earth" or other similar terms in the Act's definition of "waste," or elsewhere in the Act, suggests that no such association was intended. Thus, the Chief Counsel's memorandum signals that the SWRCB is attempting to retain jurisdiction over discharge of fill material into isolated waters of the United States by administratively expanding the definition of "waste" to include "fill material" without actually seeking amendment of the Act's definition of waste (an amendment would require action by the state legislature). Consequently, discharge of fill material into waters of the State not subject to the jurisdiction of the Corps pursuant to Section 404 of the CWA <u>may</u> require authorization pursuant to the Porter Cologne Act through application for waste discharge requirements (WDRs) or through waiver of WDRs, despite the lack of a clear regulatory imperative.

C. <u>California Department of Fish and Wildlife</u>

Pursuant to Division 2, Chapter 6, Sections 1600-1616 of the California Fish and Game Code, the CDFW regulates all diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake, which supports fish or wildlife.

CDFW defines a "stream" (including creeks and rivers) as "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having surface or subsurface flow that supports or has supported riparian vegetation." CDFW's definition of "lake" includes "natural lakes or man-made reservoirs."

CDFW jurisdiction within altered or artificial waterways is based upon the value of those waterways to fish and wildlife. The CDFW Legal Advisor has prepared the following opinion:

- Natural waterways that have been subsequently modified and which have the potential to contain fish, aquatic insects and riparian vegetation will be treated like natural waterways...
- Artificial waterways that have acquired the physical attributes of natural stream courses and which have been viewed by the community as natural stream courses, should be treated by [CDFW] as natural waterways...
- Artificial waterways without the attributes of natural waterways should generally not be subject to Fish and Game Code provisions...

Thus, CDFW jurisdictional limits closely mirror those of the Corps. Exceptions are CDFW's exclusion of isolated wetlands (those not associated with a river, stream, or lake), the addition of artificial stock ponds and irrigation ditches constructed on uplands, and the addition of riparian habitat supported by a river, stream, or lake regardless of the riparian area's federal wetland status.

III. RESULTS

A. <u>Corps Jurisdiction</u>

Corps jurisdiction associated with the Study Area totals 8.55 acres, none of which consists of jurisdictional wetlands, and includes 3,990 linear feet of ephemeral streambed. Corps jurisdiction within the Study Area is limited to one streambed, the PVSD. The PVSD is an improved, ephemeral drainage feature, which accepts urban runoff from areas surrounding the March Air Reserve Base and in the Cities of Perris and Moreno Valley.

The PVSD enters the Study Area from the northwestern portion of the Project boundary and flows from north/northwest to southeast for approximately 3,990 linear feet across the Study Area before exiting the property and flowing toward Perris Boulevard, ultimately discharging into the San Jacinto River, which is a tributary to Canyon Lake, which is a tributary to the downstream segment of the San Jacinto River, which is a tributary of Lake Elsinore, which empties into Alberhill Creek/Temescal Wash, which is a tributary of the Santa Ana River, which is a tributary of the Pacific Ocean, a TNW. The PVSD is an incised, somewhat improved and maintained, flood control channel with partially improved side slopes and a soft-bottom. The PVSD supports an OHWM ranging in width from 90 to 105 feet and is evidenced by water marks, presence of litter and debris, changes in soil characteristics, wracking, and shelving. The PVSD is generally unvegetated; therefore, no delineation data pits were necessary as no potential wetland areas are or were present.

A graphic depicting the limits of Corps jurisdiction within the PVSD is attached as Exhibit 3.

B. Regional Water Quality Control Board Jurisdiction

The PVSD has been determined to be Corps jurisdictional waters subject to regulation pursuant to Section 404 of the CWA and is also subject to regulation by the Regional Board pursuant to Section 401 of the CWA; therefore, Corps waters on site are also subject to Regional Board jurisdiction. As such, the PVSD does not need to be addressed separately pursuant to Section 13260 of the CWC, the Porter –Cologne Act. There are no other Regional Board jurisdictional waters within the Study Area.

A graphic depicting the limits of potential Regional Board jurisdiction is attached as Exhibit 3.

C. CDFW Jurisdiction

CDFW jurisdiction associated with the Study Area totals 11.97 acres, none of which consists of vegetated riparian habitat, and includes 3,990 linear feet of ephemeral streambed. CDFW jurisdiction within the Study Area is limited to one streambed, the PVSD. The PVSD is an improved, maintained, ephemeral drainage feature, which accepts urban runoff from areas surrounding the March Air Reserve Base and the Cities of Perris and Moreno Valley.

The PVSD enters the Study Area from the northwestern portion of the Project boundary and flows from north/northwest to southeast for approximately 3,990 linear feet across the Study Area before exiting the property and ultimately discharging into the San Jacinto River. The PVSD is an incised, somewhat improved, maintained, flood control channel with partially improved side slopes and a soft-bottom. The PVSD is generally unvegetated, and supports a high water mark (HWM) ranging in width from 130 to 165 feet and is evidenced by the presence of bed, bank, and channel.

A graphic depicting the limits of CDFW jurisdiction within the PVSD is attached as Exhibit 3.

IV. DISCUSSION

A. <u>Impact Analysis</u>

An analysis of impacts will be performed, based upon this delineation and the current Project design (or design alternative) upon the client's request. This analysis will be provided as a separate memorandum and accompanying map.

If you have any questions about this letter report, please feel free to contact me at (949) 837-0404 ext 20.

Sincerely,

GLENN LUKOS ASSOCIATES, INC.

Martin A. Rasnick
Sr. Regulatory Specialist

s: 0849-16_JD.docx

Exhibit 1

Regional Map

Source: ESRI World Street Map

N

0 2 4 8 Miles

MORENO VALLEY LOGISTICS CENTER PROJECT

Regional Map

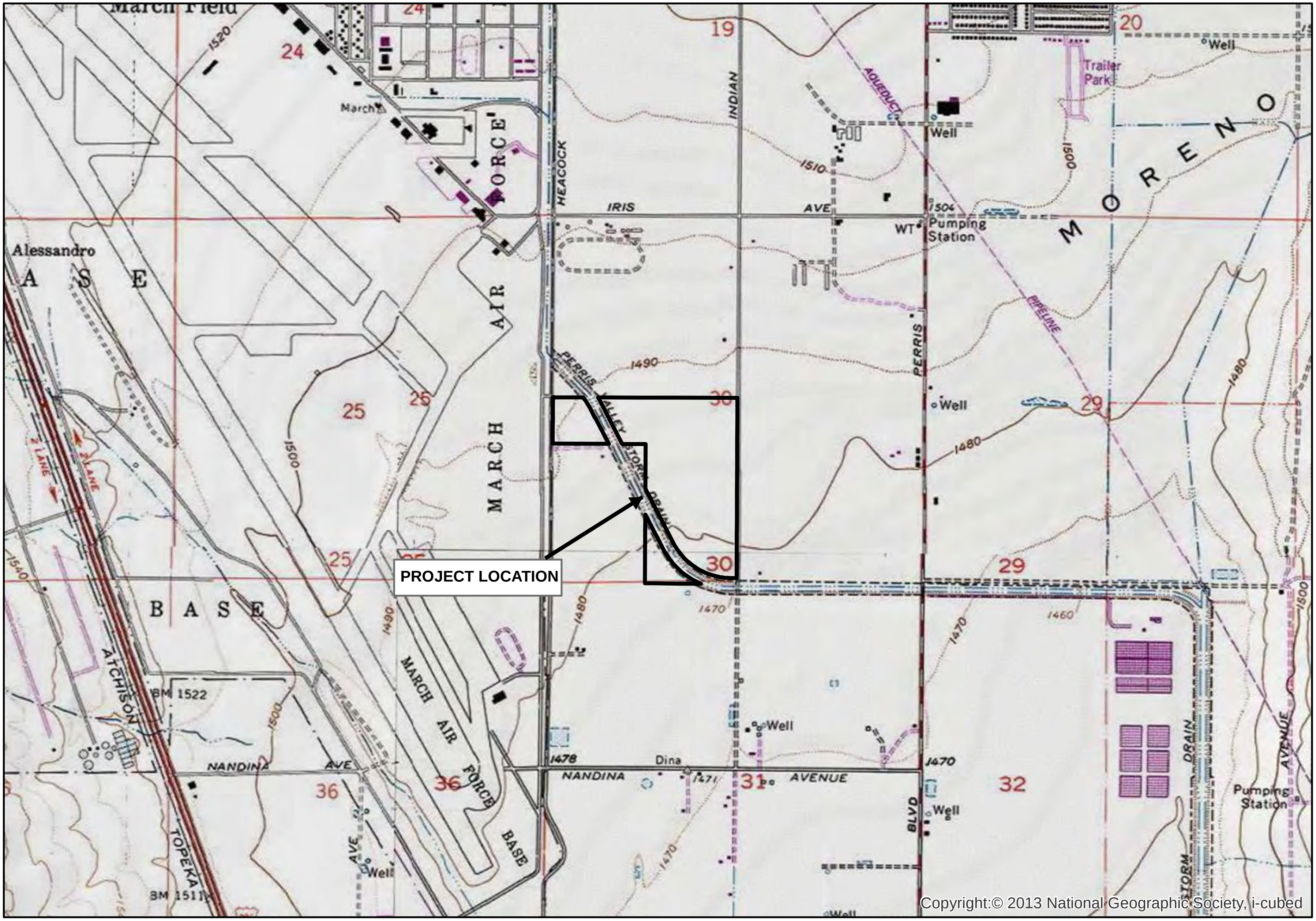
GLENN LUKOS ASSOCIATES

Exhibit 1

Exhibit 2

Vicinity Map

Adapted from USGS Sunnymeade and Perris, CA quadrangles



N

0 1,000 2,000 4,000 Feet

MORENO VALLEY LOGISTICS CENTER PROJECT

Vicinity Map

GLENN LUKOS ASSOCIATES

Exhibit 2

Exhibit 3

Jurisdictional Delineation Map

Legend

Project Boundary
Corps/RWQCB Non-Wetland Waters
CDFW Unvegetated Streambed
Widths (First Number is Corps Second is CDFW)

N

0 150 300 600
Feet

1 inch = 300 feet

Aerial Photo: ESRI Basemaps
Reference Elevation Datum: State Plane 6 NAD 83
Map Prepared by: C. Lukos, GLA
Date Prepared: April 17, 2015

MORENO VALLEY LOGISTICS CENTER PROJECT

Jurisdictional Delineation Map

GLENN LUKOS ASSOCIATES

Exhibit 3

Exhibit 4

Site Photographs

Photograph 1: Photograph depicting the Perris Valley Storm Drain.

Photograph 2: Photograph depicting the Perris Valley Storm Drain.

GLENN LUKOS ASSOCIATES

Exhibit 4

Moreno Valley Logistics Center Project

Site Photographs

Photograph 3: Photograph depicting the Project site. Note the lack of jurisdictional waters on site.

Photograph 4: Photograph depicting the Project site. Note the lack of jurisdictional waters on site.

GLENN LUKOS ASSOCIATES

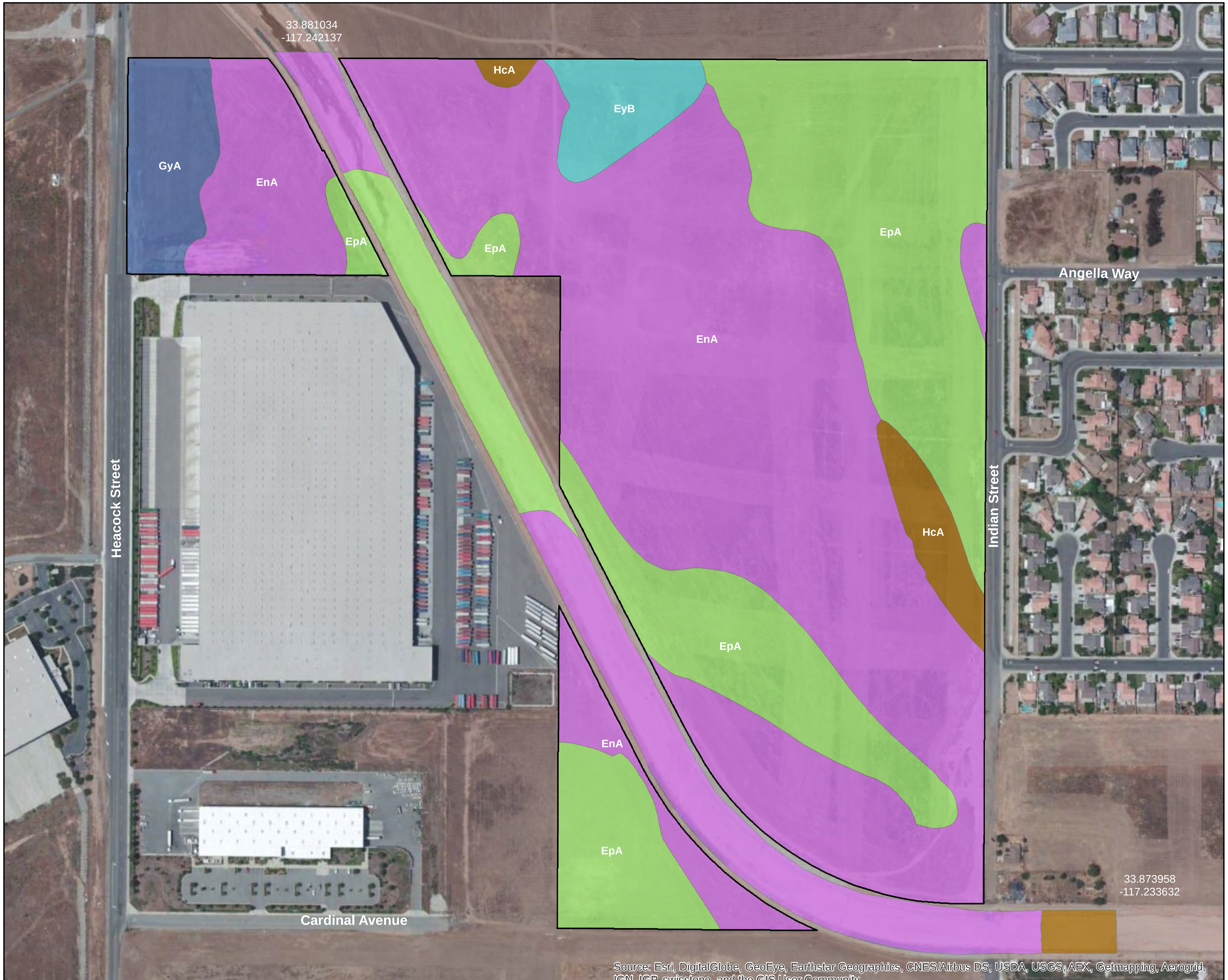
Exhibit 4

Moreno Valley Logistics Center Project

Site Photographs

Exhibit 5

Soils Map



Legend

Project Boundary
EnA - Exeter sandy loam, 0 to 2 percent slopes
EpA - Exeter sandy loam, deep, 0 to 2 percent slopes
EyB -Exeter very fine sandy loam, deep, 0 to 5 percent slopes
GyA - Greenfield sandy loam, 0 to 2 percent slopes
HcA - Hanford coarse sandy loam, 0 to 2 percent slopes

N

0 150 300 600
Feet

Aerial Photo: ESRI Basemaps
Reference Elevation Datum: State Plane 6 NAD 83
Map Prepared by: C. Lukos, GLA
Date Prepared: April 17, 2015

MORENO VALLEY LOGISTICS CENTER PROJECT

Soils Map

GLENN LUKOS ASSOCIATES

Exhibit 5

Appendix A

Impact Analysis Memorandum

MEMORANDUM

GLENN LUKOS ASSOCIATES

Regulatory Services

PROJECT NUMBER: 0849-0016more

TO: Ms. Tracy Zinn
Principal
T&B Planning, Inc.
17542 East 17th Street,
Suite 100
Tustin, California 92780

FROM: Martin Rasnick

DATE: May 12, 2015

SUBJECT: Moreno Valley Logistics Center Project Study Area; Located in the City of Moreno Valley; Riverside County, California: Jurisdictional Delineation Impact Analysis.

Ms. Zinn:

This memorandum summarizes Glenn Lukos Associates' (GLA) impact analysis of U.S. Army Corps of Engineers (Corps), California Department of Fish and Wildlife (CDFW), and Santa Ana Regional Water Quality Control Board (Regional Board) jurisdiction for the Moreno Valley Logistics Center Project Study Area (Study Area) located in the City of Moreno Valley; Riverside County, California. The Study Area encompasses approximately 89.4 acres of property on which the Moreno Valley Logistics Center is proposed (the "Project site") and a segment of the off site Perris Valley Storm Drain (PVSD) that bifurcates the property. An impact analysis was conducted for the Project based upon files received from T& B Planning and the Project team. Impacts to each regulatory jurisdiction are described below.

1. Impacts to Corps and Regional Board Jurisdiction

Potential Corps and Regional Board jurisdiction associated with the Study Area totals 8.55 acres, none of which consists of jurisdictional wetlands, and is limited to the off site Perris Valley Storm Drain (PVSD) as the on site Project does not contain Corps or Regional Board jurisdiction. A total of 3,990 linear feet of streambed is present. The Project, as proposed, would permanently impact 0.002 acre of Corps and Regional Board jurisdiction, none of which consists of jurisdictional wetlands, off site within the PVSD. A total of 52 linear feet of streambed will be permanently impacted. The Project would temporarily impact 0.09 acre of Corps and Regional Board jurisdiction none of which consists of jurisdictional wetlands, off site within the PVSD. A total of 196 linear feet of streambed will be temporarily disturbed.

Table One below depicts permanent impacts to Corps and Regional Board jurisdiction. Table Two below depicts temporary impacts to Corps and Regional Board jurisdiction. A graphic depicting permanent and temporary impact to Corps and Regional Board jurisdiction is attached as Exhibit 1A.

Table One. Permanent Impacts to Corps and Regional Board Jurisdiction

Drainage Features	Permanent Impacts to Corps Non-Wetland Waters (Acres)	Permanent Impacts to Corps Wetland Waters (Acres)	Total Permanent Impacts to Corps Jurisdiction (Acres)	Total Permanent Linear-Foot Impacts (Feet)
Perris Valley Storm Drain	0.002	0	0.002	52
Total(s)	**0.002**	**0**	**0.002**	**52**

Table Two. Temporary Impacts to Corps and Regional Board Jurisdiction

Drainage Features	Temporary Impacts to Corps Non-Wetland Waters (Acres)	Temporary Impacts to Corps Wetland Waters (Acres)	Total Temporary Impacts to Corps Jurisdiction (Acres)	Total Temporary Linear-Foot Impacts (Feet)
Perris Valley Storm Drain	0.09	0	0.09	196
Total(s)	**0.09**	**0**	**0.09**	**196**

2. Impacts to CDFW Jurisdiction

Potential CDFW jurisdiction associated with the Study Area totals 11.97 acres, none of which consist of vegetated riparian habitat, and is limited to the off site PVSD as the on site Project does not contain CDFW jurisdiction. A total of 3,990 linear feet of streambed is present. The Project, as proposed, would permanently impact 0.02 acre of CDFW jurisdiction off site, none of which consists of vegetated riparian habitat. A total of 66 linear feet of streambed will be permanently impacted. The Project would temporarily impact 0.18 acre of CDFW jurisdiction, none of which consists of vegetated riparian habitat. A total of 203 linear feet of streambed will be temporarily disturbed. Table Three below depicts permanent impacts to CDFW jurisdiction and Table Four depicts temporary impacts to CDFW jurisdiction. A graphic depicting permanent and temporary impact to CDFW jurisdiction is attached as Exhibit 1B.

Table Three. Permanent Impacts to CDFW Jurisdiction

Drainage Features	Permanent Impacts to CDFW Unvegetated Streambed (Acres)	Permanent Impacts to CDFW Vegetated Riparian Habitat (Acres)	Total Permanent Impacts to CDFW Jurisdiction (Acres)	Total Permanent Linear-Foot Impacts (Feet)
Perris Valley Storm Drain	0.02	0	0.02	66
Total(s)	**0.02**	**0**	**0.02**	**66**

Table Four. Temporary Impacts to CDFW Jurisdiction

Drainage Features	Temporary Impacts to CDFW Unvegetated Streambed (Acres)	Temporary Impacts to CDFW Vegetated Riparian Habitat (Acres)	Total Temporary Impacts to CDFW Jurisdiction (Acres)	Total Temporary Linear-Foot Impacts (Feet)
Perris Valley Storm Drain	0.18	0	0.18	203
Total(s)	**0.18**	**0**	**0.18**	**203**

The impacts identified above would require a Corps Section 404 Permit under the Corps' Nationwide Permit Program, a Section 401 Water Quality Certification from the Regional Board, and a Section 1602 Streambed Alteration Agreement from the CDFW.

If you have any questions regarding this memorandum, please call me at (949) 837-0404, Ext. 20. Thank you.

s: 0849-16_impactmemo.doc

Legend

- Project Boundary
- Offsite Permanent Impact
- Offsite Temporary Impact
- Corps/RWQCB Non-Wetland Waters

N

0 150 300 600
Feet

1 inch = 300 feet

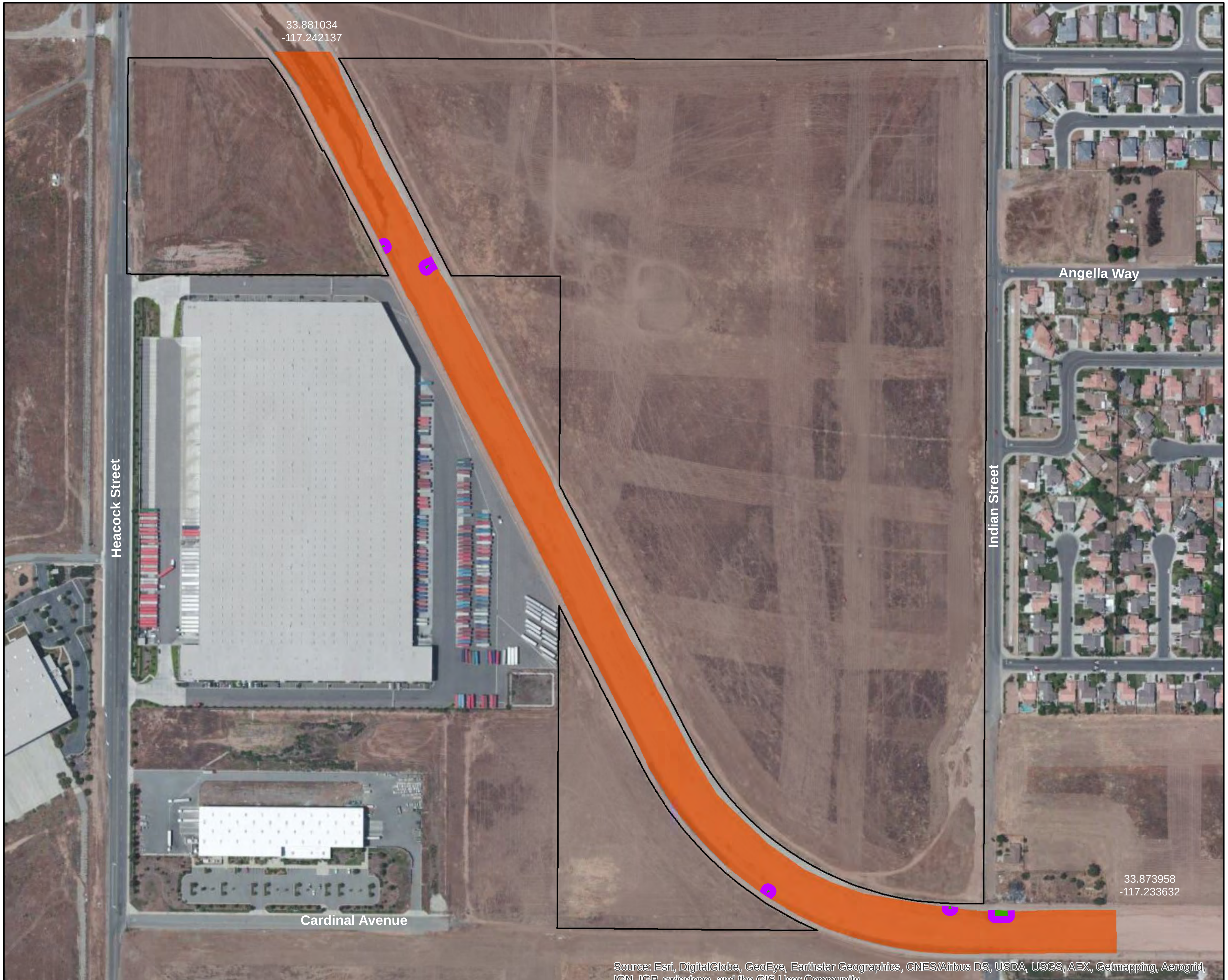
Aerial Photo: ESRI Basemaps
Reference Elevation Datum: State Plane 6 NAD 83
Map Prepared by: C. Lukos, GLA
Date Prepared: April 17, 2015

MORENO VALLEY LOGISTICS CENTER PROJECT

Corps/RWQCB Jurisdictional Delineation Impact Map

GLENN LUKOS ASSOCIATES

Exhibit 1A



Legend

- Project Boundary
- Offsite Permanent Impact
- Offsite Temporary Impact
- CDFW Unvegetated Streambed

N

0 150 300 600
Feet

1 inch = 300 feet

Aerial Photo: ESRI Basemaps
Reference Elevation Datum: State Plane 6 NAD 83
Map Prepared by: C. Lukos, GLA
Date Prepared: April 17, 2015

MORENO VALLEY LOGISTICS CENTER PROJECT

CDFW Jurisdictional Delineation Impact Map

GLENN LUKOS ASSOCIATES

Exhibit 1B

APPENDIX E:

PLANT SPECIES OBSERVED ON MARCH ARB

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Appendix E: Plant Species Observed on March ARB

SCIENTIFIC NAME	COMMON NAME
*Abelia ×grandiflora**	Glossy abelia
Acacia spp.*	Ornamental acacia
Acmispon americanus	Spanish lotus
Acmispon argophyllus	Silver bird's foot trefoil
Acmispon glaber	Deerweed
Acmispon micranthus	Small-flowered lotus
Acmispon strigosus	Strigose lotus
*Albizia julibrissin**	Silktree mimosa
*Alnus cordata**	Italian alder
*Alyssum alyssoides**	Pale madwort
*Amaranthus albus**	Pigweed amaranth
Ambrosia confertiflora	Weakleaf bur ragweed
Ambrosia psilostachya	Western ragweed
Amsinckia intermedia	Common fiddleneck
Amsinckia menziesii	Menzies' fiddleneck
Arecaceae spp.	Palm
Artemisia californica	California sagebrush
*Arundo donax**	Giant reed
Astragalus didymocarpus var. *didymocarpus*	Dwarf white milk vetch
Astragalus pomonensis	Pomona locoweed
Astragalus trichopodus var. *trichopodus*	Santa Barbara milk vetch
Atriplex lentiformis	Big saltbush
*Atriplex semibaccata**	Australian saltbush
*Avena fatua**	Wild oats
*Avena barbata**	Slender oats
*Avena sativa**	Common oat
Baccharis salicifolia	Mule fat
*Bellis perennis**	English daisy
*Bougainvillea spectabilis**	Great bougainvillea
*Brachychiton populneus**	Bottle tree
*Brassica nigra**	Black mustard
*Brassica rapa**	Field mustard

Appendix E: Plant Species Observed on March ARB

SCIENTIFIC NAME	COMMON NAME
*Bromus diandrus**	Ripgut grass
*Bromus hordeaceus**	Soft chess
*Bromus rubens**	Red brome
*Bromus tectorum**	Cheat grass
Calandrinia ciliata	Redmaids
*Callistemon citrinus**	Crimson bottlebrush
Callitriche marginata	Winged water-starwort
Calystegia macrostegia	Southern California morning-glory
Camissoniopsis bistorta	Southern suncup
*Capsella bursa-pastoris**	Shepherd’s purse
Carex eragrostis	Umbrella sedge
Castilleja exserta	Purple owl’s-clover
*Catalpa bignonioides**	Southern catalpa
*Cedrus deodara**	Deodar cedar
*Cenchrus ciliaris**	Buffelgrass
*Centaurea melitensis**	Tocalote
*Centaurea solstitialis**	Yellow star thistle
Centromadia pungens ssp. *pungens*	Common tarweed
*Ceratonia siliqua**	Carob
*Chenopodium album**	Goosefoot
*Chenopodium murale**	Nettle-leaved goosefoot
*Chloris paniculata**	Windmill grass
Chorizanthe polygonoides var. *longispina*	Knotweed spineflower
*Cirsium vulgare**	Bull thistle
Cistanthe monandra	Sand cress
Cistus x *purpureus**	Purple rockrose
*Convolvulus arvensis**	Field bindweed
Conyza canadensis	Horseweed
*Conyza bonariensis**	Little horseweed
Corethrogyne filaginifolia	Sandaster
*Cortaderia atacamensis**	Pampas grass
*Cotoneaster lacteus**	Milkflower cotoneaster

Appendix E: Plant Species Observed on March ARB

SCIENTIFIC NAME	COMMON NAME
*Cotula australis**	Australian waterbuttons
Crassula connata (=*C. erecta*)	Sand pygmy weed
Croton californicus	California croton
Cryptantha barbigera	Bearded cryptantha
Cryptantha intermedia	Common forget-me-not
Cucurbita foetidissima	Calabazilla
Cucurbita palmata	Coyote melon
Cylindropuntia acanthocarpa	Buckhorn cholla
Cylindropuntia californica var. *parkeri*	Valley cholla
*Cynodon dactylon**	Bermuda grass
Cyperus eragrostis	Tall umbrella-sedge
Cyperus parishii	Parish’s flatsedge
Datura discolor	Desert thorn-apple
Datura stramonium	Jimson weed
Datura wrightii	Sacred datura
Deinandra fasciculata	Slender tarplant
Deinandra kelloggii	Kellogg’s tarplant
Deinandra paniculata	San Diego tarplant
Delphinium parryi ssp. *parryi*	Blue larkspur
Deschampsia danthonioides	Annual hair grass
Dichelostemma capitatum	Blue dicks
*Dietes irioides**	Fortnight lily
Diplacus aurantiacus	Sticky monkeyflower
*Dodonaea viscosa**	Florida hopbush
*Echinochloa crus-galli**	Common barnyard
Eleocharis macrostachya	Creeping spikerush
*Eleusine indica**	Goose grass
Encelia californica	California brittlebush
Encelia farinosa	Brittlebush
Epilobium densiflorum	Spike primrose
Eremocarpus setigerus	Dove weed
Ericameria palmeri var. *pachylepis*	Palmer’s goldenbush

Appendix E: Plant Species Observed on March ARB

SCIENTIFIC NAME	COMMON NAME
Eriogonum fasciculatum	California buckwheat
Eriogonum gracile	Slender buckwheat
*Erodium botrys**	Long-beaked filaree
*Erodium brachycarpum**	Foothill filaree
*Erodium cicutarium**	Red-stemmed filaree
*Erodium moschatum**	White-Stemmed filaree
Eruca vesicaria ssp. *sativa**	Rocketsalad
*Erysimum cheiranthoides**	Wormseed wallflower
Erythranthe guttata	Seep monkeyflower
Eschscholzia californica	California poppy
*Eucalyptus globulus**	Blue gum
*Eucalyptus polyanthemos**	Redbox
Euphorbia albomarginata	Rattlesnake weed
*Euphorbia maculata**	Spotted sandmat
*Euphorbia maculata**	Spotted spurge
*Euphorbia nutans**	Eyebane
Festuca spp.*	Fescue
*Festuca myuros**	Rattail fescue
*Ficus carica**	Edible fig
*Fouquieria splendens**	Ocotillo
Fraxinus velutina	Velvet ash
*Galium murale**	Tiny bedstraw
*Gazania linearis**	Treasureflower
*Gazania rigens**	Treasureflower
Gilia angelensis	Chaparral gilia
Gnaphalium palustre	Western marsh cudweed
Gutierrezia californica	Matchweed
Hazardia squarrosa	Saw-toothed goldenbush
Helianthus annuus	Western sunflower
Heliotropium curassavicum	Chinese pusley
Heterotheca grandiflora	Telegraph weed
*Hibiscus moscheutos**	Crimsoneyed rosemallow

Appendix E: Plant Species Observed on March ARB

SCIENTIFIC NAME	COMMON NAME
*Hirschfeldia incana**	Perennial mustard
*Hordeum marinum**	Mediterranean barley
*Hordeum pusillum**	Little barley
*Hordeum vulgare**	Common barley
*Hypochaeris glabra**	Cat’s ear
Isocoma menziesii	Goldenbush
*Jacaranda mimosifolia**	Black poui
*Jacobaea maritima**	Dusty miller
*Juglans nigra**	Black walnut
Juniperus californica	California juniper
Koeleria macrantha	June grass
*Lactuca serriola**	Wild lettuce
*Lagunaria patersonii**	Cow itch tree
*Lamarckia aurea**	Goldentop
*Lantana montevidensis**	Trailing shrubverbena
Lasthenia gracilis	Common goldfields
Lasthenia coronaria	Royal goldfields
Lepidium lasiocarpum	Shaggyfruit peppergrass
Lepidium nitidum	Shining peppergrass
Lepidospartum squamatum	Scalebroom
Leptochloa uninervia	Sprangletop
*Ligustrum japonicum**	Japanese privet
*Liquidambar styraciflua**	Sweetgum
*Lolium multiflorum**	Italian ryegrass
*Lolium perenne**	English ryegrass
Ludwigia sp.	Primrose-willow
Lupinus bicolor	Miniature lupine
Lupinus nanus	Sky lupine
*Lythrum hyssopifolia**	Hyssop loosestrife
Malacothrix glabrata	Desert dandelion
*Malva parviflora**	Cheeseweed
Malvella leprosa	Alkali mallow

Appendix E: Plant Species Observed on March ARB

SCIENTIFIC NAME	COMMON NAME
*Marrubium vulgare**	Horehound
*Matricaria discoidea**	Pineapple weed
*Medicago polymorpha**	Bur clover
Medicago praecox	Mediterranean medick
*Medicago sativa**	Alfalfa
Melica imperfecta	Smallflower melicgrass
*Melilotus indicus**	Annual yellow sweet clover
*Melilotus officinalis**	Yellow sweet clover
*Mesembryanthemum crystallinum**	Common iceplant
Mimetanthe pilosus	Downy Monkey Flower
Muilla maritima	Common muilla
Mirabilis laevis var. *laevis*	Desert wishbone-bush
*Myrtus communis**	Myrtle
*Nandina domestica**	Sacred bamboo
Nassella pulchra	Purple needlegrass
Nemophila menziesii	Baby blue eyes
*Nerium oleander**	Oleander
*Nicotiana glauca**	Tree tobacco
*Olea europaea**	European olive
*Oncosiphon piluliferum**	Stinknet
Opuntia littoralis	Prickly pear
Oxalis albicans ssp. *californica*	California oxalis
*Oxalis corniculata**	Wood-sorrel
*Parkinsonia aculeata**	Jerusalem thorn
Parkinsonia microphyllum	Small-leaf palo verde
*Paspalum dilatatum**	Dallis grass
*Pelargonium ×hortorum zonal**	Geranium
Pectocarya linearis	Slender pectocarya
Persicaria lapathifolium	Willow weed
*Petunia ×atkinsiana**	Petunia
*Phacelia distans**	Distant phacelia
Phoenix canariensis	Canary Island date palm

Appendix E: Plant Species Observed on March ARB

SCIENTIFIC NAME	COMMON NAME
Phoenix dactylifera	Date palm
Phoenix roebelenii	Pygmy date palm
Pinus canariensis	Canary Island pine
Pinus spp.*	Ornamental pine
Plagiobothrys bracteatus	Bracted popcorn flower
Plagiobothrys canescens	Valley popcorn flower
Plagiobothrys collinus	Cooper’s popcorn flower
*Plantago coronopus**	Cut-leaf plantain
Plantago erecta	California plantain
*Plantago lanceolata**	Rib-Grass
*Plantago major**	Common plantain
*Poa annua**	Wintergrass
*Poa pratensis**	Kentucky bluegrass
Polygonum aviculare ssp. *depressum**	Smartweed
*Polypogon monspeliensis**	Beardgrass
Populus fremontii	Fremont’s cottonwood
Psilocarphus brevissimus var. *brevissimus*	Dwarf wooly marbles
Pyracantha fortuneana	Chinese firethorn
Quercus agrifolia	Coast live oak
Quercus chrysolepis	Canyon live oak
Quercus dumosa	Scrub oak
*Raphanus sativus**	Wild radish
*Rhaphiolepis indica**	Indian hawthorn
*Ricinus communis**	Castorbean
Rorippa sinuata	Spreading yellowcress
*Rosmarinus officinalis**	Rosemary
*Rumex conglomeratus**	Whorled dock
*Rumex crispus**	Curly dock
Rumex salicifolius	Willow dock
Sabal Mexicana	Texas sabal palm
Salix exigua	Narrow-leaved willow
Salix gooddingii	Black willow

Appendix E: Plant Species Observed on March ARB

SCIENTIFIC NAME	COMMON NAME
Salix lasiolepis	Arroyo willow
*Salsola tragus**	Russian thistle
*Schinus molle**	Peruvian pepper tree
*Schinus terebinthifolius**	Brazilian pepper tree
Schismus arabicus*	Arabian schismus
*Schismus barbatus**	Mediterranean grass
Scrophularia californica	California bee plant
*Senecio vulgaris**	Old man of the spring
*Sequoia sempervirens**	California redwood
*Sisymbrium irio**	London rocket
*Solanum elaeagnifolium**	White horse-nettle
Solanum parishii	Parish’s purple nightshade
Solanum umbelliferum	Blue witch
*Sonchus oleraceus**	Common sow thistle
Spergularia macrotheca var. *macrotheca*	Sticky sandspurry
Spergularia salina	Salt sandspurry
Stephanomeria exigua	Dean’s wreath-plant
Stephanomeria virgata	Tall stephanomeria
Syagrus romanzoffiana	Queen palm
Tamarix sp.*	Tamarisk
*Tamarix aphylla**	Athel tamarisk
*Tamarix chinensis**	Five-stamen tamarisk
*Taraxacum officinale**	Common dandelion
*Tecoma capensis**	Cape honeysuckle
Thuja occidentalis xhybrid*	Arborvitae
Trichostema lanceolatum	Vinegar weed
Trifolium gracilentum	Pin-point clover
*Trifolium hirtum**	Rose clover
Trifolium pretense	Red clover
*Trifolium repens**	White clover
*Triticum aestivum**	Common wheat
Tropidocarpum gracile	Slender keel fruit

Appendix E: Plant Species Observed on March ARB

SCIENTIFIC NAME	COMMON NAME
Typha angustifolia	Narrow-leaf cattail
Typha domingensis	Southern cattail
Typha latifolia	Broad-leaved cattail
*Ulmus Americana**	American elm
*Ulmus parvifolia**	Chinese elm
Uropappus lindleyi	Silver puffs
Urtica dioica ssp. *holosericea*	Stinging nettle
*Urtica urens**	Dwarf nettle
Veronica persica	Birdeye speedwell
Vicia americana	American vetch
Vicia benghalensis	Purple vetch
Xanthium strumarium	Cocklebur

Sources: MARB 1998a, MARB 1998b, MARB 2005, MARB 2010, MARB 2012, Field Visit Oberbauer 09 August 2017

Notes:

* = non-native species

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APPENDIX F:

WILDLIFE SPECIES OBSERVED ON MARCH ARB

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Appendix F: Wildlife Species Observed on March ARB

SCIENTIFIC NAME	COMMON NAME
Invertebrates	
Branchinecta lindahli	Lindahl's fairy shrimp
Amphibians	
Hyla regilla	Pacific tree frog
Reptiles	
Cnemidophorus tigris	Coastal western whiptail
Crotalus viridis helleri	Southern Pacific rattlesnake
Elgaria multicarinata	Southern alligator lizard
Pituophis melanoleucus	Gopher snake
Sceloporus occidentalis	Western fence lizard
Sceloporus orcutti	Granite spiny lizard
Uta stansburiana elegans	Side-blotched lizard
Birds	
Accipiter cooperii	Cooper's hawk
Agelaius phoeniceus	Red-winged blackbird
Agelaius tricolor	Tricolored blackbird
Ammodramus savannarum	Grasshopper sparrow
Anas cyanoptera	Cinnamon teal
Anas platyrhynchos	Mallard
Aquila chrysaetos	Golden eagle
Ardea alba	Great egret
Ardea herodias	Great blue heron
Athene cunicularia	Burrowing owl
Buteo jamaicensis	Red-tailed hawk
Buteo lagopus	Rough-legged hawk
Buteo lineatus	Red-shouldered hawk
Buteo regalis	Ferruginous hawk
Carpodacus mexicanus	House finch
Carpodacus purpureus	Purple finch
Casmerodius albus	Great egret
Cathartes aura	Turkey vulture
Charadrius montanus	Mountain plover

Appendix F: Wildlife Species Observed on March ARB

SCIENTIFIC NAME	COMMON NAME
Charadrius vociferus	Killdeer
Columba livia	Rock pigeon
Corvus brachyrhynchos	American crow
Corvus corax	Common raven
Dendroica coronata	Yellow-rumped warbler
Egretta thula	Snowy egret
Elanus leucurus	White-tailed kite
Eremophila alpestris actia	California horned lark
Euphagus cyanocephalus	Brewer’s blackbird
Falco mexicanus	Prairie falcon
Falco sparverius	American kestrel
Fulica americana	American coot
Gallinago gallinago	Common snipe
Geococcyx californianus	Greater roadrunner
Haliaeetus leucocephalus	Bald eagle
Icterus cucullatus	Hooded oriole
Lanius ludovicianus	Loggerhead shrike
Larus argentatus	Herring gull
Larus californicus	California gull
Larus delawarensis	Ring-billed gull
Mimus polyglottos	Northern mockingbird
Molothrus ater	Brown-headed cowbird
Nycticorax nycticorax	Black-crowned night heron
Pandion haliaetus	Osprey
Passer domesticus	House sparrow
Passerculus sandwichensis	Savannah sparrow
Pelecanus occidentalis	Brown pelican
Picoides nuttallii	Nuttall’s woodpecker
Podiceps nigricollis	Eared grebe
Podilymbus podiceps	Pied-billed grebe
Sayornis nigricans	Black phoebe
Sayornis saya	Say’s phoebe

Appendix F: Wildlife Species Observed on March ARB

SCIENTIFIC NAME	COMMON NAME
Sialia currucoides	Mountain bluebird
Sturnella neglecta	Western meadowlark
Sturnus vulgaris	European starling
Tringa melanoleuca	Greater yellowlegs
Turdus migratorius	American robin
Tyrannus verticalis	Western kingbird
Tyrannus vociferans	Cassin's kingbird
Tyto alba	Barn owl
Zenaida macroura	Mourning dove
Zonotrichia leucophrys	White-crowned sparrow
Mammals	
Canis latrans	Coyote
Dipodomys agilis	Pacific kangaroo mouse
Lepus californicus bennettii	San Diego black-tailed jackrabbit
Mephitis mephitis	Striped skunk
Mustela frenata	Long-tailed weasel
Peromyscus maniculatus	Deer mouse
Procyon lotor	Raccoon
Reithrodontomys megalotis	Western harvest mouse
Spermophilus beecheyi	California ground squirrel
Spilogale gracilis	Western spotted skunk
Sylvilagus audubonii	Audubon's cottontail
Thomomys bottae	Botta's pocket gopher

Sources: MARB 1998, MARB 1998, MARB 2005, MARB 2010, MARB 2012

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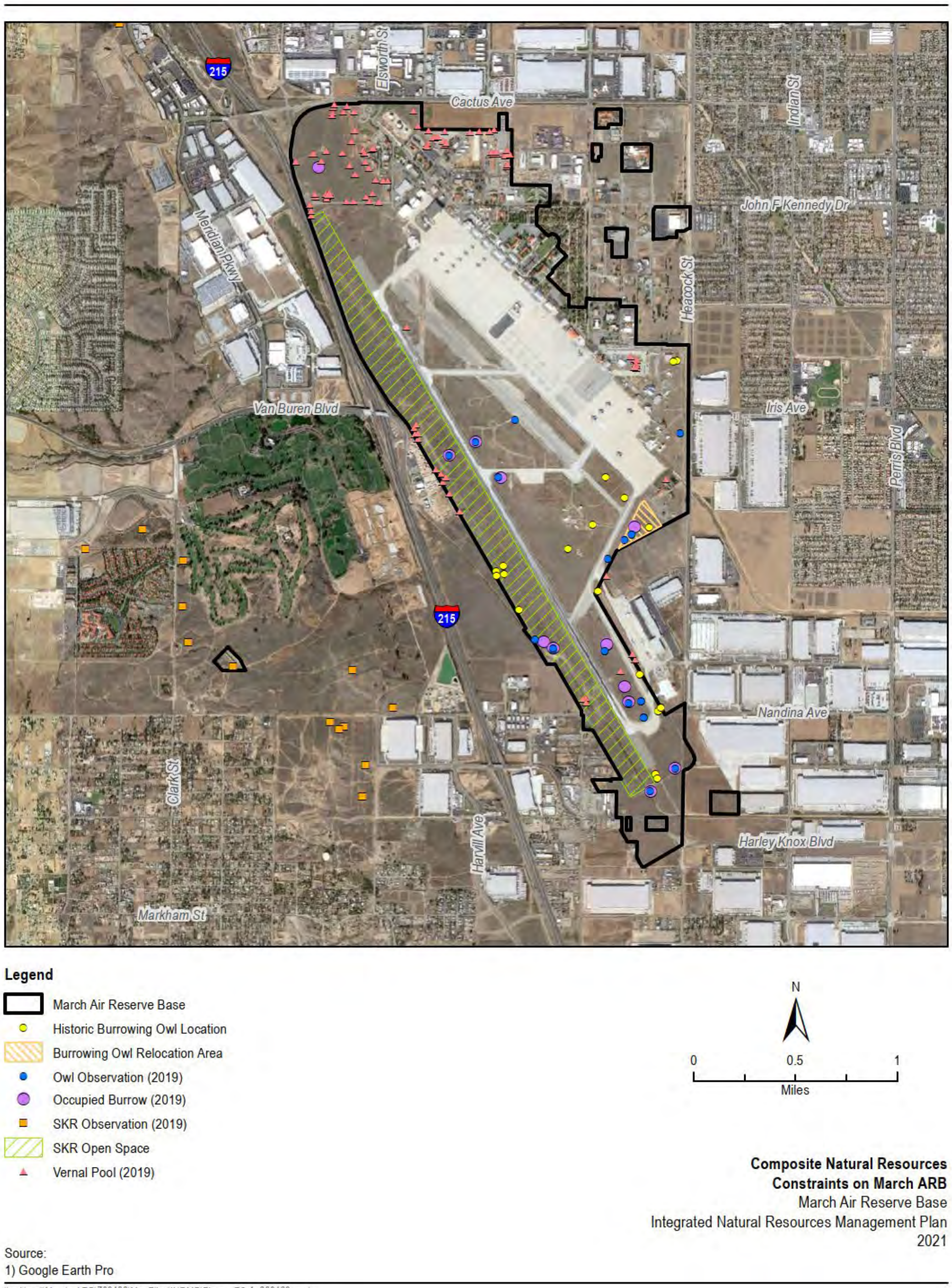
APPENDIX G:

COMPOSITE NATURAL RESOURCES CONSTRAINTS ON MARCH ARB



Composite Natural Resources Constraints on March ARB
March Air Reserve Base
Integrated Natural Resources Management Plan
2021

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APPENDIX H:

AIR INSTALLATION COMPATIBLE

USE ZONE REPORT FOR MARCH ARB

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FINAL

AIR INSTALLATIONS COMPATIBLE USE ZONES STUDY

MARCH AIR RESERVE BASE

RIVERSIDE, CALIFORNIA

AIR FORCE RESERVE COMMAND

2018

28 November 2017

MEMORANDUM FOR AREA GOVERNMENTS

FROM: 452 AMW/CC
2145 Graeber St Ste 117 (Bldg 470)
March ARB CA 92518-1667

SUBJECT: Air Installations Compatible Use Zones (AICUZ) Study

1. This AICUZ Study for March Air Reserve Base (ARB) is an update of the AICUZ study dated 2005. This update was initiated because of the beddown of new aircraft, operational changes and the introduction of new flight tracks. It is a reevaluation of aircraft noise and accident potential related to Air Force flying operations and is designed to aid in the development of local planning mechanisms which will protect the public safety and health, as well as preserve the operational capabilities of March ARB.

2. The AICUZ study contains a summary description of the affected area around the base. It outlines the location of runway clear zones, aircraft accident potential zones and noise contours and provides recommendations for development compatible with military flight operations. It is our desire that local governments incorporate these recommendations into community plans, zoning ordinances, subdivision regulations, building codes and other related documents.

3. This update provides noise contours based upon the Community Noise Equivalent Level (CNEL) metric and utilizes a planning noise contour. Long-range planning by local land use authorities involves strategies to influence present and future uses of land. Due to the long-range nature of planning, the Air Force provides planning contours–noise contours based on reasonable projections of future missions and operations. AICUZ studies using planning contours provide a description of the long-term (5-10 year) aircraft noise environment for projected aircraft operations that is more consistent with the planning horizon used by State, tribal, regional and local planning bodies.

4. We greatly value the positive relationship March ARB has experienced with its neighbors over the years. As a partner in the process, we have attempted to minimize noise disturbances through such actions as minimizing night flying, avoiding flights over heavily populated areas, reducing night maintenance activities and enforcing requested quiet hours. We solicit your cooperation in implementing the recommendations and guidelines presented in this AICUZ study update.

MATTHEW J. BURGER, Colonel, USAF
Commander, 452d Air Mobility Wing

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ACRONYMS

°F	degrees Fahrenheit
144 FW	144th Fighter Wing
160 ATKS	160th Attack Squadron
163 ATKW	163rd Attack Wing
194 FS	194th Fighter Squadron
196 ATKS	196th Attack Squadron
336 ARS	336th Air Refueling Squadron
452 AMW	452nd Air Mobility Wing
729 AS	729th Airlift Squadron
912 ARS	912th Air Refueling Squadron
ACC	Air Combat Command
AEDT	Aviation Environmental Design Tool
AETC	Air Education and Training Command
AFB	Air Force Base
AFH	Air Force Handbook
AFI	Air Force Instruction
AFM	Airfield Manager
AFPD	Air Force Policy Directive
AFRC	U.S. Air Force Reserve Command
AGL	above ground level
AGR	Active Guard Reserve
AICUZ	Air Installations Compatible Use Zones
ALUC	Airport Land Use Commission
ALUCP	Airport Land Use Compatibility Plan
AM	Airfield Manager
AMC	Air Mobility Command
AMW	Air Mobility Wing
ANG	Air National Guard
AOM	Airfield Operations Manager
AORB	Aircraft Operations Resource Book
AOZ	Airport Overlay Zones
APZ	Accident Potential Zones
ARB	Air Reserve Base
ART	Air Reserve Technician
ARW	Air Refueling Wing
ATC	Air Traffic Control
ATM	Air Traffic Manager
BASH	Bird Animal Strike Hazard
BRAC	Base Realignment and Closure
CBP RAU	U.S. Customs and Border Protection Riverside Aviation Unit
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNEL	Community Noise Equivalent Level
CP	Command Post
CY	Calendar Year

ACRONYMS (CONTINUED)

CZ	Clear Zones
dB	decibel
dBP	peak sound level
dBA	A-weighted decibels
DNL	Day / Night Average Sound Level
DoD	Department of Defense
DoDI	Department of Defense Instruction
DOT	Department of Transportation
DSG	Traditional Guard
DST	Daylight Savings Time
EA	Environmental Assessment
EMI	Electromagnetic Interference
EPA	Environmental Protection Agency
EIS	Environmental Impact Statement
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FHA	Federal Housing Administration
FICAN	Federal Interagency Committee on Aviation Noise
FICUN	Federal Interagency Committee on Urban Noise
FMC	Federal Management Circular
FOL	Forward Operating Location
ft	foot / feet
FY	Fiscal Year
GC	Government Code
GCA	Ground Control Approach
GCI	Ground Control Intercept
GSA	General Services Administration
HUD	Department of Housing and Urban Development
HAFZ	Hazards to Aircraft Flight Zones
HAZMAT	Hazardous Materials
Hz	Hertz
IFR	Instrument Flight Rules
ILS	Instrument Landing System
INM	Integrated Noise Model
IFR	Instrument Flight Rules
JCS	Joint Chiefs of Staff
JLUS	Joint Land Use Study
JNGB	Joint National Guard Base
JPA	Joint Powers Authority
Lmax	Maximum Sound Level
MAJCOM	Major Command
MSL	mean sea level
NAF	Non-appropriated Fund
NDB	Non-directional Beacon
NEPA	National Environmental Policy Act

ACRONYMS (CONTINUED)

NGB	National Guard Bureau
NLR	Noise Level Reduction
NM	Nautical Miles
NOTAM	Notice to Airmen
NVG	Night Vision Goggles
OEA	Office of Economic Adjustment
OPR	Office of Planning and Research
ORE / ORI	Operational Readiness Exercise / Operational Readiness Inspection
PAO	Public Affairs Officer
PM	Project Manager
RAPCON	Radar Approach Control System
SB	Senate Bill
SEL	Sound Exposure Level
SFO	simulated flame out
SLUCM	Standard Land Use Coding Manual
TACAN	Tactical Air Navigation
TR	Traditional Reservist
USAF	United States Air Force
UFC	United Facilities Criteria
USEPA	U.S. Environmental Protection Agency
VA	Veterans Administration
VFR	Visual Flight Rules
VHF	Very High Frequency
VORTAC	VHF Omnidirectional Range / Tactical Aircraft Control

SECTION 1
INTRODUCTION

This study is an update of the March Air Reserve Base (ARB) Air Installations Compatible Use Zones (AICUZ) Study. The update presents and documents the changes to the AICUZ since the release of the last study in 2005. It reaffirms Air Force policy of promoting public health, safety, and general welfare in areas surrounding base while seeking development compatible with the defense flying mission. This study presents changes in flight operations since the last study, and provides current noise contours and recommendations for achieving development compatible with the defense flying mission.

1.1 AICUZ PROGRAM

Military airfields attract development – people who work on base want to live nearby while others want to provide services to base employees and residents. When incompatible development occurs near an installation or training area, affected parties within the community may seek relief through political channels that could restrict, degrade or eliminate capabilities necessary to perform the defense mission. In the early 1970s, the Department of Defense (DoD) established the AICUZ program. The goal of the program is to protect the health, safety, and welfare of those living and working near air installations while sustaining the Air Force's operational mission. The Air Force accomplishes this goal by promoting proactive, collaborative planning for compatible development to sustain mission and community objectives.

The AICUZ Program recommends that noise levels, Clear Zones (CZs), Accident Potential Zones (APZs), and flight clearance requirements associated with military airfield operations be incorporated into local community planning programs in order to maintain the airfield's operational requirements while minimizing the impact to residents in the surrounding community. Cooperation between military airfield planners and community-based counterparts serves to increase public awareness of the importance of air installations and the need to address mission requirements and associated noise and risk factors in the public planning process. As the communities that surround airfields grow and develop, the United States Department of the Air Force has the responsibility to communicate and collaborate with local government on land use planning, zoning, and similar matters that could affect the installation's operations or missions. Likewise, the Air Force has a responsibility to understand and communicate potential impacts that new and changing missions may have on the local community.

1.2 Scope and Authority

1.2.1 Scope

This AICUZ study uses projected air operations. CZs, APZs, and noise zones associated with the March ARB runways are provided to the local communities along with recommendations for compatible land use near the base for incorporation into comprehensive plans, zoning ordinances, subdivision regulations, building codes, and other related documents.

1.2.2 Authority

Authority for the Air Force AICUZ program is lies in two documents:

- AFI 32-7063, Air Installations Compatible Use Zones Program implements Department of Defense Instruction (DoDI) 4165.57 Air Installations Compatible Use Zones and applies to all Air Force installations with active runways located in the United States and its territories. This instruction provides guidance to installation AICUZ Program Managers (PMs) with a framework that complies with Air Force Policy Directive (AFPD) 32-70.
- AF Handbook (AFH) 32-7084, AICUZ Program Manager's Guide provides installation AICUZ Program Managers (PM) specific guidance concerning the organizational tasks and procedures necessary to implement the AICUZ program. It is written in a "how to" format and aligns with AFI 32-70 Environmental Quality.

1.3 Previous AICUZ and Related Studies

The following five studies are relevant to this document:

- *1998 March Air Reserve Base AICUZ Study* (March ARB 1998) is the initial compatible land use study completed for March ARB.

- *2005 March Air Reserve Base AICUZ Study* (March 2005) which included the conversion from C-141 Starlifter aircraft to the C-17 Globemaster.
- *Final Environmental Assessment for the Proposed Military Construction and Total Force Integration at March Air Reserve Base, California*. July, 2010 (U.S. Air Force Reserve Command [AFRC] 2010). This document assessed the addition of the 912th Air Refueling Squadron (912 ARS) to the 452 AMW as an "Active Associate" to utilize existing KC-135 aircraft and a 60 percent (%) increase in KC-135 operations.
- *Final Environmental Impact Statement F-15 Aircraft Conversion for the 144th Fighter Wing, California Air National Guard, Fresno-Yosemite International Airport, California*. March, 2013 (California ANG 2015). This action replaced the California Air National Guard (ANG) 144th Fighter Wing (144 FW) F-16 aircraft with F-15 aircraft which included their Alert Mission at March ARB.
- *Environmental Assessment for the California Air National Guard 163rd Attack Wing MQ-9 Beddown at March Air Reserve Base, California*. March, 2017 (California ANG 2017). While 163rd Attack Wing (163 ATKW) pilots are based at March ARB, the launch and recovery element takes place at Southern California Logistics Airport. This document assesses the beddown and launch and recovery element of the MQ-9 at March ARB.

1.4 Changes Requiring an AICUZ Update

Based on the reasons listed below, this 2018 AICUZ Study is a needed update to the 2005 AICUZ Study and provides flight track, CZs, APZs, and noise zones information that reflects the most accurate picture of the aircraft activities associated with the base, as projected for 2018.

1.4.1 Operational Changes

The DoD aircraft fleet mix and training requirements may change over time. Resulting flight operations changes can affect the CNEL contours. The primary operational changes since the 2005 AICUZ Update are:

- The 144th Detachment Fighter Wing (144 FW) transition from F-16 to F-15 aircraft;
- Addition of the MQ-9 Reaper of the California Air National Guard 163rd Attack Wing (163 ATKW);
- Addition of the KC-135 Total Force Integration and associated flying hours.

The 2018 planning contours reflect the anticipated noise environment at March ARB.

1.4.2 Update of AICUZ Instruction

The March ARB AICUZ uses the most recent Air Force Instruction (AFI), which uses "annual average day." The primary reason for the change to average annual day is to be consistent with the land use recommendations guidelines.

1.4.3 Noise Model Development

To develop the noise contours that were presented in the 2005 March ARB AICUZ Study, military aircraft operations were modeled utilizing the DoD noise model NOISEMAP 6.5, and civilian operations were modeled utilizing the Federal Aviation Administration's Integrated Noise Model (INM). For the 2018 March ARB AICUZ Study, NOISEMAP 7.3 is used to model military aircraft operations, which include impedance (e.g., soft ground, hard ground, etc.) and elevation inputs that were not available in 2005. The FAA has replaced INM with the Aviation Environmental Design Tool (AEDT) 2c as the noise model for use at civilian airfields. Civilian operations at March ARB associated with March Joint Powers Authority (JPA) are now modeled using the FAA's new noise model AEDT. Noise level grids have been developed by both noise models for relevant aircraft operations, and these grids have been combined utilizing a plotting software program, NMPLOT 4.969; the result develops 2018 noise contours.

SECTION 2
MARCH ARB, CALIFORNIA

2.1 LOCATION

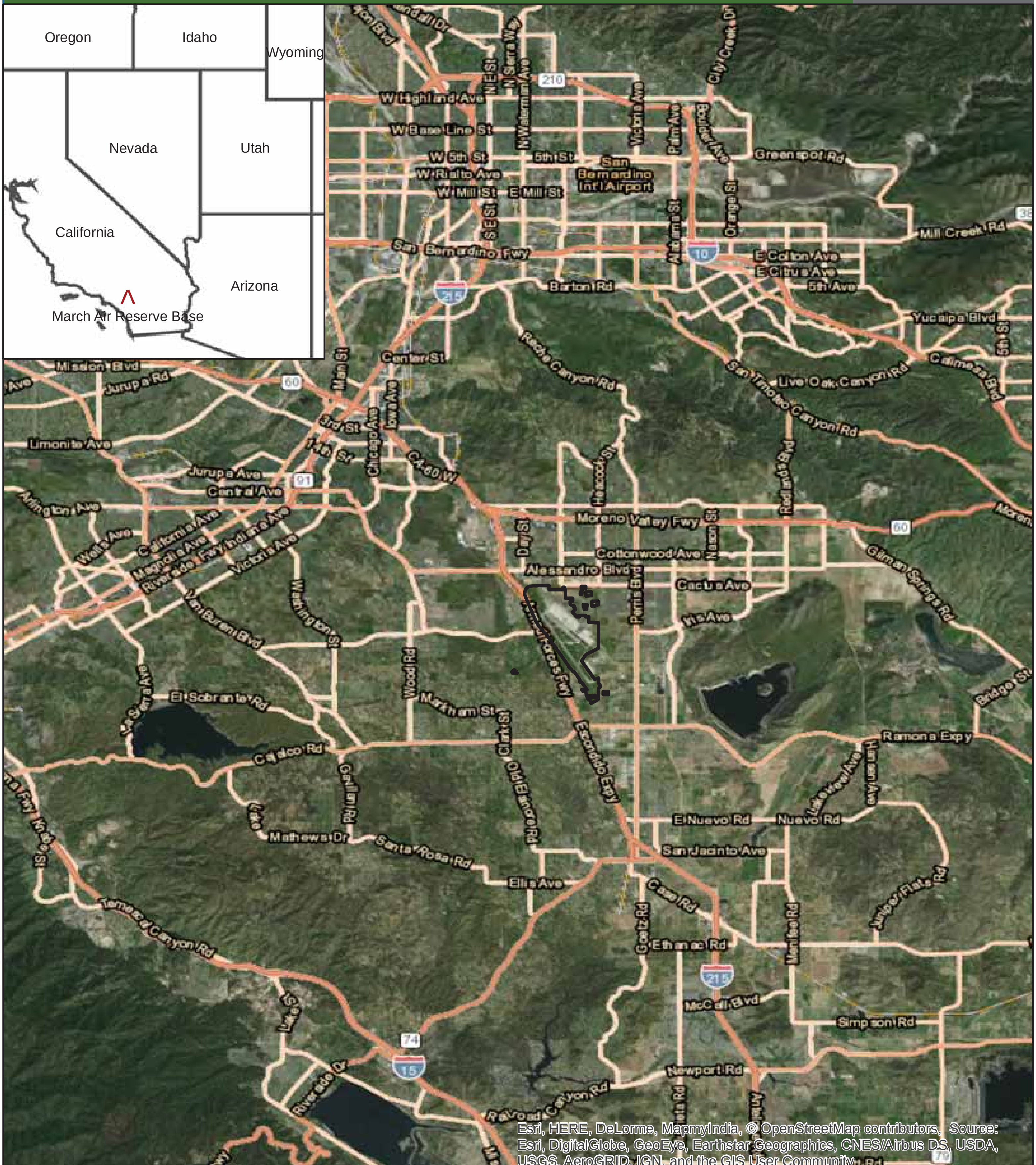
March ARB is in western Riverside County, California, approximately 70 miles east of Los Angeles (Figure 2-1). The base, which is composed of an airfield and associated support facilities, occupies approximately 2,300 acres of contiguous property and seven (7) geographically separate parcels. The March JPA planning area surrounds March ARB. In addition, the cities of Riverside, Moreno Valley, and Perris are adjacent to, or in close proximity to the base. March ARB has two active runways: Runway 14/32 is 13,302 feet in length and contains 1,000-foot overruns at both ends, while Runway 12/30 (3,061 feet in length) has 200-foot overruns at both ends.

2.2 HISTORY

The story of March Field began at a time when the United States was rushing to build up its military forces in anticipation of an entry into World War I. In early 1917, Congressional appropriations totaling approximately $640,000,000 attempted to back the plans of General George O. Squier, the Army's chief signal officer, to "put the Yankee punch into the war by building an army in the air." At the same time, the War Department announced its intentions to build several new military installations. Efforts by Mr. Frank Miller, then owner of the Mission Inn in Riverside, Hiram Johnson, and other notable Californians, succeeded in gaining War Department approval to construct an airfield at Alessandro Field located near Riverside, an airstrip used by aviators from Rockwell Field on cross-country flights from San Diego.

Regional Map

Figure 2-1



Legend

March Air Reserve Base

0 6 Miles

1 inch = 4.07 miles

Shortly thereafter, the Army established a new airfield. Sergeant Charles E. Garlick, who had landed at Alessandro Field in a "Jenny" in November 1917, was selected to lead the advance contingent of four men to the new base from Rockwell Field. On February 26, 1918, Garlick and his crew and a group of muleskinners from nearby Colton, known to be experts in clearing land as well as for their colorful syntax, began the task of excavating the building foundations at Alessandro. On March 20, 1918, Alessandro Flying Training Field became March Field, named in honor of Second Lieutenant Peyton C. March, Jr., son of the Army Chief of Staff, who had been killed in a flying accident in Texas the previous month. By late April 1918, enough progress had been made in the construction of the new field to allow the arrival of the first troops. The commander of the 818th Aero Squadron detachment, Captain William Carruthers, took over as the field's first commander and for a time operated out of an office in the Mission Inn. On May 15 when the first JN-4D "Jenny" took off, March Field seemed to have come into its own as a training installation. The signing of the armistice on November 11, 1918, did not halt training at March Field initially, but by 1921, the decision had been made to phase down all activities at the new base in accordance with sharply reduced military budgets. In April 1923, March Field closed its doors with one sergeant left in charge.

In July 1926, Congress created the Army Air Corps and approved the Army's five-year plan which called for an expansion in pilot training and the activation of tactical units. Accordingly, funds were appropriated for the reopening of March Field in March of 1927. Colonel William C. Gardenhire, assigned to direct the refurbishment of the base, had just directed his crews to replace underpinnings of many of the previous buildings when he received word that future construction would be in Spanish Mission architectural design.

March Field 1929

As March Field began to take on the appearance of a permanent military installation, the basic mission of the base changed. When Randolph Field began to function as a training site in 1931, March Field became an operational base. Before the end of the year, the 7th Bomb Group, commanded by Major Carl A. Spaatz, brought its Condor B-2 and Keystone B-4 bombers to the picturesque field. The activation of the 17th Pursuit Group and several subordinate units, along with the arrival of the 1st Bombardment Wing, initiated a period where March Field became associated with the Air Corps' heaviest aircraft as well as an assortment of fighters. In the decade before World War II, March Field took on much of its current appearance.

The attack on Pearl Harbor in December of 1941 quickly brought March Field back into the business of training aircrews. Throughout the war, many soon-to-be-famous bombardment groups performed their final training at March before embarking for duty in the Pacific. During this period, the base doubled in area and at the zenith of the war effort March supported approximately 75,000 troops. At the same time, the government procured a similar-sized tract west of the San Diego highway that bordered the base and established Camp Hahn as an anti-aircraft artillery training facility. It supported 85,000 troops at the height of its activity.

After the war, March reverted to its operational role and became a Tactical Air Command base. The main unit, the famed 1st Fighter Wing, brought the first jet aircraft, the F-80, to the base. In 1949, March became a part of the relatively new Strategic Air Command. Headquarters Fifteenth Air Force along with the 33rd Communications Squadron moved to March from Colorado Springs in the same year. Also in 1949, the 22nd Bombardment Wing moved from Smoky Hill AFB, Kansas to March. Thereafter, these three units remained as dominant features of base activities.

From 1949 to 1953, the B-29 Super fortresses dominated the flightline at March AFB. For four months, July to October, the 22nd saw action over Korea, and in this brief period contributed to the elimination of all strategic enemy targets. Involvement in the Korean Conflict had no sooner ended when the wing converted from the huge propeller-driven B-29s to the sleek B-47 jet bombers and their supporting tankers, the KC-97s. The KC-97s belonged to the 17th and 22nd Air Refueling Squadrons and represented an amazing jump in technology. This had been demonstrated earlier when General Archie Old, the Fifteenth Air Force

Boeing B-47 Stratojets assigned to March AFB's 12th Air Division

KC-97 Stratotanker at March AFB

commander, had led a flight of three B-52s in a non-stop around-the-world flight termed "Power Flight" in just 45 hours and 19 minutes. In 1960, the first Reserve unit was assigned to March, flying C-119s. The end of the 1960s saw March AFB preparing to exchange its B-47s and KC-97s for updated bombers and tankers. Increasing international tensions in Europe and elsewhere by September 16, 1963, brought March its first B-52B bomber, "The City of Riverside." Soon 15 more of the giant bombers appeared on the flightline along with new KC-135 jet "Stratotankers." March's first KC-135, "The Mission Bell," arrived on October 4, 1963.

During this period, both tankers and bombers stood alert at March AFB as part of America's nuclear deterrent force. The might of the bombers and tankers, however, was soon to be used in quite another scenario. During the conflict in Southeast Asia, the 22nd Bombardment Wing deployed its planes several times and March crews learned well the meaning behind such names as Young Tiger, Rolling Thunder, Arc Light and Linebacker II. In these troubled years, the base served as a logistical springboard for supplies and equipment en route to the Pacific. Near the end of the conflict, March operated as one of the reception centers for returning prisoners of war.

Following the end of hostilities in Southeast Asia, the 22nd returned to its duties as an integral part of the Strategic Air Command. For the next eighteen years until 1982, March AFB effectively supported America's defensive posture. The 22nd Bombardment Wing, so long a key ingredient in March's long history, became an air refueling wing operating the new KC-10 tanker. The new tankers, able to accomplish considerably more than the KC-135s, promised a new tomorrow for the Strategic Air Command. Within months after the first KC-10 arrived at the base on August 11, 1982, crews quickly realized the ability of the new aircraft to carry cargo and passengers as well as impressive fuel loads over long distances. Air refueling for March AFB had entered a new age. The California Air National Guard (ANG) also arrived in 1982, bringing with them the F-4Cs.

Beginning in the early 1980s, the KC-10 was the vehicle that carried March into a new technological epoch. The large KC-10s with their versatility and dependability again gave the base a featured part in America's efforts to retain a strong and flexible military air arm. The utter importance of the KC-10s in conventional operations became particularly apparent during DESERT SHIELD and DESERT STORM where their outstanding service contributed measurably to the success of American forces in the defense of Saudi Arabia and the liberation of Kuwait.

In 1993, March was selected for realignment. In August 1993, the 445th Military Airlift Wing transferred to March from Norton Air Force Base (AFB), California. On January 3, 1994, the 22nd Air Refueling Wing was transferred to McConnell AFB, Kansas, and the 722nd Air Refueling Wing stood up at March AFB. As part of the Air Force's realignment and transition, March's two Reserve units, the 445th Military Airlift Wing and the 452nd Air Refueling Wing were deactivated and their personnel and equipment joined under the 452 AMW on April 1, 1994. On April 1, 1996, March AFB officially became March ARB.

In 2005, the wing retired the C-141B Stratolifter fleet and a year later began receiving the first of eight C-17 Globemaster aircraft.

2.3 MISSION

The primary mission of the U.S. Air Force Reserve Command (AFRC) 452 AMW is to provide airlift support for the USAF and to train in tactical airlift and airdrop of personnel and supplies in combat, air refueling, and aeromedical evacuation. The 452 AMW is the host organization responsible for all operational functions at March ARB supporting the Air Mobility Command (AMC), Air Combat Command (ACC), and Pacific Air Forces, and is the AFRC’s largest wing. Currently, both KC-135 and C-17 aircraft are assigned to March ARB and used for training missions of the 452 AMW. In addition to the AFRC, March ARB is home to the California ANG’s 163 ATKW, which operates the MQ-9 Reaper. Another California ANG unit, the 144th Fighter Wing (144 FW) out of Fresno-Yosemite International Airport, operates an F-16 aircraft (soon to be transitioned to F-15 aircraft) alert mission out of March ARB. Additional tenants at March ARB, include the U.S. Customs and Border Patrol Riverside Aviation Unit (CBP RAU), an Aero Club, and civilian operations through March JPA.

As the host unit at March ARB, the 452 AMW is responsible for providing certain on-base services and facilities that are common to the wing and tenant organizations. These include law enforcement, fire department, fuel storage area, airfield management, and service for transient aircraft.

In addition to the military entities at March ARB, airport facilities are used by civilian aircraft and organizations. A joint use agreement was created on May 7, 1997, between the DoD and the March JPA to establish March Air Field as a joint use airport. A joint use airport is defined by the USAF as one where the facilities are owned and operated by the USAF and are made available for use by civil aviation. Consequently, the joint use agreement permits the establishment and operation of commercial aviation, except for pilot training activities, where civilian and military entities share essential aviation facilities (March JPA 2005).

2.4 HOST AND TENANT UNITS

The based operating unit and host wing is the 452 AMW of the AFRC. Tenant flying units include 912th Air Refueling Squadron (912 ARS), an active associate squadron, the California Air National Guard’s 144 FW and 163 ATKW, the CBP RAU, Aero Club, and March JPA.

2.4.1.1 452 AMW

The 452 AMW is host to more than 16 tenant organizations located at March ARB. The wing consists of the 452nd Operations Group, 452nd Maintenance Group, 452nd Mission Support Group and 452nd Medical Group. The Operations Group includes the 729th Airlift Squadron (729 AS) which operates the C-17 Globemaster and the 336th Air Refueling Squadron (336 ARS) and 912 ARS which operate the KC-135 Stratotanker.

2.4.1.2 California Air National Guard

The 194th Fighter Squadron (194 FS) of the 144 FW accomplishes an alert mission at March ARB with four F-16 aircraft. Though the 194 FS currently utilize F-16 aircraft for their alert mission, when F-15 aircraft become available the unit will be expected to complete the alert mission operating F-15 aircraft. The 160th and 196th Attack Squadrons (160 ATKS and 196 ATKS) of the 163 ATKW operates the MQ-9 Reaper, both the beddown and launch and recovery element, from March ARB, which would include a chase plane when operating outside Prohibited, Restricted, and Warning Area airspaces.

2.4.1.3 U.S. Customs and Border Protection

CBP RAU operate two-fixed wing PC-12s and one rotary-wing AS-350 from March ARB in fulfilling its role as the nation's only federal law enforcement center tasked to coordinate interdiction operations in the Western Hemisphere.

2.4.1.4 Aero Club

Established in 1954, the Aero Club at March ARB operates General Aviation Aircraft (i.e., fixed- and variable-pitch, turbo propeller, etc.) for use by eligible active or retired military personnel.

2.4.1.5 March JPA

The March JPA oversees general and commercial aviation operations at March ARB under the Joint Use Agreement established on 7 May 1997, and amended on 19 March, 2014.

2.5 AIRFIELD ENVIRONMENT

March ARB occupies approximately 2,300 acres of contiguous property and is surrounded by the March JPA planning area. The main airfield includes two runways (14/32 and 12/30) which handle all of the aircraft operations and is located to the west of the main base (Figure 2-2).

March ARB Map

Figure 2-2

The aircraft apron and hangars are located to the east of both Runway 14/32 and Runway 12/30, and parallel to the later. March ARB contains two active runways: Runway 14/32 is a Class B runway with a length of 13,302 feet and width of approximately 200 feet; Runway 12/30 is a Class A runway with a length of 3,061 feet and width of 100 feet, and is closed to the public. (Figure 2-3). An in-frame engine run up pad with aircraft anchor blocks is located on the parking apron and in front of the air traffic control tower for high-end power aircraft engine maintenance runs. There is a southwest facing blast fence at the southern end of the apron and another blast fence at the mid-way point of the apron facing to the northwest.

A runway is typically used in both directions and counted as two separate runways, depending on the direction of the departure. Each direction is labeled as a separate runway and numbered based on its magnetic heading, divided by 10 and rounded to a whole number.

2.6 Economic Impact

During Fiscal Year (FY) 2014 March ARB employed over 9,500 personnel, as tabulated in Table 2-1. March ARB included a serving population of over 7,089 military personnel, with 6,378 traditional guardsmen and reserves. Civilian employees totaled 2,436 including 1,479 appropriated and 957 non-appropriated employees (Table 2-1).

Table 2-1. 2014 March ARB Employment

Classification	Total
Active Duty Military	305
Air National Guard (ANG)/ Reserve (ART/AGR)	346
Traditional Guard (DSG) / Reserve (TR)	6,378
Individual Mobilization Augmentees (IMA)	60
Total Military	7,089
Civilian Employees Appropriated	1,479
Civilian Employees Non-appropriated	957
Total Civilian Personnel	2,436
Total Personnel	**9,525**

Source: Filson 2016.

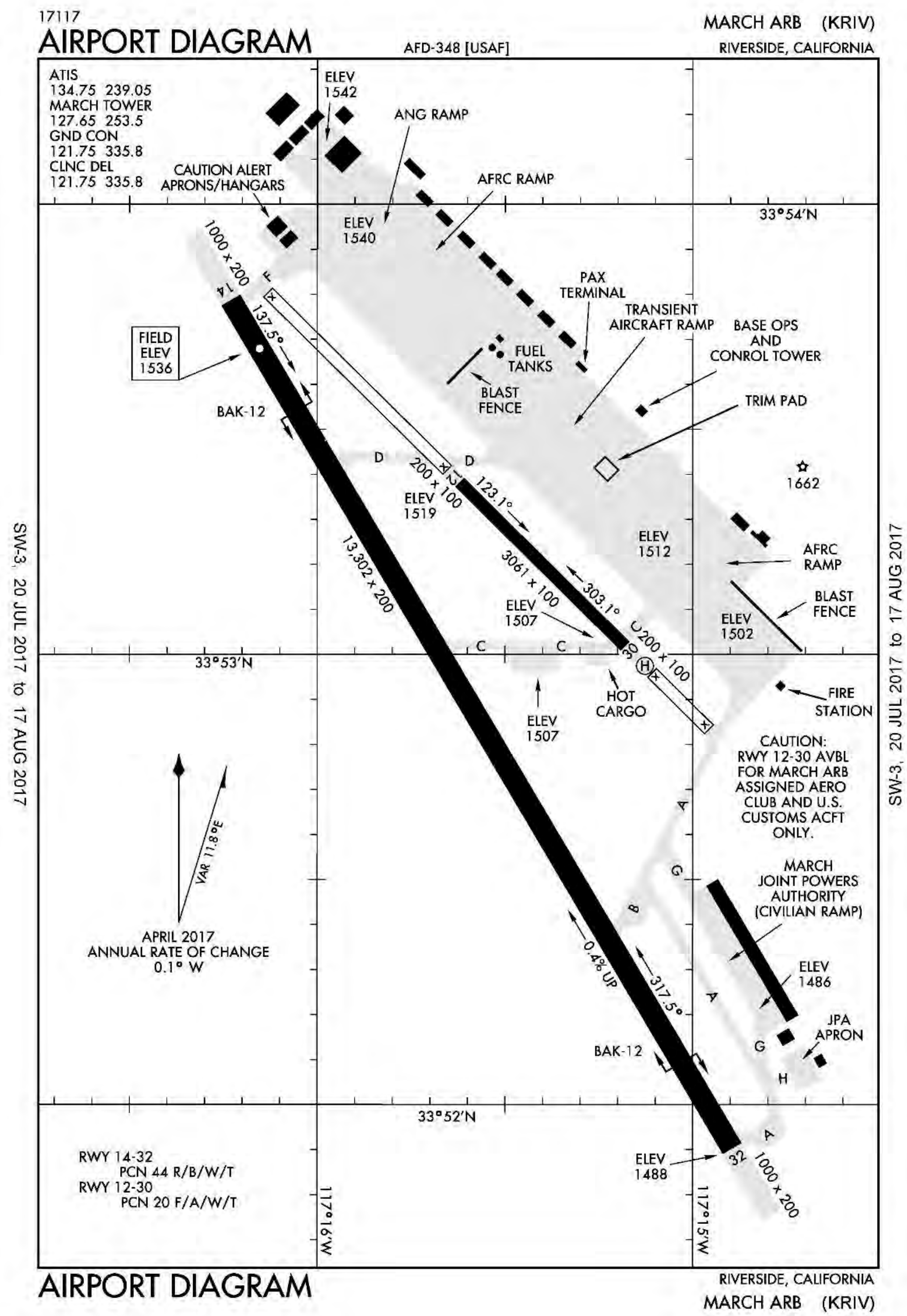


Figure 2-3. March ARB Airfield Diagram

In addition to a payroll over $267 million, total expenditures for goods/services by March ARB exceeded $182 million which results in a total economic direct impact of approximately $450 million from March ARB (Table 2-2).

Table 2-2. 2014 March ARB Direct Economic Impact

Classification	Category	
Appropriated Fund Military Payroll	Active Duty Military	$19,093,768
	Air National Guard (ANG)/ Reserve (ART/AGR)	$30,363,018
	Traditional Guard (DSG)/ Reserve (TR)	$74,084,581
	Individual Mobilization Augmentees (IMA)	$1,620,074
	Subtotal	$125,161,441
Appropriated Fund Civilian Payroll	General Schedule	$92,513,542
	Other	$38,751,309
	Subtotal	$131,264,851
Non-Appropriated Fund, Contract Civilian and Private Business Payroll	Civilian NAF	$4,536,062
	Contract Civilian (not included elsewhere)	$4,582,349
	Other	$1,696,165
	Subtotal	$10,814,576
Expenditures	Contracts and Procurement	$ 28,073,896
	Material, Equipment and Supplies	$127,582,415
	Construction	$26,925,607
	Subtotal	$182,581,918
Total	Total Economic Impact Estimate	$449,822,785

Source: Filson 2016.

SECTION 3
AIRCRAFT OPERATIONS

Aircraft operations are the primary source of noise associated with a military airbase. The level of noise exposure relates to a number of variables, including the aircraft type, engine power setting, altitude flown, direction of the aircraft, flight track, temperature, relative humidity, frequency and time of operation (day/night). This chapter discusses aircraft based at or transient (aircraft that are not permanently assigned, but conduct operations at the base on an occasional basis) to March ARB, the types and number of operations conducted at the airfields, and the runways and flight tracks used to conduct the operations.

Aircraft types that operate at March ARB are presented in Section 3.1. Sections 3.2 and 3.3 present aircraft operations and runway/flight track utilization, respectively. Section 3.4 summarizes flight profiles specific to March ARB.

3.1 AIRCRAFT TYPES

There are two primary classifications (types) of aircraft in operation at March ARB, fixed wing and rotary wing (helicopter). An assortment of these are permanently based at March ARB and are the most commonly observed aircraft to conduct operations from the base. Aircraft that are not permanently assigned, but conduct operations at the base on an occasional basis are referred to as transient. A brief description of base assigned and the most common transient aircraft is provided below.

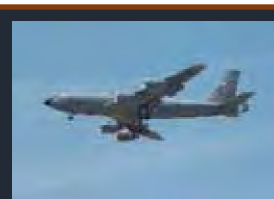
3.1.1 Based Military Aircraft

Based military aircraft operating out of March ARB include airlift, refueling, remotely piloted, and fighter aircraft. The C-17 and KC-135 aircraft are operated by the 452 AMW, which includes the 729 AS (C-17) and 336 ARS (KC-135). The 912 ARS also operates the 452 AMW's KC-135 aircraft. The 194 FS of the California ANG, a detachment unit of the 144 FW, would operate F-15 aircraft. Also with the California ANG, the 160 ATKS and 196 ATKS operates the remotely piloted aircraft (RPA) MQ-9 Reaper.


C-17 Globemaster

The C-17 Globemaster is a Tactical and Strategic Airlift Aircraft that is powered by four turbofan engines and can operate on a runway as short as 3,500 feet. In addition to its cruise speed of 500 miles per hour (mph) and range of 2,700 miles, the C-17 can also reverse and is capable of completing a three-point turn. Thus, the C-17 is the most flexible cargo aircraft in the airlift force.

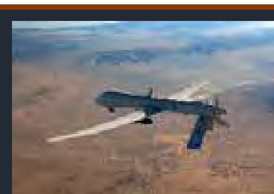
The KC-135 Stratotanker provides the core aerial refueling capability for the USAF and has excelled in this role for more than 50 years. It also provides aerial refueling support to the Navy, Marine Corps and allied nation aircraft. The KC-135 is also capable of transporting litter and ambulatory patients using patient support pallets during aeromedical evacuations.


KC-135 Stratotanker

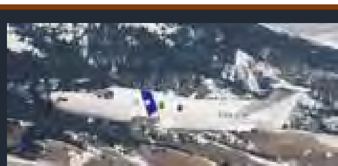

F-15 Eagle

The F-15 Eagle is a twin engine, all-weather, extremely maneuverable, tactical fighter designed to permit the Air Force to gain and maintain air supremacy over the battlefield. This aircraft has a maximum low altitude speed of 900 mph and can achieve a maximum altitude of 65,000 feet.

Commonly referred to as the Reaper, the MQ-9 is powered by a single turbo-propeller and has multiple mission capabilities. It's a medium-altitude, long-endurance RPA that is employed primarily against dynamic execution targets and secondarily as an intelligence collection asset. Given its significant loiter time, wide-range sensors, multi-mode communications suite, and precision weapons -- it provides a unique capability to perform strike, coordination, and reconnaissance against high-value, fleeting, and time-sensitive targets.

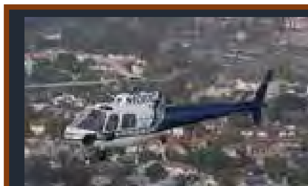

MQ-9 Reaper

3.1.2 Based Government and Aero Club Aircraft


PC-12

This single-engine turbo propeller aircraft operated by the CBP RAU at March ARB, the fixed-wing PC-12 can be operated by one or two pilots and can accommodate up to nine passengers. This aircraft has a cruising speed of 320 mph and a range of 2,120 miles.

The rotary-winged AS-350 is also utilized by the CBP RAU at March ARB. This single-engine helocopter has a cruising speed of 152 mph and a range of 411 miles. A popular helicopter choice for law enforcement based on its versatility and minimal maintenance requirements.


AS-350

Utilized by the March ARB Aero Club, the Cessna 172 is a fixed-pitch single-engine propeller aircraft that seats four. With a cruise speed of 140 mph and a range of 801 miles, the Cessna 172 is arguably the most popular general aviation aircraft in the world.


Cessna 172

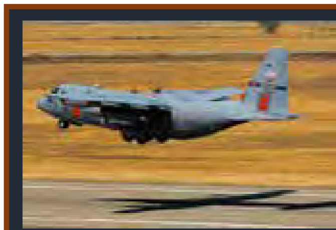

Cessna 182

Also operated by the March ARB Aero Club, the Cessna 182 is a variable-pitched propeller aircraft that seats four and has a fixed-landing gear. The Cessna 182 has a cruising speed of 167 miles per hour and range of 1,070 miles.

3.1.3 Transient Aircraft


F-16C/D

The F-16 Fighting Falcon is a compact, multi-role fighter aircraft. It is highly maneuverable and has proven itself in air-to-air combat and air-to-surface attack. It provides a relatively low-cost, high-performance weapon system for the United States and allied nations.


C-130 Hercules

The C-130 Hercules primarily performs the tactical portion of the airlift mission and is capable of operating from rough, dirt strips; further, it's the prime transport for airdropping troops and equipment into hostile areas. With a cruising speed between 350 and 400 mph, depending on aircraft variant, this four engine turbo-propeller aircraft first entered the Air Force service in 1959.

The primary mission of the HH-60G Pave Hawk helicopter is to conduct day or night personnel recovery operations into hostile environments to recover isolated personnel during war. The HH-60G is also tasked to perform military operations other than war, including civil search and rescue, medical evacuation, disaster response, humanitarian assistance, security cooperation/aviation advisory, NASA space flight support, and rescue command and control.

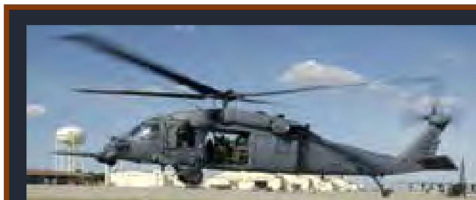

HH-60G Pave Hawk

Table 3-1 lists the various transient aircraft that utilize March ARB. The most frequent are the KC-135 and C-130 which perform Instrument Flight Rules (IFR) and Visual Flight Rules (VFR) closed patterns to Runway 32.

3.2 Maintenance Operations

Maintenance is an integral part of any flying operation and requires a dedicated team of professionals to ensure that units can meet their flying requirements. Two key tasks in maintaining aircraft are low and high powered engine maintenance runs.

Engine runs may be conducted at any power setting between idle and maximum power and are typically conducted on aircraft parking ramps or just outside of maintenance hangars. All engine run areas are located to the east of Runway 12/30 on the main parking apron. Noise associated with these operations is included in the noise analysis and has been modeled for incorporation into the March ARB noise contours.

Table 3-1. Transient Aircraft

Aircraft Type	Description	Category
B-52H	Eight engines	Bomber
C-17	Four engines	Large Military Transport
C-5	Four engines	
B-737	Mid-size, narrow-body, twin-engine jet airliner	
B-757	Mid-size, narrow-body, twin-engine jet airliner	
DC-9	Mid-size, narrow-body, twin-engine jet airliner	
C-12	Twin-engine turboprop based on Super King Air	Small Military Transport
C-130	Four-engine turboprop	
E-3	Four engines based on B-707	Radar
E-6	Four engines based on B-707-320	Command
F-15	Twin Engine	Fighter
F-16	Single Engine	
KC-10	Based on the DC-10, three engines	Air Refueling Tanker
KC-135	Based on the B-707, four engines	
T-38	Twin Engine	Trainer
UH-1N	Two-blade, twin engine medium lift utility	Helicopter
HH-60	Four-blade, twin engine medium lift utility	
CH-53	Six-blade, twin engine heavy lift transport	
CH-46	Tandem rotor, three-blades per rotor, twin engine medium lift	
AH-1G	Two-blade, twin engine attack	

Source: March ARB 2016b.

Approximately 2.0 percent of all aircraft engine runs at March ARB occur during nighttime (10:00 p.m. to 7:00 a.m.) and are mainly associated with pre-flight checks. The noise associated with pre-flight and engine maintenance engine runs were included in the noise analysis and modeling associated with the noise contours.

3.3 FLIGHT OPERATIONS

Flight activities, including where aircraft fly, how high they fly, how many times they fly over a given area, and the time of day they operate, must be fully evaluated to understand the relationship of flight operations and land use. This chapter discusses typical flight operations for aircraft based at March ARB.

Each time an aircraft crosses over a runway threshold (the beginning or ending of a runway's useable surface) with the intent to either takeoff, practice an approach, or land, it is counts as a single flight operation. For example, a departure counts as a single operation as does an arrival. However, when an aircraft conducts a pattern (a departure followed by an immediate return) it counts as two operations. This is because the aircraft crosses both the approach and departure ends of the runway during the pattern.

Aircraft operations at March ARB are conducted on a year around basis and in general, experience very little variance in operations from month to month. The following paragraphs and figures highlight typical flight tracks that are followed during normal or increased operations. Each track is designed to maximize flight operations and, when possible, minimize the effects of noise.

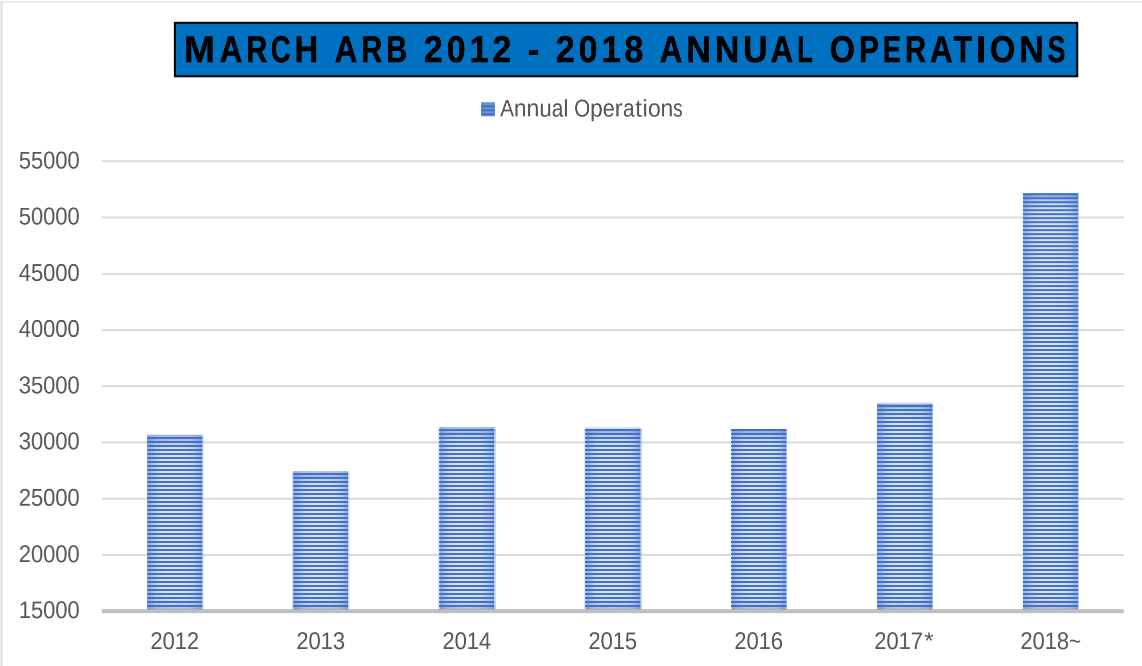
- **Takeoff.** When an aircraft is positioned on the runway, the engine power is set to facilitate movement and eventual flight.
- **Departure.** For the purpose of air traffic sequencing, separation, noise abatement, compliance with avoidance areas and overall safety of flight, aircraft follow specific ground tracks and altitude restrictions as they depart the airfield's immediate airspace.
- **Straight-In Arrival.** An aircraft is aligned with the runway extended centerline and begins a gradual descent for landing. This type of approach enables an aircraft to maintain a smooth, stable and steady approach and requires no additional maneuvering.
    - **Overhead Break Arrival.** An expeditious arrival using VFR. The aircraft arrives over the airfield on the runway centerline at a specified point and altitude and then performs a 180 degree "break turn" away from the runway to enter the landing pattern. Once established, the landing gear and flaps are lowered and the pilot performs a second 180-degree descending turn toward runway centerline to land.
    - **Pattern Work.** Pattern work refers to traffic pattern training where the pilot performs takeoffs and landings in quick succession by taking off, flying the pattern, and then landing. Traffic pattern training is demanding and utilizes all the basic flying maneuvers a pilot learns: takeoffs, climbs, turns, climbing turns, descents, descending turns, and straight and level landings.
    - **Low Approach.** A low approach is an approach to a runway that does not result in a landing, but rather a descent towards the runway (usually below 500 feet above ground level [AGL]) followed by a climb-out away from the airfield. Low approaches are accomplished for a number of reasons. One such reason is to practice avoiding potential ground obstructions (i.e., vehicles, debris, stray animals, etc.).
    - **Touch and Go.** A touch-and-go landing pattern is a training maneuver that involves landing on a runway and taking off again without coming

to a full stop. Usually the pilot then circles the airport in a defined pattern known as a circuit and repeats the maneuver.

- **Box/Arrival Pattern.** Ground Control Approach (GCA) is a radar or "talk down" approach directed from the ground by an air traffic controller (ATC). ATC personnel provide pilots with verbal course and glide slope information, allowing them to make an instrument approach during inclement weather. A Box/Arrival Pattern is normally flown to practice GCA approaches. The Box/Arrival Pattern utilizes a "box-shaped" flight pattern with four 90-degree turns done at a set altitude, used to practice a variety of approach procedures at an airfield.
- **Radar Approach.** An instrument approach is provided with active assistance from ATC during poor weather conditions. ATC personnel direct the aircraft toward the runway centerline. Once established on the centerline, pilots use aircraft instruments to maintain runway alignment and adherence to altitude restrictions until the pilot is able to acquire visual sight with the runway environment. Pilots often practice this type of approach to maintain proficiency.
- **Simulated Flame-Out (SFO).** This is a visual flight maneuver used to simulate a landing recovery from a complete loss of engine thrust. To execute the maneuver, a pilot must establish the aircraft on a specified flight profile (altitude, airspeed, position over the airfield) which would allow the aircraft to glide safely across the runway threshold in a position to land. If properly executed, the maneuver should not require the use of additional engine power until after the maneuver is complete.

3.4 Annual Aircraft Operations

Figure 3-1 describes all aircraft operations that occurred at March ARB over a 5-year period, including based and transient aircraft. As described below, total annual operations account for each departure and arrival, including those conducted as part of a pattern operation.



2012-2016 transient, CBP RAU, Aero Club, and March JPA operations are consistent annually
*estimation, includes 2016 ATC counts in addition to 163 ATKW proposed operations
~Includes all projected based, transient, CBP RAU, Aero Club, and March JPA operations
Sources: March ARB 2016a, 2016b; March JPA 2016

Figure 3-1. Summary of Flight Operations at March ARB from 2012 to 2018

This study focuses on aircraft activity that is anticipated to occur during Calendar Year (CY) 2018 (CY18), taking into account existing based aircraft operations and allocated March JPA aircraft operations. March ARB is expected to conduct approximately 52,172 annual aircraft operations during 2018 as shown in Figure 3-1. The CY18 scenario accounts for full operational capability of the 163 ATKS MQ-9 Reaper operations and the transition of the 144 FS operations from F-16 aircraft to F-15 aircraft. Approximately 72 percent of the flight operations at March ARB are closed patterns in this scenario. Under the March ARB and March JPA Joint Use Agreement, March JPA is allocated up to 21,000 annual operations (only arrivals and departures); this allocation is also included in development of the study.

Consistent with Air Force policy, aircraft operations are modeled on an average annual day basis, thus the annual operations in Table 3-2 are divided by 365 resulting in approximately 143 average daily flight operations as detailed in Table 3-3.

Table 3-2. Annual Projected Aircraft Flight Operations for 2018

Category	Squadron	Aircraft	Engine*	Arrivals				Departures				Closed Patterns				Total			
				Day 0700-1900	Evening 1900-2200	Night 2200-0700	Total	Day 0700-1900	Evening 1900-2200	Night 2200-0700	Total	Day 0700-1900	Evening 1900-2200	Night 2200-0700	Total	Day 0700-1900	Evening 1900-2200	Night 2200-0700	Total
Based	729 AS	C-17		596	130	3	729	708	21	0	729	8,734	3,886	0	12,620	10,036	4,038	4	**14,078**
	144 FS	F-15E	F-15E (X-220)	374	21	21	416	374	42	0	416	364	20	0	384	1,112	83	21	**1,216**
	336/912 ARS	KC-135R		433	112	148	693	478	210	5	693	3,761	442	221	4,424	4,672	764	374	**5,810**
	163 ATKS	MQ-9	T34	568	0	0	568	568	0	0	568	1,136	0	0	1,136	2,272	0	0	**2,272**
	CBP RAU	PC12	T34	155	17	0	172	153	19	0	172	258	0	0	258	566	36	0	**602**
		AS350		78	8	0	86	76	10	0	86	128	0	0	128	282	18	0	**300**
	Aero Club	Cessna 172	GASEPF	761	27	0	788	770	18	0	788	1,418	0	0	1,418	2,949	45	0	**2,994**
		Cessna 182	GASEPV	262	0	0	262	262	0	0	262	472	0	0	472	996	0	0	**996**
Transient				664	0	4	668	668	0	0	668	1,568	0	0	1,568	2,900	0	4	**2,904**
March JPA				5,376	3,019	2,105	10,500	4,976	4,044	1,480	10,500	0	0	0	0	10,352	7,063	3,585	**21,000**
Total				**9,267**	**3,334**	**2,281**	**14,882**	**9,033**	**4,364**	**1,485**	**14,882**	**17,839**	**4,348**	**221**	**22,408**	**36,137**	**12,047**	**3,988**	**52,172**

Sources: CBP RAU 2016; March ARB 2016a, 2016b; March ARB Aero Club 2016; March JPA 2016.

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Table 3-3. Annual Average Daily Aircraft Flight Operations Projected for 2018

Category	Squadron / Unit / Group	Aircraft	Average Daily Arrival and Departure Operations	Average Daily Closed Operations	Total Average Daily Operations
Based	729 AS	C-17	3.99	34.58	38.57
	144 FS	F-15	2.28	1.05	3.33
	336/912 ARS	KC-135	3.80	12.12	15.92
	163 ATKS	MQ-9	3.11	3.11	6.22
	CBP RAU	PC-12/AS-350	1.41	1.06	2.47
	Aero Club	Cessna 172/182	5.75	5.18	10.93
Transient			3.67	4.26	7.93
March JPA			57.54	0	57.54
Total			**81.55**	**61.36**	**142.91**

Sources: CBP RAU 2016; March ARB 2016a, 2016b; March ARB Aero Club 2016; March JPA 2016.

3.5 RUNWAY AND FLIGHT TRACK UTILIZATION

3.5.1 Runway Utilization

The frequency with which aircraft utilize a runway involves a variety of factors including, but not limited to:

- the airfield environment (layout, lights, runway length, etc.),
- direction of prevailing winds,
- location of natural terrain features (rivers, lakes, mountains, and other features),
- wildlife activity,
- number of aircraft in the pattern, and/or
- the preference of a runway for the purpose of safety and noise abatement.

Airfield Management, control tower personnel and the Supervisor of Flying establish the runway in use. Pattern procedures are adjusted accordingly to maximize air traffic flow efficiency.

Table 3-4 summarizes daytime and nighttime runway utilization by operation type and aircraft type. Runway 32 is used most frequently by all aircraft with approximately 95 percent of all operations, while the remaining 5 percent occur on Runway 14. Runway 12/30 is used exclusively by the March ARB Aero Club and CBP RAU rotary-wing aircraft.

Table 3-4. March ARB Runway Utilization

Operation	Runway	Based							Transients		March JPA	
		729 AS	336/912 ARS	144 FS	163 ATKS	CBP RAU		Aero Club	Aircraft	Helicopter	Aircraft	Helicopter
		C-17	KC-135R	F-15	MQ-9	AS350	PC-12	C-172/-182				
Arrival	14	5%	20%	2%	8%				5%		6%	
	32	95%	80%	98%	92%		90%	5%	95%		94%	
	12					5%	1%			50%		4%
	30					95%	9%	95%		50%		96%
Departure	14	11%	80%	99%	10%				30%		6%	
	32	89%	20%	1%	90%		90%	3%	70%	50%	94%	
	12					5%	1%	5%		50%		4%
	30					95%	9%	92%				96%
Closed Pattern	14				10%							
	32	100%	100%	100%	90%		91%	2%	100%			
	12					5%	1%			50%		
	30					95%	8%	98%		50%		

Sources: CBP RAU 2016; March ARB 2016a, 2016b; March Aero Club 2016, March JPA 2016.

3.5.2 Flight Tracks

Each runway has designated flight tracks which provide for the safety, consistency, and control of an airfield. Flight tracks depict where aircraft fly in relation to an airfield. They are designed for departures, arrivals and for pattern work procedures, and are designated for each runway to facilitate operational safety, noise abatement, aircrew consistency, and the efficient flow of air traffic within the tower's controlled airspace. Aircraft flight tracks are not set highways in the sky. While we show flight tracks as a line on the map, they are actually bands. Aircraft de-confliction, configuration, pilot technique, takeoff weight, and wind all affect the actual path taken on any given flight.

Flight tracks specific to March ARB result from several considerations, including:

- departure tracks routed to avoid noise-sensitive areas as much as possible;
- criteria governing the speed, rate of climb, and turning radius for each type of aircraft in the given airspace;
- efforts to control and schedule missions to keep noise levels low, especially at night; and
- coordination with the FAA to minimize conflict with civil aircraft operations.

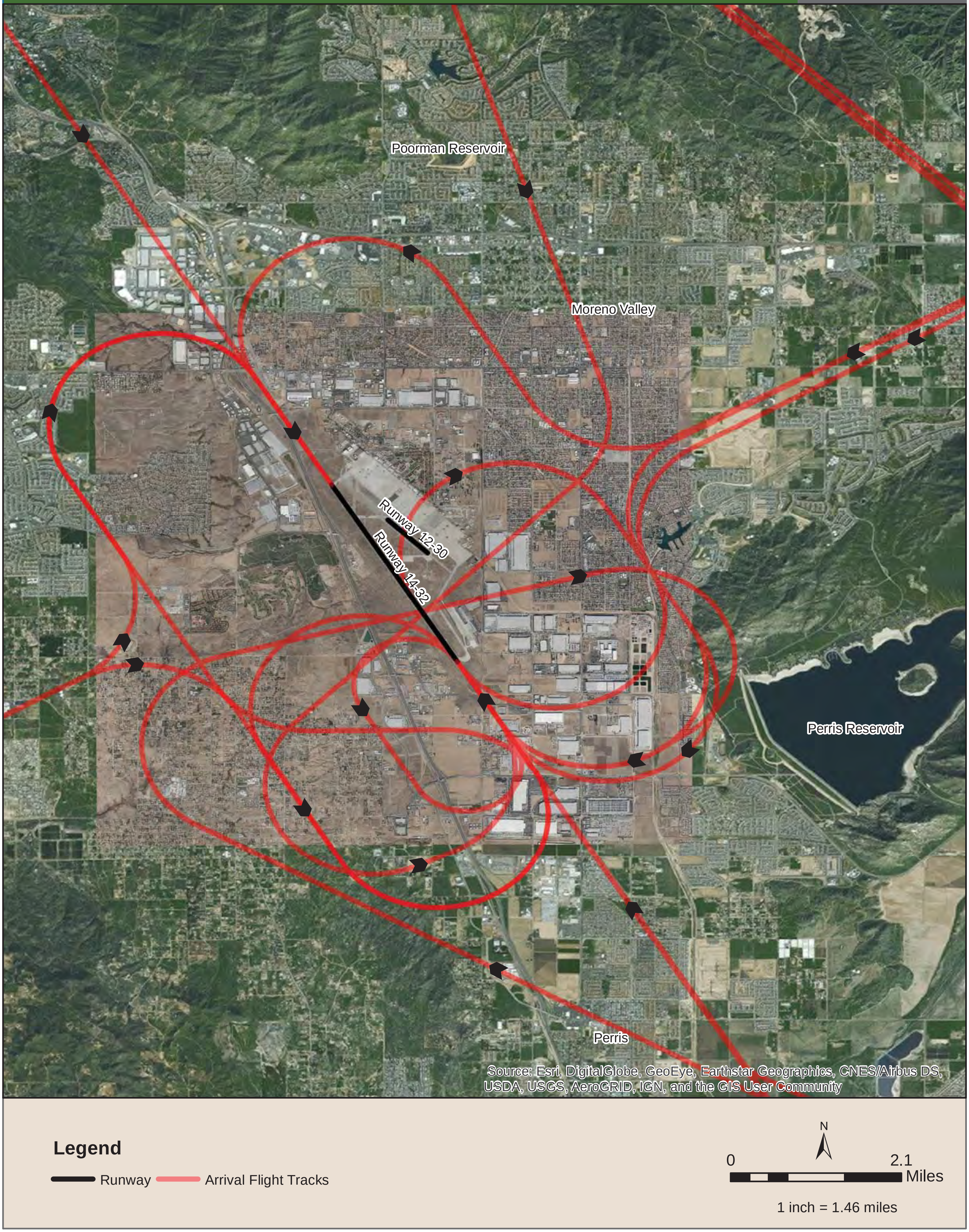
Aircraft operating at March ARB utilize the following flight tracks:

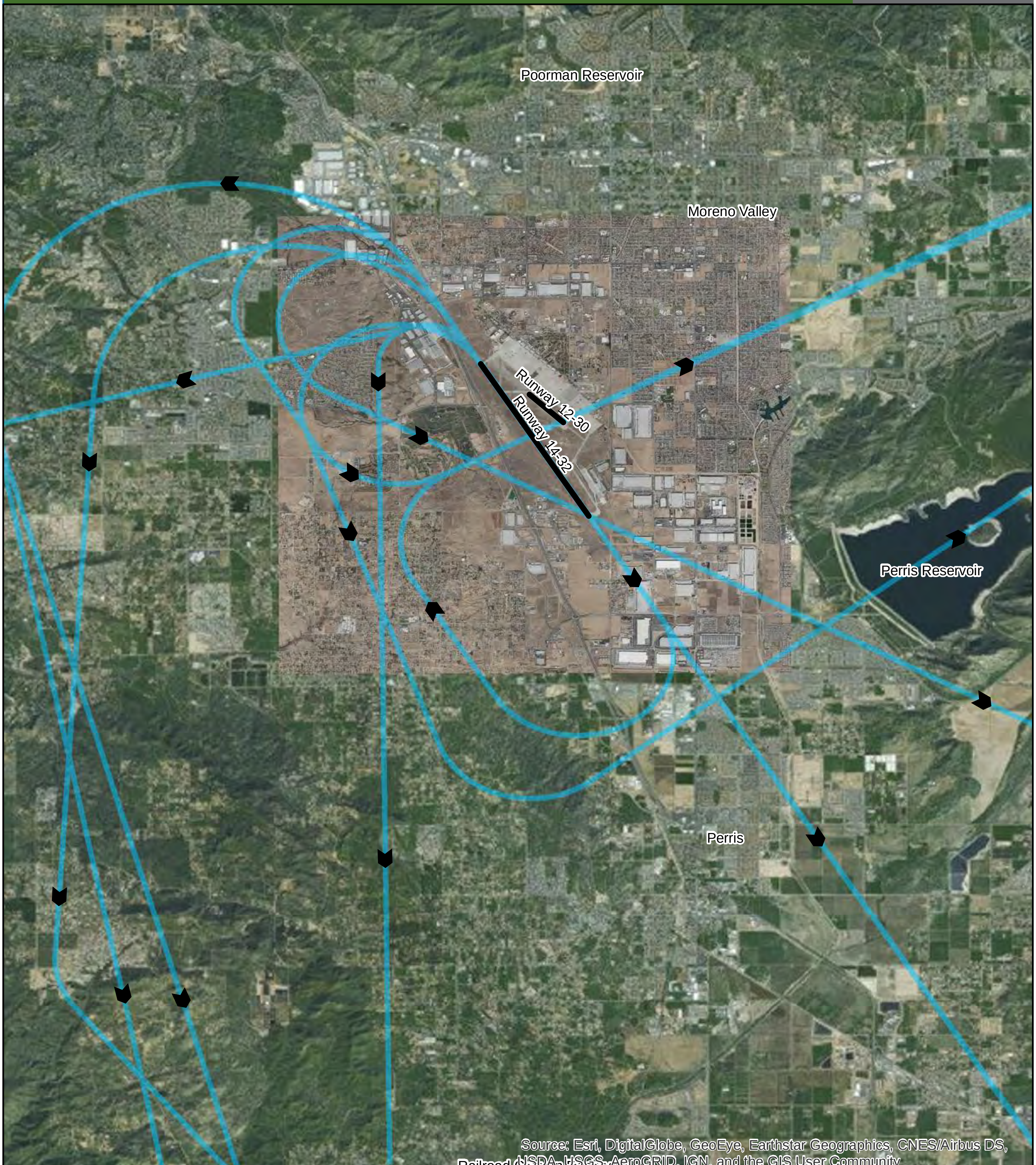
- departures in both north and south directions;
- arrivals from both north and south directions;
- Runway 14/32 radar and visual closed patterns to the west and east of the airfield; and,
- Runway 12/30 visual closed patterns to the east of the airfield.

The typical flight tracks for Runway 14/32 and Runway 12/30 are depicted in Figures 3-2 through 3-7, starting with arrivals, then departures and closed patterns. These flight tracks were used for March ARB aircraft noise modeling.

March ARB Runway 14/32 Arrivals

Figure 3-2





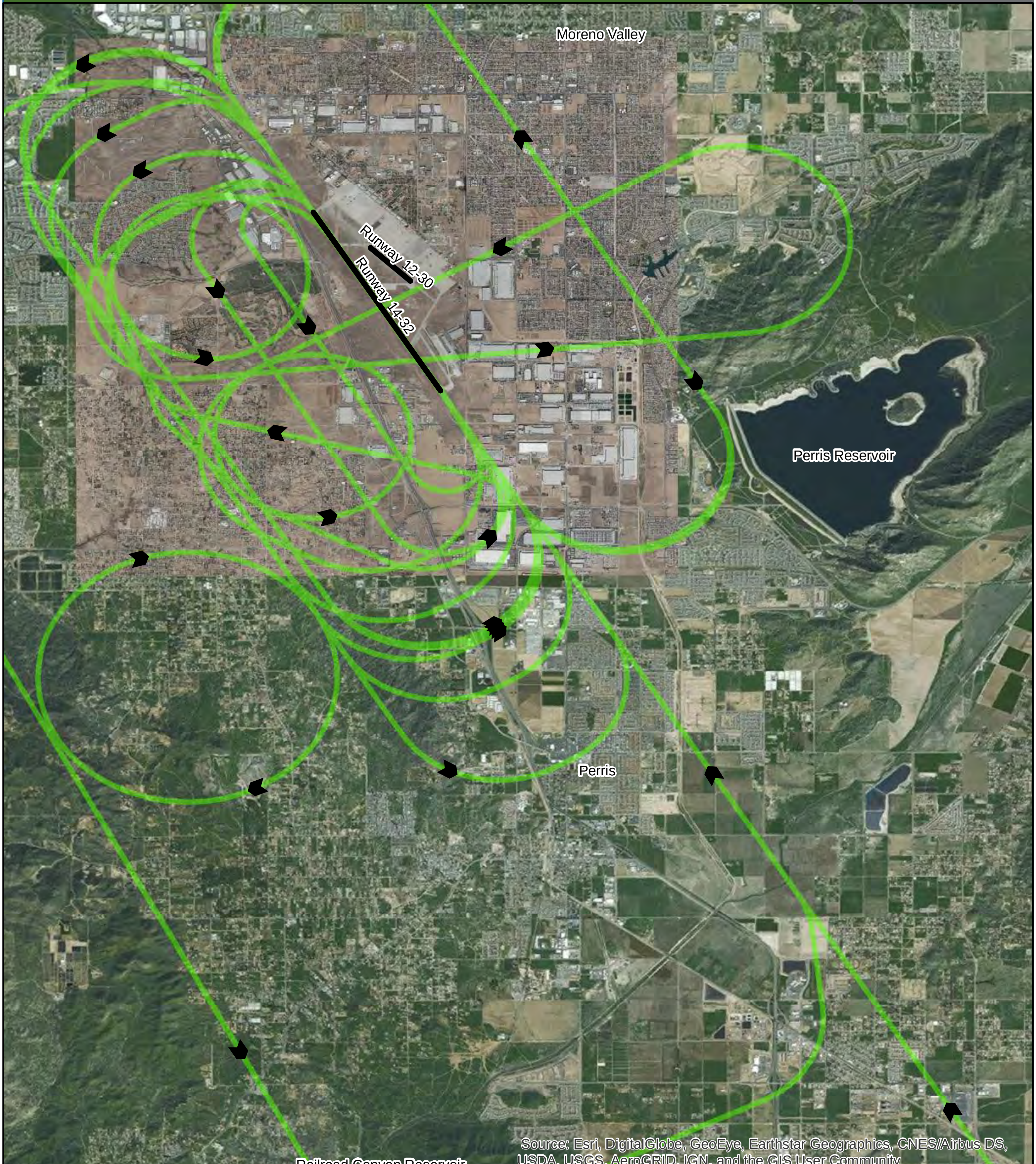
Legend

Runway
Departure FlightTracks

N
0 2.7 Miles
1 inch = 1.82 miles

March ARB Runway 14/32 Closed Patterns

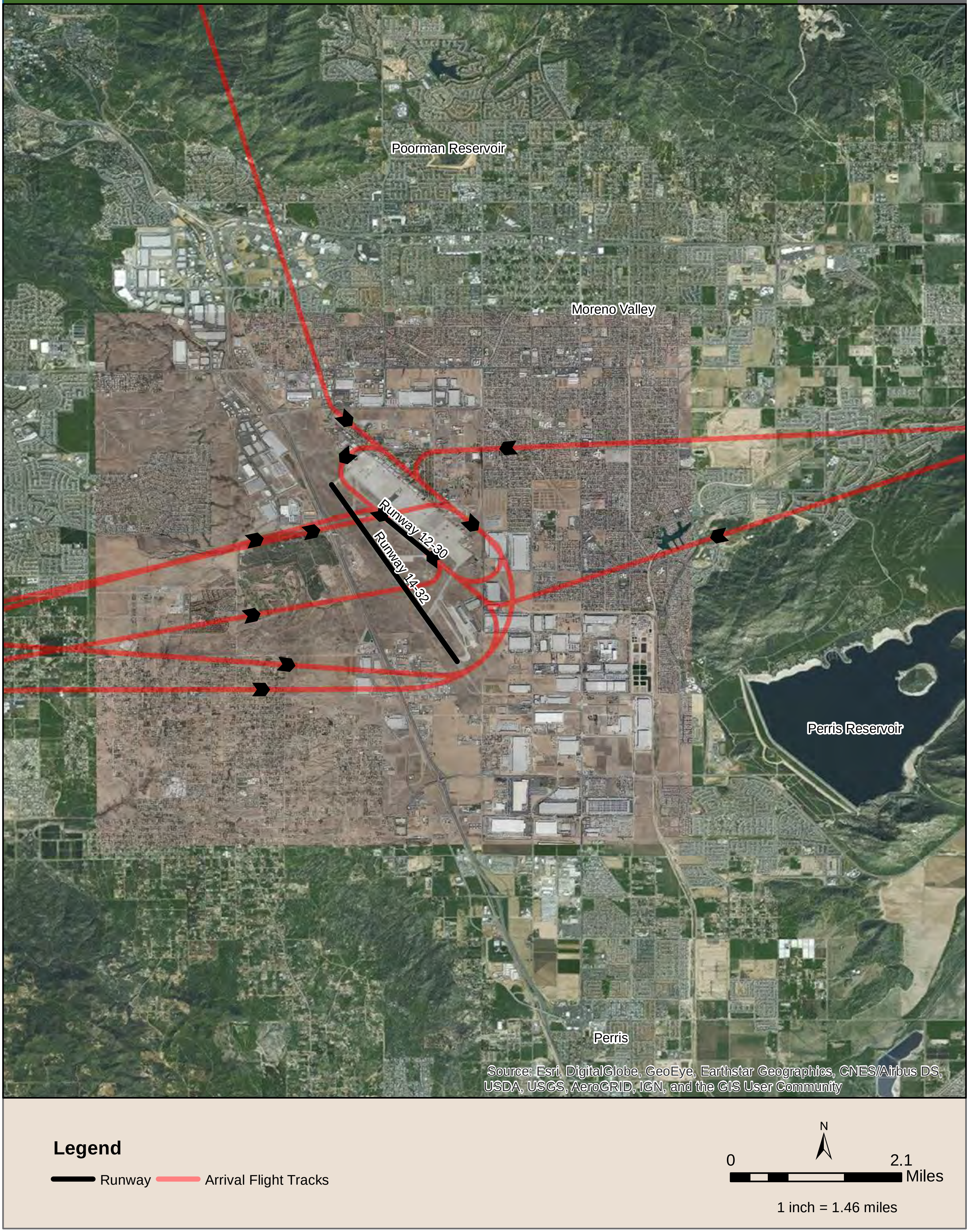
Figure 3-4

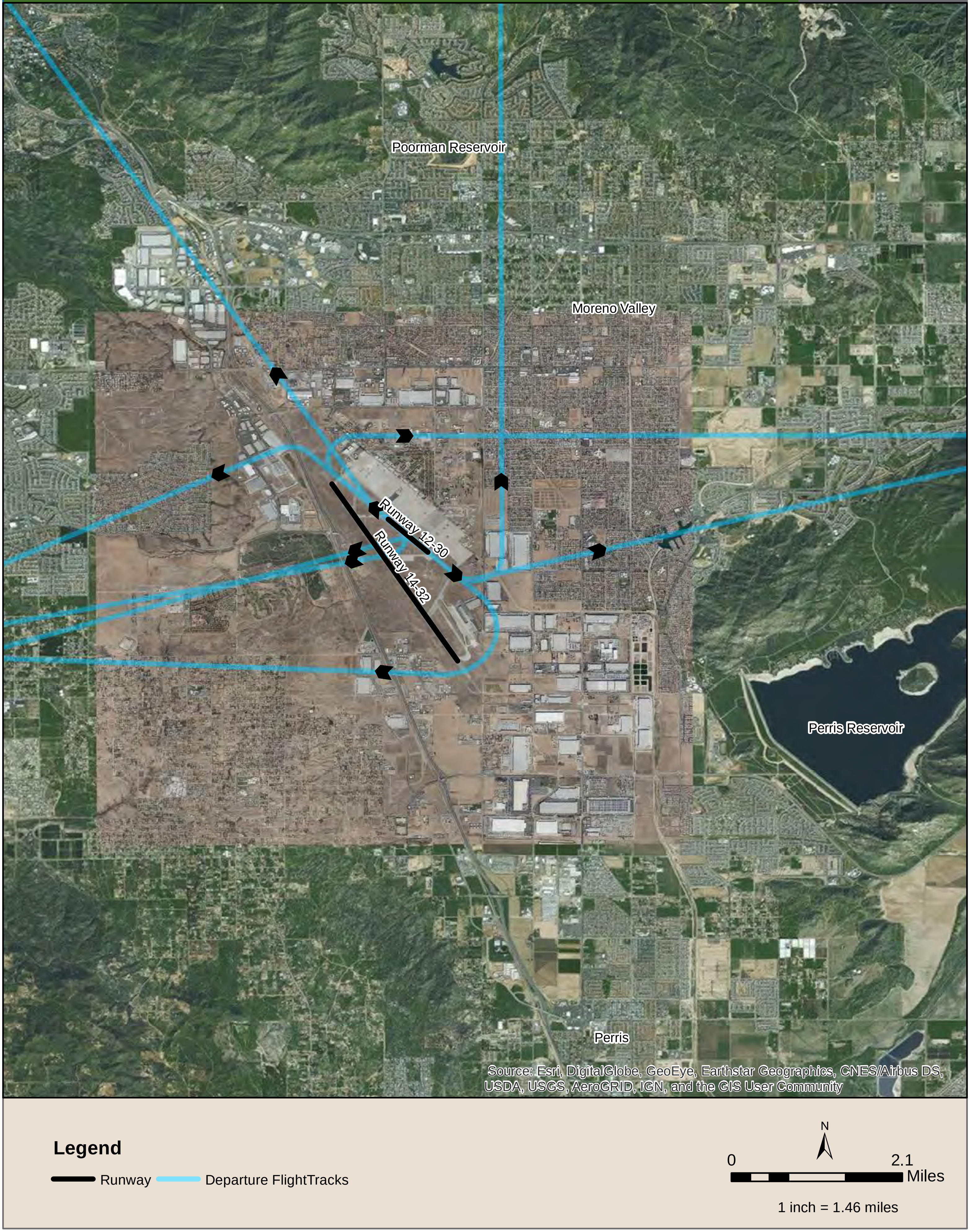


Legend

Runway
Closed Pattern Flight Tracks

N
0
2.25
Miles
1 inch = 1.55 miles


Poorman Reservoir
Moreno Valley
Runway 12-30
Runway 14-32
Perris Reservoir
Perris
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
Runway
Arrival Flight Tracks
N
0
2.1
Miles
1 inch = 1.46 miles



Legend

- Runway
- Departure FlightTracks

Runway 12-30
Runway 14-32
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
Runway
Closed Pattern Flight Tracks
N
0
0.45
Miles
1 inch = 0.34 miles

3.6 NOISE ABATEMENT

The Air Force recognizes that noise from military operations may cause concern for people living near military installations.

For this reason, the Air Force has established a Noise Program aimed at reducing and controlling the emission of noise and vibrations associated with the use of military aircraft, weapon systems and munitions while maintaining operational requirements. The result is the implementation of various strategies, techniques and procedures, documented under the March ARB Noise Abatement Program, that are aimed at protecting persons and structures from the harmful effects of noise and vibrations.

March ARB Noise Abatement Program includes quiet hours that coincide with the published operating hours and other times by Notice to Airmen (NOTAM). The Airfield Manager (AM) and staff are responsible for distribution of approved quiet hours, coordinating and submitting NOTAMs implementing quiet hours, and restricting prior permission required for applicable quiet hour times. All units operating on the airfield are required to comply with quiet hour restrictions. Emergencies as well as 144 FW and CBP RAU alert operations take precedence over any quiet hour restrictions. The AM and ATC will enforce quiet hours as directed and implement restrictions no later than five minutes prior to quiet hours.

Organizations requesting quiet hours must specify the type of operational restrictions, which fall under the "No", "Limit", or "Permitted" operational parameter and include: aircraft towing; aircraft engine runs, aircraft auxiliary power runs, aircraft taxi; vehicle and personnel movement; and runway operations.

During quiet hours, transient aircraft not permanently based at March ARB are not authorized to conduct pattern work between the hours of 9 p.m. and 11 p.m.; however, full stop (i.e. aircraft proceed to parking apron after landing) landings are authorized. Radar Approach Control (RAPCON) must utilize 5,000 feet MSL pattern altitude within confines of delegated airspace between the hours of 10 p.m. and 11 p.m. The tower must hold tanker or receiver aircraft awaiting wingman departure at 3,500 feet MSL or higher over the airfield.

Base leadership reviews flight operations and their potential impact on surrounding communities. This requirement facilitates the planning, designation and establishment of flight tracks over sparsely populated areas and/or waterways as often as practicable as possible to balance operational safety and reduce noise exposure levels in surrounding communities.

3.7 NOISE COMPLAINTS

At times, military operations may draw noise complaints. The Air Force evaluates all noise complaints to ensure future operations, where possible, do not generate unacceptable noise. Concerned citizens are encouraged to contact the March ARB Public Affairs Office with any noise complaints at (951)-655-4137 or via email at 452amw.paworkflow@us.af.mil.

SECTION 4
AIRCRAFT NOISE

> Terrain features, weather phenomena, man-made structures and daily life activity contribute to noise exposure.

How a base manages aircraft noise can play a key role in shaping an installation's relationship with the adjacent communities. Aircraft noise management is ideally a key factor in local land use planning.

While the level of noise produced by aircraft may have a direct effect on communities in close proximity to military air installations, other factors also influence the noise impact. An airfield's layout (its buildings, parking ramps and runways, etc.), type of aircraft, natural terrain features, weather phenomena, and daily activities all influence the levels of noise that the community experiences.

Because noise from aircraft may affect areas around the installation, the Air Force has defined noise zones using the guidance provided in the AICUZ instruction (AFI 32-7063).

4.1 WHAT IS SOUND/NOISE

Sound consists of vibrations in the air. A multitude of sources can generate these vibrations, including roadway traffic, barking dogs, radios – or aircraft operations. We call these vibrations compression waves. Just like a pebble dropped into a pond creates ripples, the compression waves – formed of air molecules pressed together – radiate out, decreasing with distance. If these vibrations reach your eardrum, at a certain rate and intensity, you perceive it as sound. When the sound is unwanted, we refer to it as noise. Generally, sound becomes noise to a listener when it interferes with normal activities. Sound has three components: intensity, frequency and duration.

> Sound becomes noise when it interferes with normal activities.

- Intensity or loudness is related to sound pressure change. As the vibrations oscillate back and forth, they create a change in pressure on the eardrum. The greater the sound pressure change, the louder it seems.

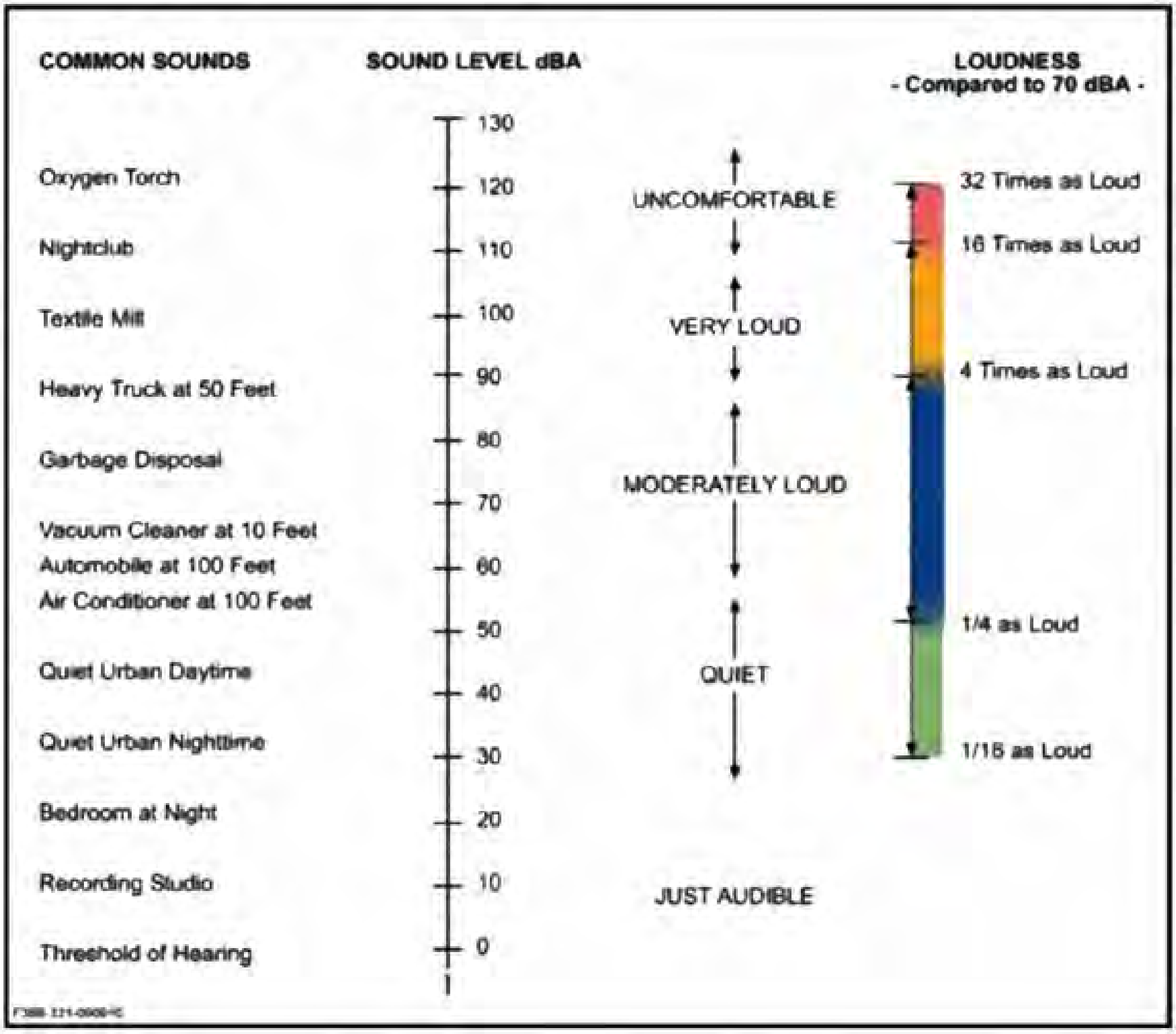
- Frequency determines how we perceive the pitch of the sound. Low-frequency sounds are characterized as rumbles or roars, while high-frequency sounds are typified by sirens or screeches. Sound frequency is measured in terms of cycles per second or hertz (Hz). While the range of human hearing goes from 20 to 20,000 Hz, we hear best in the range of 1,000 to 4,000 Hz. For environmental noise, we use A-weighting, which focuses on this range, to best represent human hearing. While A-weighted decibels may be written as "dBA", if it is the only weighting being discussed, the "A" is generally dropped.
- Duration is the length of time we can detect the sound.

4.2 How Sound Is Perceived

The loudest sounds that can be comfortably heard by the human ear have intensities a trillion times higher than those of sounds barely heard. Because such large numbers become awkward to use, we measure noise in decibels (dB), which uses a logarithmic scale, which doubles the noise energy every three decibels.

Figure 4-1 is a chart of A-weighted sound levels from common sources. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above 120 dB can cause discomfort inside the ear, while sound levels between 130 and 140 dB are felt as pain.

Table 4-1 tabulates the subjective responses with change in (single-event) sound level. While noise energy doubles or halves with every three-decibel change, we do not perceive all that noise energy. It takes a 10 decibel increase or decrease for our ear to perceive a doubling or halving of loudness.



Sources: Harris 1979; Federal Interagency Committee on Aviation Noise (FICAN) 1997.

Figure 4-1. Common A-weighted Sound Levels

Table 4-1. Subjective Response to Changes in Sound Level

Change in Sound Level	Change in Loudness
20 dB	Striking 4-fold Change
10 dB	Dramatic 2-fold or Half as Loud
5 dB	Quite Noticeable
3 dB	Barely Perceptible
1 dB	Requires Close Attention to Notice

4.3 COMMUNITY NOISE EQUIVALENT LEVEL

When we hear an aircraft fly over, the question may be asked, "How loud was that?" While we may often find ourselves concerned over the loudness of a sound, there are other dimensions to the sound event that draw our interest. For instance, does one overflight draw the same interest as two separate overflights – or as twenty? Also, does the 30-second run-up of engines prior to takeoff roll draw the same interest as a 30-minute maintenance run? Additionally, is an overflight more noticeable at two in the afternoon – or two in the morning, when the ambient noise is low and you are trying to sleep?

The length and number of events – the total noise energy – and the time of day play key roles in our perception of noise. To reflect these concerns, the Air Force and the State of California use a metric called the Community Noise Equivalent Level (CNEL).

CNEL, when used as a metric for aircraft noise, represents the accumulation of noise energy from all aircraft noise events in 24-hours. Additionally, for all operations between 10:00 p.m. and 7:00 a.m., a penalty of 10 decibels is added each event to account for the intrusiveness of nighttime operations. CNEL also adds a penalty for evening operations, adding a penalty of five decibels to each event between the hours of 7:00 p.m. and 10:00 p.m. CNEL represents the noise energy present in a daily period. However, because aircraft operations at military airfields fluctuate from day to day, CNEL is typically based upon a year's worth of operations and thus represents the annual average daily aircraft events.

4.4 NOISE CONTOURS

The Air Force prepares noise contours, as needed, to assess the compatibility of aircraft operations. Noise contours connect points of equal value, just as contours on topographic maps connect points of equal elevation. This AICUZ Study exhibits the present-day planning noise contours. The Air Force utilizes NOISEMAP, the DoD standard model for assessing noise exposure from military aircraft operations at air installations. Noise contours, when overlaid on local land use maps, can help to identify areas of incompatible land uses and assist communities in planning for future development around an air installation.

4.4.1 Noise Contour Assumptions

Assumptions included for the March ARB noise zones include:

- The California Air National Guard's 163 ATKW would be fully operational completing two (2) MQ-9 sorties per day, both during weekdays and one (1) weekend per month.

- The California Air National Guard's 144 FW would complete their alert mission at March ARB operating F-15 aircraft.

- March JPA would operate at their maximum annual allocation of 21,000 aircraft operations.

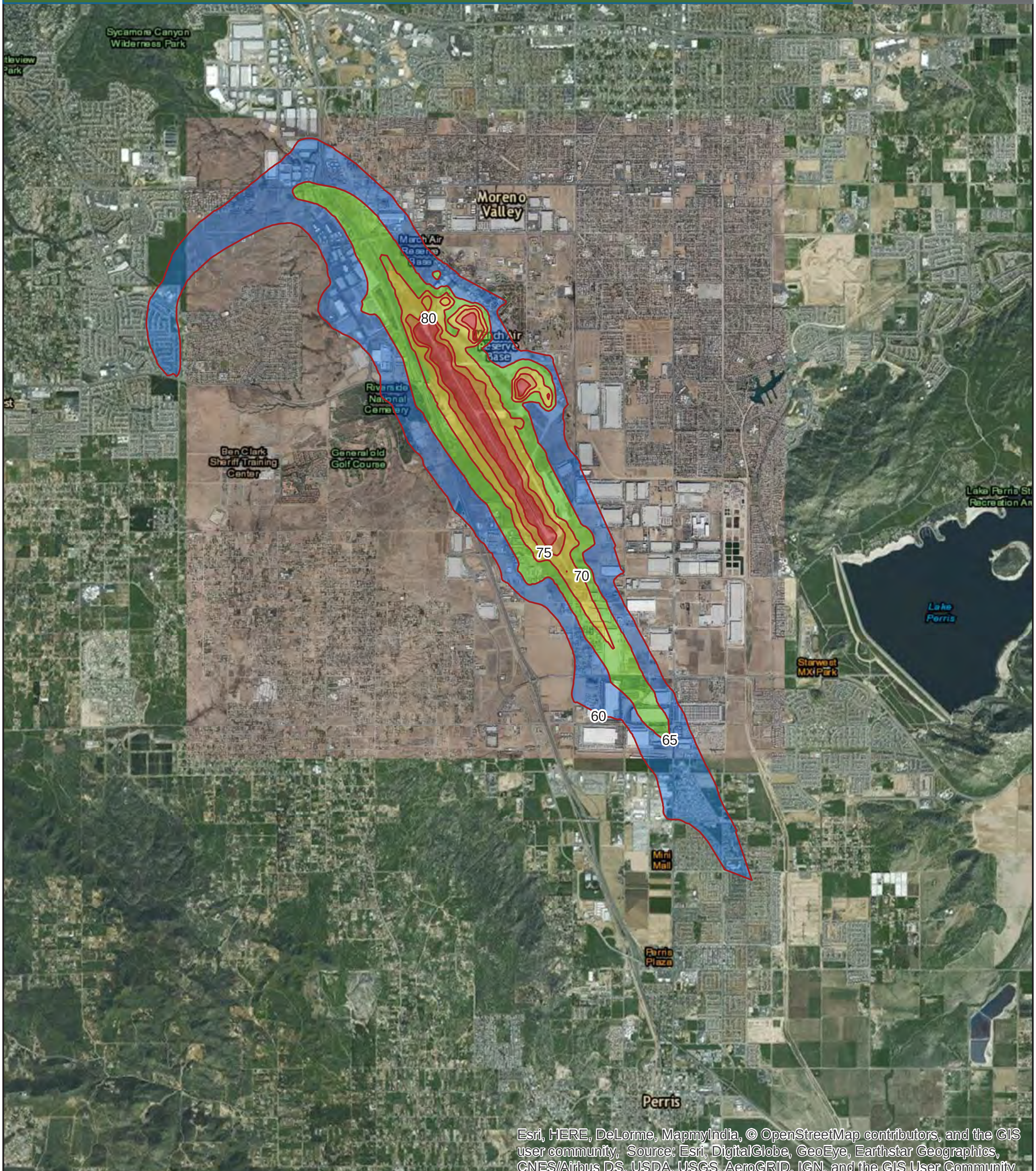
Table 4-2 presents the projected operations for the March ARB 2018 AICUZ noise zones (Figure 4-2).

Table 4-3 tabulates the off-base land acreage and estimated population within the greater than 60 dB CNEL noise zone. The population estimates are based on refined 2010 census block data for average numbers of persons per residence for each of the local municipalities (i.e., city of Moreno Valley, city of Perris, city of Riverside, and Riverside County) (US Census Bureau 2010). Using imagery, residential units within each noise contour were counted and multiplied by the average number of persons per residence within each municipality. The exposure to a minimum of 60 dB CNEL would include approximately 3,989 acres and 4,570 people, the majority of which (98 percent) would be exposed to CNEL between 60 dB and 64 dB. Very little acreage and no people would be exposed to CNEL greater than or equal to 75 dB off-base.

4.4.1.1 City of Moreno Valley

Within the City of Moreno Valley, the 60 dB CNEL noise zone extends to the north of Runway 14/32 and the 65 dB CNEL noise zone passes over a corner of the city's jurisdiction, where the highest noise level anticipated would be 69 dB CNEL.

The city's boundary also covers the south end of Runway 14/32 where the 60 dB, 65 dB, and 70 dB CNEL noise zones all pass through Moreno Valley jurisdiction. The highest noise level within the Moreno Valley would be 74 dB CNEL.



Legend

March ARB 2018 Noise Contours

Noise Contour Levels (CNEL)

60dB 65dB 70dB 75dB 80dB

Table 4-2. Annual Aircraft Flight Operations for March ARB 2018 AICUZ Noise Zones

Category			Based								Transient	March JPA	Total
Squadron			729 AS	144 FS	336/912 ARS	163 ATKS	CBP RAU		Aero Club				
Aircraft			C-17	F-15E	KC-135R	MQ-9	PC12	AS350	Cessna 172	Cessna 182			
Engine*			-	F-15E (X-220)	-	T34	T34	-	GASEPF	GASEPV			
Arrivals	Day	0700-1900	596	374	433	568	155	78	761	262	664	5,376	**9,267**
	Evening	1900-2200	130	21	112	0	17	8	27	0	0	3,019	**3,334**
	Night	2200-0700	3	21	148	0	0	0	0	0	4	2,105	**2,281**
	Total		**729**	**416**	**693**	**568**	**172**	**86**	**788**	**262**	**668**	**10,500**	**14,882**
Departures	Day	0700-1900	708	374	478	568	153	76	770	262	668	4,976	**9,033**
	Evening	1900-2200	21	42	210	0	19	10	18	0	0	4,044	**4,364**
	Night	2200-0700	0	0	5	0	0	0	0	0	0	1,480	**1,485**
	Total		**729**	**416**	**693**	**568**	**172**	**86**	**788**	**262**	**668**	**10,500**	**14,882**
Closed Patterns	Day	0700-1900	8,734	364	3,761	1,136	258	128	1,418	472	1,568	0	**17,839**
	Evening	1900-2200	3,886	20	442	0	0	0	0	0	0	0	**4,348**
	Night	2200-0700	0	0	221	0	0	0	0	0	0	0	**221**
	Total		**12,620**	**384**	**4,424**	**1,136**	**258**	**128**	**1,418**	**472**	**1,568**	**0**	**22,408**
Total	Day	0700-1900	10,036	1,112	4,672	2,272	566	282	2,949	996	2,900	10,352	**36,137**
	Evening	1900-2200	4,038	83	764	0	36	18	45	0	0	7,063	**12,047**
	Night	2200-0700	4	21	374	0	0	0	0	0	4	3,585	**3,988**
	Total		**14,078**	**1,216**	**5,810**	**2,272**	**602**	**300**	**2,994**	**996**	**2,904**	**21,000**	**52,172**

Table 4-3. Off-base Land Area and Estimated Population within the Greater Than 60 dB CNEL Noise Zones

CNEL (dB)	Acres	Housing Units	Population
60-64	2,847	1,229	4,483
65-69	1,052	18	75
70-74	90	3	12
75-79	0	0	0
80+	0	0	0
Total	**3,989**	**1,250**	**4,570**

Sources: Amec Foster Wheeler 2017a; U.S. Census Bureau 2010.

4.4.1.2 City of Perris

The City of Perris is situated directly along the southern end of Runway 14/32 where the majority of aircraft arrivals and closed patterns occur, thus Perris has the largest amount of acreage exposed to noise levels above 60 dB CNEL when compared to the neighboring municipalities. The 60 dB, 65 dB, and 70 dB CNEL noise zones all extend inside the city of Perris boundary, with the largest anticipated cumulative noise level being 73 dB CNEL.

4.4.1.3 City of Riverside

Within the City of Riverside, the 60 dB CNEL noise zone extends to the north and west of March ARB following the departure track from Runway 32 that departs to the north and is followed by a 140-degree left turn which heads south. The 65 dB CNEL noise zone extends slightly into the Riverside boundary, where the highest expected noise level would be 66 dB CNEL.

4.4.1.4 Riverside County

The 60 dB CNEL noise zone passes through Riverside County's jurisdiction directly west of the base; additionally, part of the 65 dB CNEL noise zone extends into Riverside County jurisdiction to a lesser extent.

4.4.2 Comparison of 2005 AICUZ and 2018 AICUZ

As depicted in Figure 4-3, there is a large reduction in the noise footprint and exposure when comparing the 2005 AICUZ to the current study. This reduction is due largely to the methodology (determining aircraft operational numbers based on average annual day instead of average busy day); changes in the aircraft noise models, both civilian (INM in 2005 and AEDT in 2018) and military (newer version of NOISEMAP); and modern aircraft engines (quieter than their predecessors).

The area of off-base noise exposure above 60 dB CNEL from aircraft operations at March ARB totals approximately 1,954 acres less when comparing the current study (2018) to the 2005 AICUZ Study (Table 4-4).

Table 4-4. Off-Base Acreage Comparison 2005 AICUZ and 2018 AICUZ

CNEL (dB)	Acres		Difference
	2005	2018	
60-64	3,959	2,847	-1,112
65-69	1,501	1,052	-449
70-74	417	90	-327
75-79	66	0	--66
80+	0	0	0
Total	**5,943**	**3,989**	**-1,954**

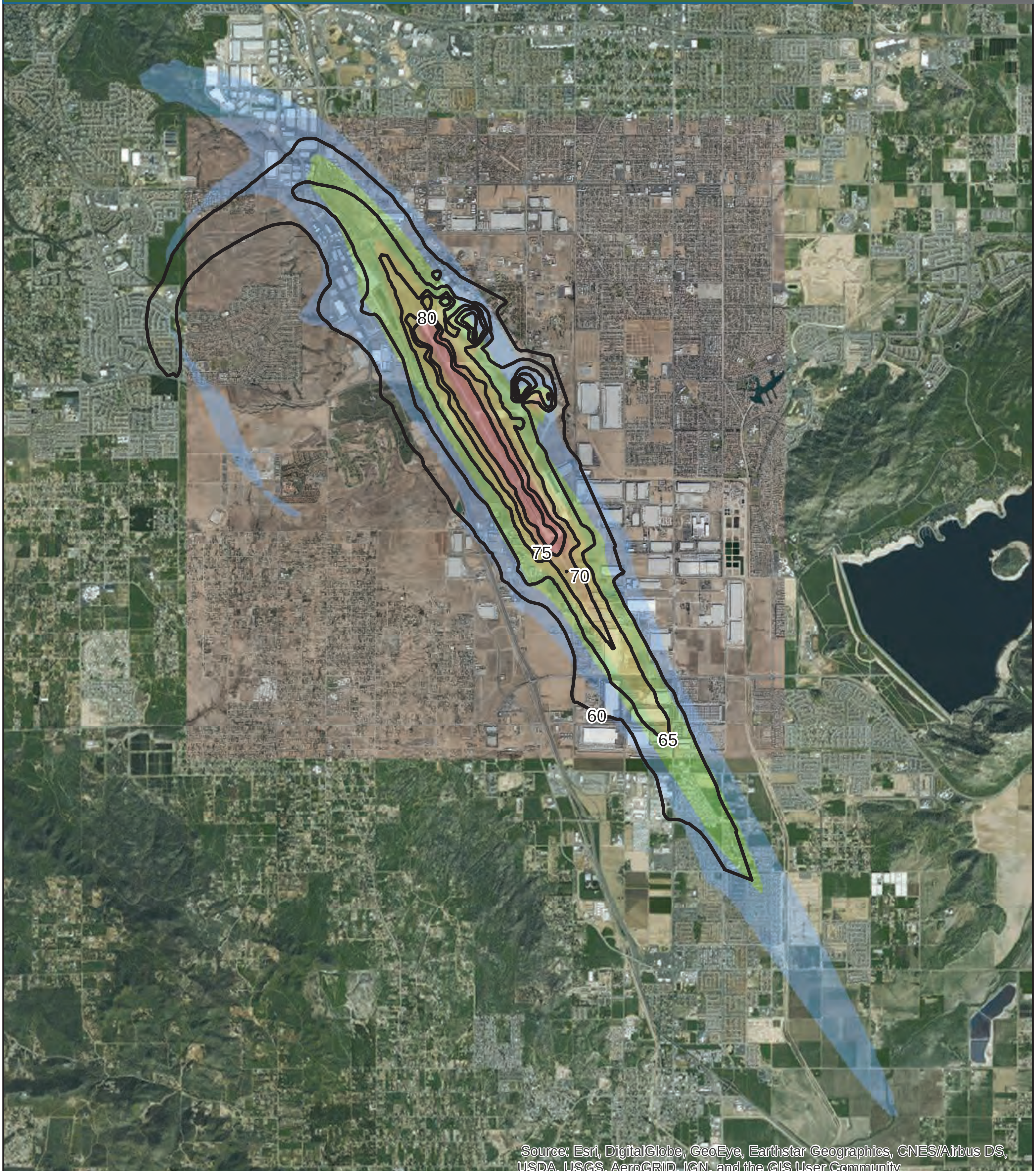
Sources: Amec Foster Wheeler 2017a; U.S. Census Bureau 2010.

4.5 MARCH AIR RESERVE BASE SMALL ARMS RANGE

Outside of the March ARB airfield boundary is a geographically separate parcel with an outdoor small arms firing range facility utilized primarily by the base's security forces. The range contains shooting positions and targets in a northeast to southwest orientation. Both firing positions and targets are under cover; further, the target backstop starts at floor level and meets the roof. The range accommodates the following weapons: M9; M4; and 12 gauge shotgun (March ARB 2017b). Table 4-5 and 4-6 presents peak sound levels (dBP) for the M4 and 12-gauge shotgun, the two loudest of the three weapons, respectively. The range of levels are based on sound propagation between the source and receiver without

March ARB 2005 and 2018 AICUZ Noise Contours

Figure 4-3



Legend

March ARB 2018 Noise Contours

2018 Noise Contour levels (CNEL) 60dB, 65dB, 70dB, 75dB, 80dB

2005 Noise Contour Levels (CNEL)

60dB 65dB 70dB 75dB 80dB

N

0 1.95 Miles

1 inch = 1.29 miles

Table 4-5. Predicted Peak Sound Level for M4 Rifle (dBP)

Distance (feet)	Azimuth		
	0	90	180
164	135-150	112-127	102-117
328	113-128	106-121	95-110
656	106-121	99-114	89-104
1,312	93-108	86-101	78-93
2,624	85-100	77-92	69-84
5,249	75-90	67-82	59-74

Sources: Hede and Bullen 1982, O'Loughlin et. al. 1986.

Table 4-6. Predicted Peak Sound Level for 12 Gauge Shotgun (dBP)

Distance (feet)	Azimuth (Degrees)		
	0	90	180
164	119-134	107-122	107-122
328	112-127	100-115	101-116
656	105-120	93-108	95-110
1,312	94-109	83-98	85-100
2,624	85-100	74-89	77-92
5,249	76-91	65-80	68-83

Sources: Hede and Bullen 1982, O'Loughlin et. al. 1986.

any barriers. The lower level numbers are expected when the receiver is upwind of the source and higher numbers when the receiver is downwind of the source (Hede and Bullen 1982; O'Loughlin et. al. 1986).

The nearest residences to the March ARB outdoor range is approximately 1,970 feet from the firing positions and the line of sight from the residences to the firing positions is blocked by both an earthen berm and target backstop.

Similar range configurations with covered firing positions and targets, wall enclosures, and target backstops result in a noise level of 87 dBP between 1,475 and 1,970 feet from the firing positions (Warrenton Training Center 2005). Based on the weapons, configuration of the range, and distance to the nearest residence, it is anticipated that residences would experience a noise level of approximately 87 dBP or less.

SECTION 5
COMMUNITY AND AIRCRAFT SAFETY

As development increases near an airfield, more people may be exposed to the potential risks from nearby aircraft operations. Airfield safety is a shared responsibility between the Air Force and surrounding communities, each playing a vital role in its success.. Cooperation between the Air Force and the community results in strategic and effective land use planning and development. As such, the Air Force has established a flight safety program and has designated areas of accident potential around its air installations to assist in preserving the health, safety, and welfare of residents living near the airfield. This AICUZ Study provides the information needed, in part, to reach this shared safety goal.

Identifying safety issues assists the community in developing land uses compatible with airfield operations. As part of the AICUZ program, the Air Force defines areas of accident potential, imaginary surfaces, and hazards to flight.

Section 5.1 discusses clear zones and accident potential zones. Section 5.2 presents the imaginary surfaces and Section 5.3 discusses the zones associated with hazards to aircraft flight.

5.1 CLEAR ZONES AND ACCIDENT POTENTIAL ZONES

In the 1970s and 1980s, the military conducted studies of historic accident and operations data throughout the military. The studies showed that most aircraft mishaps occur on or near the runway, diminishing in likelihood with distance from the runway. Based on these studies, the DOD identified Clear Zones and Accident Potential Zones (APZ) as areas where an aircraft accident is most likely to occur if an accident were to take place – these zones are not predictors of accidents. The studies identified three areas that, because of accident potential, should be considered for density and land use restrictions: the Clear Zone (CZ), Accident Potential Zone I (APZ I) and Accident Potential Zone II (APZ II). The CZs and APZs are described in the bullets below and are shown on Figure 5-1.

- **Clear Zone.** At the end of all active Air Force runways is an area known as the Clear Zone. The CZ is a square area beyond the end of the runway and centered on the runway centerline extending outward for 3,000 feet. A Clear Zone is required for all active runways and should remain undeveloped.

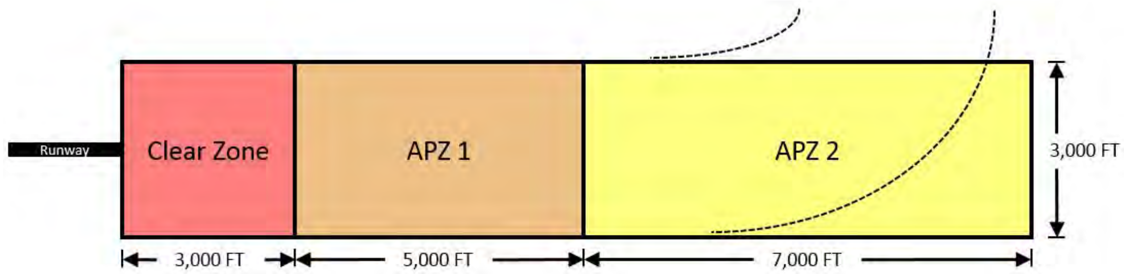


Figure 5-1. Runway CZs and APZs

- **APZ I.** Beyond the CZ is Accident Potential Zone I (APZ I). APZ I is 3,000 feet in width and 5,000 feet in length along the extended runway centerline.
- **APZ II.** Accident Potential Zone II is the rectangular area beyond APZ I. APZ II is 3,000 feet in width by 7,000 feet in length along the extended runway centerline.

While the APZs extend outward from the ends of the runway along the extended runway centerline, base may add a curved APZ where over 80-percent of the operations follow a curved departure.

Within the CZ, most uses are incompatible with military aircraft operations. For this reason, it is the Air Force's policy, where possible, to acquire real property interests in land within the CZ to ensure incompatible development does not occur. Within APZ I and APZ II, a variety of land uses are compatible; however, higher density uses (e.g., schools, apartments, churches, etc.) should be restricted because of the greater safety risk in these areas. Chapter 6 discusses land use and recommendations for addressing incompatibility issues within APZs for each runway.

March ARB has two active runways which carry different class designations based on their size and capability, thus the size of the CZs and APZs associated with each runway differ. Runway 14/32 is a Class B runway and at both ends has CZs that encompass an area 3,000 feet wide by 3,000 feet long. Beyond the CZs are an APZ I that is 3,000 feet wide by 5,000 feet long, and an APZ II that is 3,000 feet wide by 7,000 feet long. Runway 12/30 is a Class A runway and at both ends has CZs that encompass an area 1,000 feet wide by 3,000 feet long, an APZ I that is 1,000 feet wide by 2,500 feet long, and an APZ II that is 1,000 feet wide by 2,500 feet long. Figure 5-2 through 5-5 depicts the CZs and APZs for Runways 14/32 and 12/30 at March ARB.

March ARB Runway Clear Zones and Accident Potential Zones

Figure 5-2

March ARB Runway 12 and 14 Clear Zones and Accident Potential Zones

Figure 5-3

Legend

- Runway
- City of Riverside
- City of Moreno Valley
- APZ I
- APZ II
- CZ

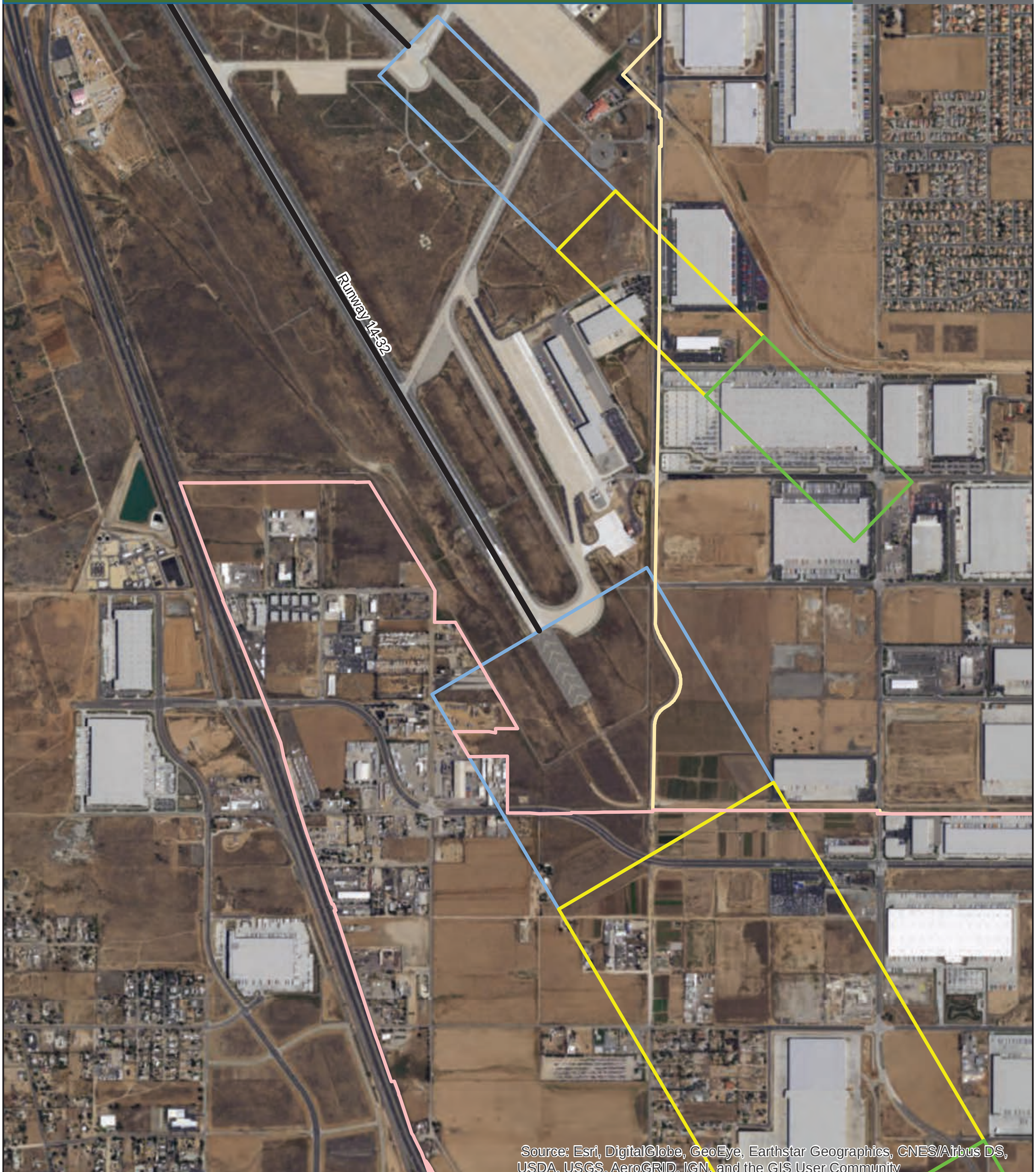
N

0 0.45 Miles

1 inch = 0.36 miles

March ARB Runway 30 Clear Zones and Accident Potential Zones

Figure 5-4



Legend

Runway
City of Perris
City of Moreno Valley
APZ I
APZ II
CZ

N
0 0.3 Miles

1 inch = 0.29 miles

March ARB Runway 32 Clear Zones and Accident Potential Zones

Figure 5-5

Table 5-1 tabulates the off-base land acreage and estimated population within the CZs and APZs**.** While some portions of the CZs and APZs associated with March ARB runways fall within jurisdiction of each local government (i.e., city of Moreno Valley, city of Perris, city of Riverside, and Riverside County), only the cities of Moreno Valley and Perris have residences within the APZs. To the north end of Runway 14/32 within the city of Moreno Valley, approximately 44 residential units are within APZ II. There are 37 and 38 residential units in APZ I and APZ II, respectively, in the city of Perris to the south end of Runway 14/32. To determine the population within the APZs, the identical method to determining populations within noise contour levels was applied.

Table 5-1. Off-Base Land Area and Estimated Population within the Clear Zones and Accident Potential Zones

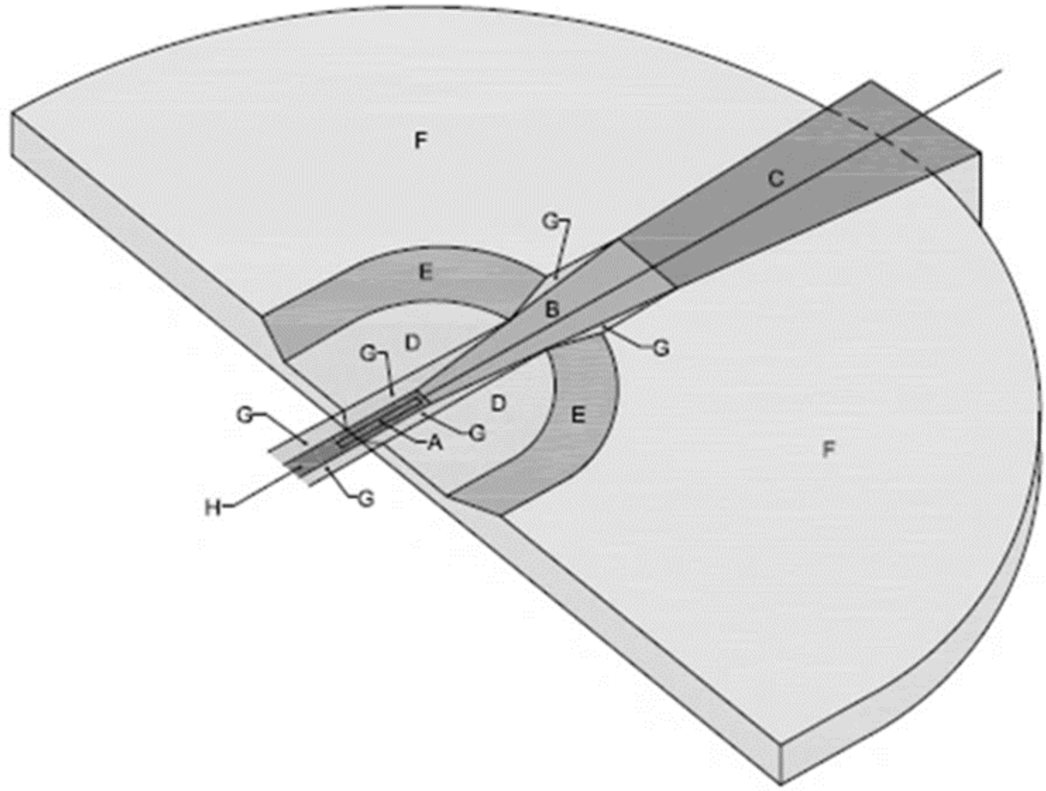
Zone	Acres	Population
CZ	72	0
APZ I	731	154
APZ II	1,034	323
Total	**1,837**	**477**

Source: U.S. Census Bureau 2010

5.2 Imaginary Surfaces

The DoD and Federal Aviation Administration (FAA) identify a complex series of imaginary planes and transition surfaces which define the airspace needed to remain free of obstructions around an airfield. Obstruction-free imaginary surfaces ensure safe flight approaches, departures, and pattern operations. Obstructions include natural terrain and man-made features, such as buildings, towers, poles, wind turbines, cell towers, and other vertical obstructions to airspace navigation.

Fixed-wing runways and rotary-wing runways/helipads have different imaginary surfaces. Brief descriptions of the imaginary surfaces for fixed-wing runways are provided on Figure 5-6 and in Table 5-2. Figure 5-7 and Figure 5-8 depict runway airspace imaginary surfaces specific to March ARB, specifically Runway 14/32 and Runway 12/30, respectively. In general, the Air Force does not permit above-ground structures in the primary surface, and height restrictions apply to transitional surfaces and approach and departure surfaces. Height restrictions are more stringent the closer you are to the runway and flight paths.



LEGEND
A Primary Surface
B Approach-Departure Clearance Surface (50:1 Slope Ratio)
C Approach-Departure Clearance Surface (Horizontal)
D Inner Horizontal Surface (45.72m [150'] Elevation)
E Conical Surface (20:1 Slope Ratio)
F Outer Horizontal Surface (152.40m [500'] Elevation
G Transitional Surface (7:1 Slope Ratio)
H Runway

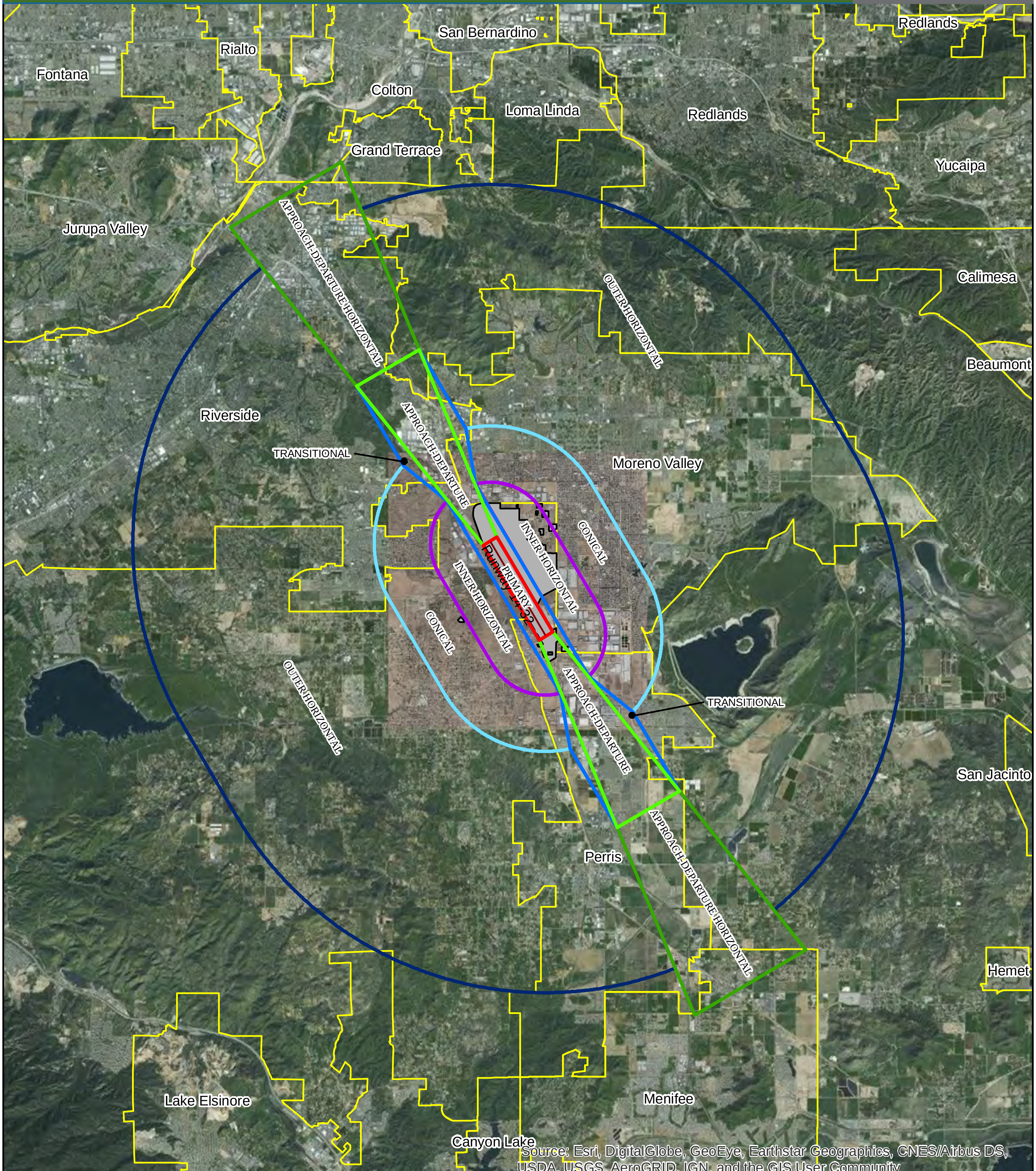
Figure 5-6. Runway Imaginary Surfaces and Transition Planes

Table 5-2. Description of Imaginary Surfaces for Military Airfields

Primary Surface	An imaginary surface symmetrically centered on the runway, extending 200 feet beyond each runway end that defines the limits of the obstruction clearance requirements in the vicinity of the landing area. The width of the primary surface is 2,000 feet, or 1,000 feet on each side of the runway centerline.
Approach-Departure Clearance Surface	This imaginary surface is symmetrically centered on the extended runway centerline, beginning as an inclined plane (glide angle) at the end of the primary surface (200 feet beyond each end of the runway), and extending for 50,000 feet. The slope of the approach-departure clearance surface is 50:1 until it reaches an elevation of 500 feet above the established airfield elevation. It then continues horizontally at this elevation to a point 50,000 feet from the starting point. The width of this surface at the runway end is 2,000 feet, flaring uniformly to a width of 16,000 feet at the end point.
Inner Horizontal Surface	This imaginary surface is an oval plane at a height of 150 feet above the established airfield elevation. The inner boundary intersects with the approach-departure clearance surface and the transitional surface. The outer boundary is formed by scribing arcs with a radius 7,500 feet from the centerline of each runway end and interconnecting these arcs with tangents.
Conical Surface	This is an inclined imaginary surface extending outward and upward from the outer periphery of the inner horizontal surface for a horizontal distance of 7,000 feet to a height of 500 feet above the established airfield elevation. The slope of the conical surface is 20:1. The conical surface connects the inner and outer horizontal surfaces.
Outer Horizontal Surface	This imaginary surface is located 500 feet above the established airfield elevation and extends outward from the outer periphery of the conical surface for a horizontal distance of 30,000 feet.
Transitional Surface	This surface extends outward and upward at right angles to the runway centerline and extended runway centerline at a slope of 7:1. The transitional surface connects the primary and the approach-departure clearance surfaces to the inner horizontal, the conical, and the outer horizontal surfaces.

Runway 14/32 Imaginary Surfaces

Figure 5-7



Legend

- Runway 14-32
- APPROACH-DEPARTURE CLEARANCE SURFACE
- APPROACH-DEPARTURE CLEARANCE SURFACE HORIZONTAL
- CONICAL SURFACE
- INNER HORIZONTAL SURFACE
- OUTER HORIZONTAL SURFACE
- PRIMARY SURFACE
- TRANSITIONAL SURFACE
- Installation Boundry
- City Boundary

Runway 12/30 Imaginary Surfaces

Figure 5-8

5.3 Hazards to Aircraft Flight Zones (HAFZ)

Certain land uses and activities can pose potential hazards to flight. To ensure land uses and activities are examined for compatibility, the Air Force has identified a Hazards to Aircraft Flight Zone (HAFZ). The HAFZ is defined as the area within the "Imaginary Surfaces" that are shown in Figures 5-7 and 5-8, Imaginary Surfaces for Runway 14/32 and Runway 12/30 at March ARB, respectively. Unlike Noise and Safety Zones, the HAFZ does not have recommended land use compatibility tables. Instead, it is a consultation zone recommending that project applicants and local planning bodies consult with the Air Force to ensure the project is compatible with Air Force operations. These land uses and activities include:

- **Height:** Tall objects can pose significant hazards to flight operations or interfere with navigational equipment (including radar). City/County agencies involved with approvals of permits for construction should require developers to submit calculations which show that projects meet the height restriction criteria of 14 CFR, Part 77.17, for the specific airfield described in the AICUZ study. City and County agencies may also consider requiring a "Determination of No Hazard" issued by the Federal Aviation Administration for any tall objects within this zone.
- **Visual Interference:** Industrial or agricultural sources of smoke, dust, and steam in the airfield vicinity can obstruct the pilot's vision during takeoff, landing, or other periods of low-altitude flight. Close coordination between the base and the landowner can often mitigate these concerns. For example, irrigating before plowing can greatly reduce dust concerns.
- **Light Emissions:** Bright lights, either direct or reflected, in the airfield vicinity can impair a pilot's vision, especially at night. A sudden flash from a bright light causes a spot or "halo" to remain at the center of the visual field for a few seconds or more, rendering a person virtually blind to all other visual input. This is particularly dangerous for pilots at night when the flash can diminish the eye's adaptation to darkness. The eyes partially recover from this adaptation in a matter of minutes, but full adaptation typically requires 40 to 45 minutes. Specific examples of light emissions that can interfere with the safety of nearby aviation operations include:
    - Lasers that emit in the visible spectrum can be potentially harmful to a pilot's vision during both day and night.
    - The increasing use of energy-efficient LED lights also poses potential conflicts in areas where pilots use Night Vision Goggles (NVGs). NVGs can exaggerate the brightness of these lights, interfering with

pilot vision.
  - The use of red LED lights to mark obstructions can produce an unintended safety consequence because red LED lights are not visible on most NVG models, rendering them invisible to NVG users in the area.

- **Bird Animal Strike Hazard (BASH):** Wildlife represents a significant hazard to flight operations. Birds, in particular, are drawn to different habitat types found in the airfield environment including hedges, grass, brush, forest, water, and even the warm pavement of the runways. Although most bird and animal strikes do not result in crashes, they cause structural and mechanical damage to aircraft as well as loss of flight time. Most collisions occur when the aircraft is at an elevation of less than 1,000 feet. Due to the speed of the aircraft, collisions with wildlife can happen with considerable force.

  To reduce the potential of a BASH, the Air Force recommends that land uses that attract birds not be located near installations with an active air operations mission. These land uses include but not limited to:

  - Waste disposal operations
  - Wastewater treatment facilities
  - Transfer stations
  - Landfills
  - Golf courses
  - Wetlands
  - Storm water ponds
  - Retention basins
  - Dredge disposal sites
  - Fruit trees

  Birds and raptors in search of food or rodents will flock to landfills, increasing the probability of BASH occurrences in the vicinity of these facilities. Design modifications also can be used to reduce the attractiveness of these types of land uses to birds and other wildlife.

- **Radio Frequency/Electromagnetic Interference (RF/EMI):** The American National Standards Institute defines Electromagnetic Interference (EMI) as any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics/electrical equipment. EMI may be caused by atmospheric phenomena, such as lightning or precipitation static, and by non-telecommunications equipment, such as vehicles and industrial machinery.

New generations of military aircraft are highly dependent on complex electronic systems for navigation and critical flight and mission-related functions. Consequently, communities should use care when siting any activities that create EMI. Many of these sources are low-level emitters of EMI. However, when combined, they have an additive quality.

EMI also affects consumer devices, such as cell phones, FM radios, television reception, and garage door openers. In some cases, the source of interference occurs when consumer electronics use frequencies set aside for military use.

SECTION 6
LAND USE ANALYSIS

The AICUZ area of influence or the "AICUZ footprint" of an airfield is the combination of noise contours, CZ, APZs, and the HAFZ, and is used as the basis for the land use compatibility analysis. The AICUZ footprint defines the minimum recommended area within which land use controls are needed to enhance the health, safety, and welfare of those living or working near a military airfield and to preserve the flying mission. The AICUZ footprint, combined with the guidance and recommendations set forth in the AICUZ study, are the fundamental tools necessary for the planning process. The Air Force recommends local and regional governments adopt the AICUZ noise zones, CZs, APZs and HAFZ into planning studies, regulations, and processes to best guide compatible development around the installation. This study uses the AICUZ footprint (Figures 6-1 and 6-3) for March ARB as the basis for the land use compatibility analysis.

6.1 LAND USE COMPATIBILITY AND GUIDELINES

In an effort to establish long-term compatibility for lands within the vicinity of military air installations, the DoD has created land use compatibility recommendations based on the Federal Highway Administration's Standard Land Use Coding Manual (SLUCM). These guidelines are used by DoD personnel for on-base planning and for engaging with the local community to foster compatible land use development. Table A-1 of Appendix A shows the suggested land use compatibility guidelines within the Clear Zones (CZ) and Accident Potential Zones (APZs). Table A-2 of Appendix A provides land use compatibility recommendations within CNEL noise contours.

6.2 PLANNING AUTHORITIES

This section presents the State of California, Riverside County, and the municipalities that have land use jurisdiction near March ARB, including descriptions of objectives to address existing and future land use specifically influenced by aircraft operations at March ARB. Riverside County exercises control over unincorporated lands to the east and west of March ARB. The City of Perris exercises land use control to the south and south west of the base, the City of Moreno Valley and City of Riverside exercise land use control to the north and northeast and northwest, respectively of the base. The Riverside Airport Land Use Commission (ALUC) has developed noise and safety compatibility guidelines for all areas surrounding March ARB, which include the municipalities mentioned.

6.2.1 State of California

Published in 2009 and updated on 8 June 2017, the State of California Governor's Office of Planning and Research (OPR) Community and Military Compatibility Planning branch assists cities and counties in addressing military compatibility issues when developing, updating or significantly amending their general plans. These guidelines are the result of the passage of Senate Bill 1468 and Senate Bill 1462, which outline the responsibilities of cities and counties regarding the military in the planning and land use decision-making process. SB 1462 and SB 1468 identify specific measures that need to be taken by local jurisdictions. The State recommends that cities and counties near military facilities consider such facilities to be part of the community and, therefore, there is a need to address these facilities and local land use impacts within the general plan

Codified in the California Government Code (GC) at sections 65302 and 65560, Senate Bill (SB) 1468 was authored by Senator Pete Knight and signed into law by Governor Gray Davis on September 26, 2002. SB 1468 outlines how cities and counties must consider the impact of development on military readiness activities when preparing or updating their general plan. The intention of the law is to encourage cooperation between military installations and local communities to reduce land use conflicts between civilian development and military readiness activities. SB 1468 identifies specific requirements about when and where local governments must incorporate military readiness activities into the general plan. SB 1468 also required OPR to prepare and publish the California Advisory Handbook for Community and Military Compatibility Planning (OPR Handbook) for local officials, planners and developers to include information about how to reduce land use conflicts between the effects of civilian development and military readiness.

SB 1462 amended GC sections 65352, 65404, 65940, and 65944, and was signed by Governor Arnold Schwarzenegger on September 29, 2004. It requires cities and counties to notify the military of certain local planning proposals and development permit applications. The intent of SB 1462 is to create a local notification process which informs the military of certain local land use proposals in an effort to prevent land use conflicts between local communities and military installations and their training activities. The bill requires local governments to: (a) revise their development permit application forms, and (b) notify branches of the military when proposed general plan actions and amendments, and development projects might have an impact on military facilities and operations.

AB1108 amended the California Environmental Quality Act (CEQA) to ensure military agencies are provided notice of proposed projects within two miles of installations or under training routes or Special Use Airspace.

6.2.2 Riverside County Airport Land Use Commission

The Riverside County Airport Land Use Commission (ALUC) has been assigned the lead responsibility for airport land use compatibility planning around each public-use and military airport in Riverside County. Established in accordance with the California State Aeronautic Act (Public Utilities Code Section 21670 *et seq.*), the Riverside County ALUC is required to prepare an Airport Land Use Compatibility Plan (ALUCP) for each airport. With regard to military airports, Section 21675(b) states that ALUCs must prepare a compatibility plan and that such plans "shall be consistent with the safety and noise standards in the Air Installations Compatible Use Zones plan prepared for that military airport" (Riverside County ALUC 2014).

In 2014, the *March ARB/Inland Port Authority (IPA) ALUCP* was completed. This ALUCP is primarily based on the *2005 March ARB AICUZ Study*, however the noise contours presented within the 2005 AICUZ were supplemented by more recent contours prepared for both March ARB and March JPA (Riverside County ALUC 2014).

6.2.3 City of Moreno Valley

In 2016, the City of Moreno Valley revised the *2006 Moreno Valley General Plan* which addresses proposed development on land surrounding March ARB. Based on the compatible uses identified within the *2005 AICUZ*, the Moreno Valley General Plan discourages new residential development where noise due to aircraft overflights exceeds 65 CNEL. In addition, noise attenuation is required where necessary to achieve acceptable interior noise levels. The acceptable interior noise is not greater than 45 CNEL for residences and schools and 50 CNEL for libraries, hospitals, places of worship and office uses (Moreno Valley 2006). The City of Moreno Valley is currently updating their General Plan to conform to the *2014 March ARB/IPA ALUCP*.

6.2.4 City of Perris

In 2016, the City of Perris adopted an Airport Overlay Zones (AOZ) (Zoning Code Chapter 19.51) to comply with the *2014 March ARB/IP ALUCP* boundaries and policies. Presented within the City of Perris Land Use Element, an AOZ ensures that the policies in the *March ARB/IP ALUCP* are adhered to when new development projects are brought before the City of Perris (City of Perris 2016).

The purpose and intent of the AOZ is to:

- Implement the City's General Plan policies to ensure that all land uses within the AOZ are consistent with the State Aeronautics Act, state law, Federal Aviation Administration regulations, and guidance of the California Airport Land Use Planning Handbook;
- Ensure that land uses and development within the AOZ are compatible with the March ARB/IPA ALUCP;
- Prohibit the establishment of new incompatible land uses and further expansion of existing incompatible land uses to avoid or minimize exposure of persons to potential hazards associated with aircraft operations;
- Prohibit development, uses, or any installations or activities that could represent a hazard to aircraft operations; and

- Recognize the unique constraints and considerations that apply to properties potentially affected by aircraft operations by establishing policies and review criteria for land use, development, and properties within the AOZ.

6.2.5 City of Riverside

The Land Use and Urban Design Element of the Riverside General Plan 2025 describes present and planned land uses and their relationship to Riverside's vision and goals. In addition to constituting an action plan for implementation of Riverside's vision, this element complies with all requirements for General Plan Elements set forth in California Law. This also includes two objectives directly addressing March ARB (City of Riverside 2013):

- Objective 22 - Avoid land use/transportation decisions that would adversely impact the long-term viability of the March ARB/IPA, Riverside Municipal and Flabob Airports; and
- Mission Grove Objective 69 - Complete buildout of the Mission Grove Specific Plan, encouraging development that can harmoniously co-exist near the March ARB/IPA facility.

The Noise Element of the City’s General Plan examines noise sources in the city with a view toward identifying and appraising the potential for noise conflicts and problems, and identifies ways to reduce existing and potential noise impacts. In particular, the Noise Element contains policies and programs to achieve and maintain noise levels compatible with various types of land uses. Although, this element addresses noise which affects the community at large, rather than noise associated with site specific conditions, this element also addresses effective strategies to reduce, eliminate and limit community exposure to loud noise sources. Guidelines put forth by the State of California include requirements for defining projected future noise conditions in the form of noise exposure contours. These contours serve as the basis for developing guidelines for identifying compatible land uses. The following objectives are associated with March ARB/IPA aircraft operations and include:

- Objective 1 - Minimize noise levels from point sources throughout the community and, wherever practicable, mitigate the effects of noise to provide a safe and healthful environment;
- Objective 2 - Minimize the adverse effects of airport-related noise through proper land use planning; and
- Objective 3 - Ensure the viability of March ARB/IPA.

The City of Riverside is currently in the process of updating the Housing Element of their General Plan.

6.3 LAND USE AND ZONING

6.3.1 Existing Land Use and Zoning

Zoning is the legal regulation of property use to protect the health, safety, and welfare of citizens; protect property rights; conserve resources; and avoid incompatible uses. In California, counties and cities enact zoning ordinances to implement respective comprehensive plan objectives. Land use and zoning classifications are generalized to illustrate compatibility across common land use and zoning types.

As mentioned in earlier sections, March ARB is located in the middle of four separate municipalities, three of which share a border with the base. Nearest the base to the south is the city of Perris where land use designations are established by the City of Perris Specific Plan which encourages industrial and commercial land use and no new residential housing. To the east and north of the base, Moreno Valley shares a continuous border with March ARB where industrial and commercial land use is designated and encouraged. Riverside County shares a western border with March ARB where commercial, industrial, open space, and public/quasi-public land use has been designated. The city of Riverside does not border March ARB, however aircraft overflights and associated noise extends into areas of Riverside where commercial land use exists, and into residential areas to a lesser extent relative to noise.

Interstate 215 is a north-south highway and is the primary transportation corridor that runs through Moreno Valley and to the west of March ARB. Interstate 215 links to regional primary and secondary transportation routes within Riverside

County. Land use designation along the interstate is primarily industrial and commercial.

Table 6-1 indicates specific land use designations from each municipality and the associated amount of acreage within each noise zone above 65 dB CNEL and within the CZs and APZs associated with March ARB.

Table 6-1. Municipality Land Use Acreage within High Noise Zones, Clear Zones, and Accident Potential Zones (Acres)

Municipality	Land Use	CNEL (dB)				CZ	APZ I	APZ II
		65-69	70-74	75-79	80+			
City of Moreno Valley	Open Space/Ag	23	5			36	1	
	Commercial						4	11*
	Industrial	34					86	97*
	Residential							
City of Perris	Commercial							2
	PVCC SP	332	76			28	344*	475
	Residential	20	1					7
City of Riverside	Commercial	3						367
	Recreation							4
Riverside County	Commercial	370	4			16	114	30
	Industrial	247	4			17	57	35
	Open Space/Ag							
	Public-Quasi	23					3	
	Undesignated	-	-					

-Ag=Agriculture, PVCC SP=Perris Valley Community Center Specific Plan
* does include residences within commercial or industrial land use
-Does not include all land use designations, only those with acreage within 65+ dB CNEL noise zones, CZs, and APZs
-CZs and APZs includes acreage within these zones for both runways
-Does not include acreage where CZ/APZ of one runway overlaps a CZ/APZ of another runway, in this case the more conservative zone acreage is presented.
Sources: Amec Foster Wheeler 2017; City of Moreno Valley 2006; City of Perris 2016; City of Riverside 2013; Riverside County 2014.

Figure 6-1 shows the existing land uses for the area that surrounds March ARB and identifies those areas exposed to CNEL greater than or equal to 60 dB due to aircraft operations at the base. Figure 6-2 depicts zoning classifications associated with the Riverside County ALUC. Existing land use was determined utilizing GIS provided by the local governments (i.e., cities of Moreno Valley, Perris, Riverside, and Riverside County) with mapping of land use layers.

Figures 6-3 and 6-4 present the CZs and APZs associated with the March ARB runways relative to surrounding land uses, both for the cities and the Riverside County ALUC. Currently, March ARB does not own all property within the CZs or APZs associated with either Runway 14/32 or Runway 12/30. All surrounding municipalities have lands that are within March ARB CZs and APZs and, though zoned for compatibility, existing incompatible land use does exist.

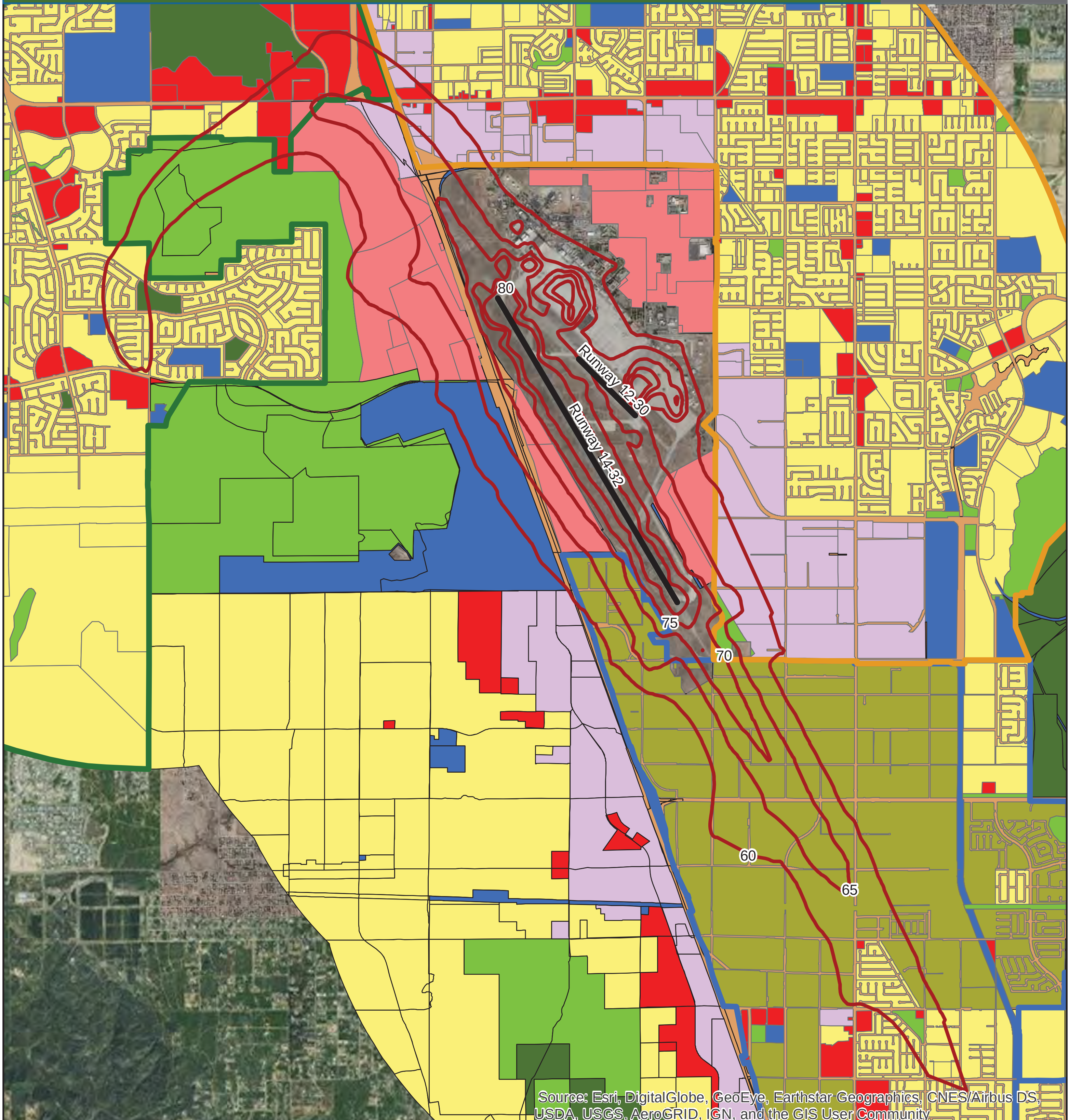
6.3.2 Future Land Use and Zoning

As with existing land use and zoning, future land use has been generalized for comparison. The cities of Moreno Valley, Perris, Riverside and Riverside County (specifically the ALUC) have zoned areas surrounding March ARB to ensure long-term land use compatibility with aircraft operations at the base. While existing incompatible land use does exists, through responsible zoning future land use incompatibility can be maintained at a negligible level.

To the south end of Runway 14/32, the City of Perris has zoned an area within APZ I, APZ II, and the 65+ dB CNEL noise zone as “City of Perris Specific Plan.” Within this Specific Plan, commercial and industrial land use would be encouraged with no new residences included. It is important that the City of Perris follow through in encouraging only commercial and industrial land use within this area, with a focus on compatibility with density requirements per the SLUCM.

March ARB 2018 Noise Contours and Surrounding Land Use

Figure 6-1



Legend

- Runway

March ARB 2018 Noise Contours

- Noise Contour Levels(CNEL) 60dB, 65dB, 70dB, 75dB, 80dB
- City of Moreno Valley
- City of RiverSide
- City of Perris

LANDUSE

- Open/Agriculture/Low Density
- Commercial
- Public/Quasi-Public
- Undesignated
- Commercial/Industrial/Mixeduse
- Residential
- Industrial
- Recreation
- City of Perris Specific Plan

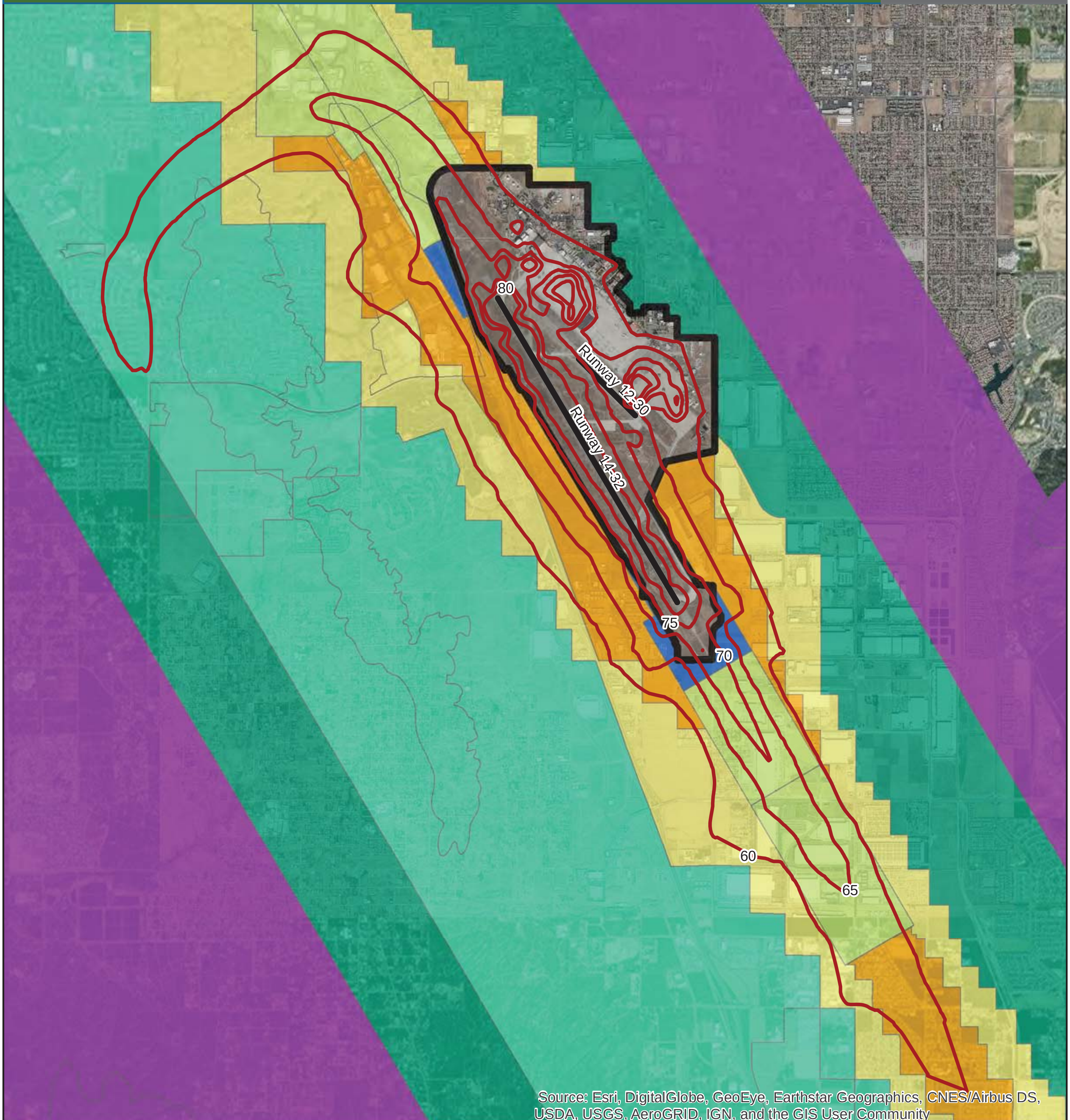
N

0 — 1.35 Miles

1 inch = 0.94 miles

ALUC Zones and 2018 Noise Contours

Figure 6-2



Legend

March ARB 2018 Noise Contours

- Noise Contour Levels (CNEL) 60dB, 65dB, 70dB, 75dB, 80dB
- Runways

ZONES

- Clear Zone
- Inner Approach/Depature Zone
- High Noise Zone
- Primary Approach/Departure Zone
- Flight Cooridor Zone
- Flight Cooridor Buffer
- Other Airport environment
- Military

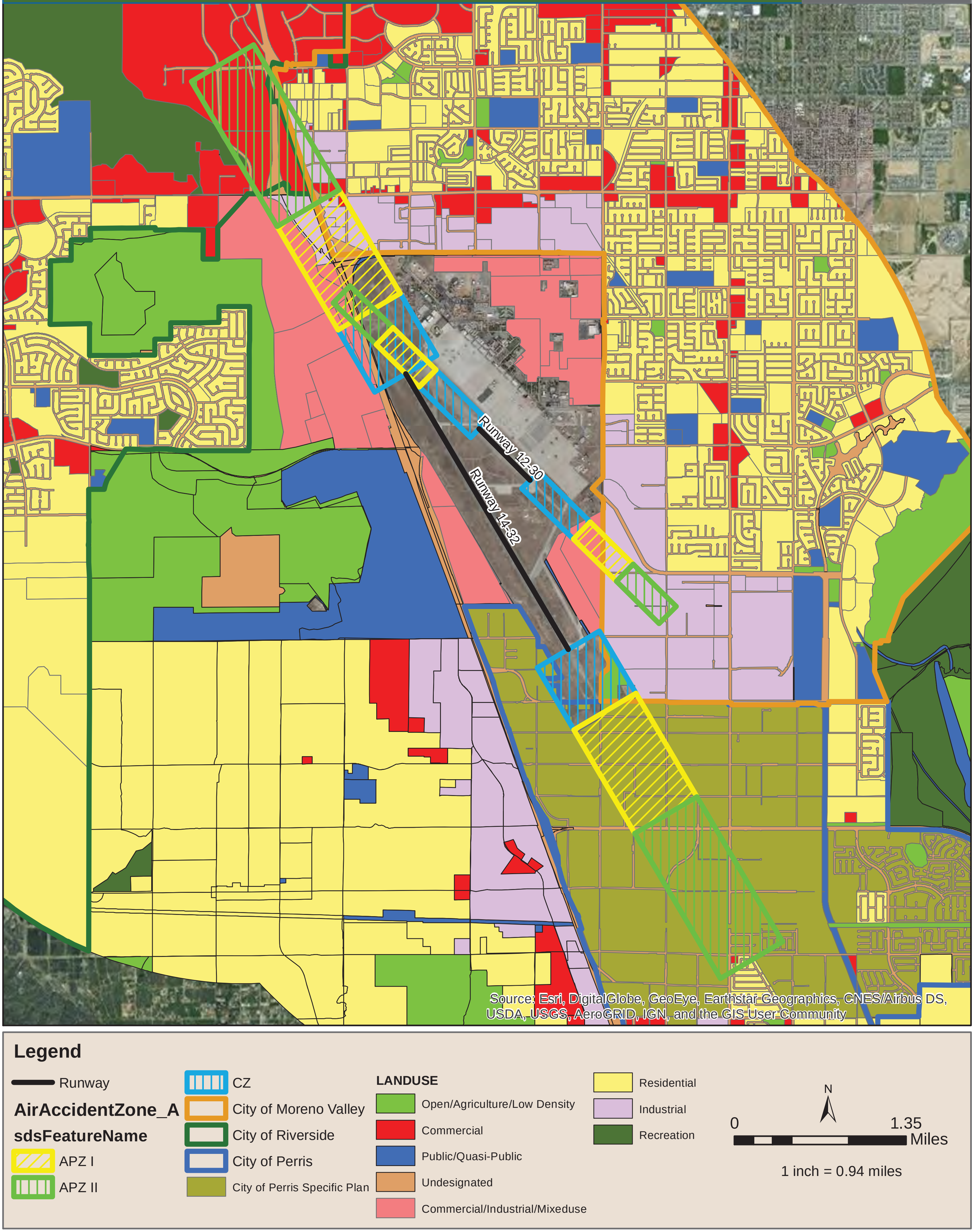
N

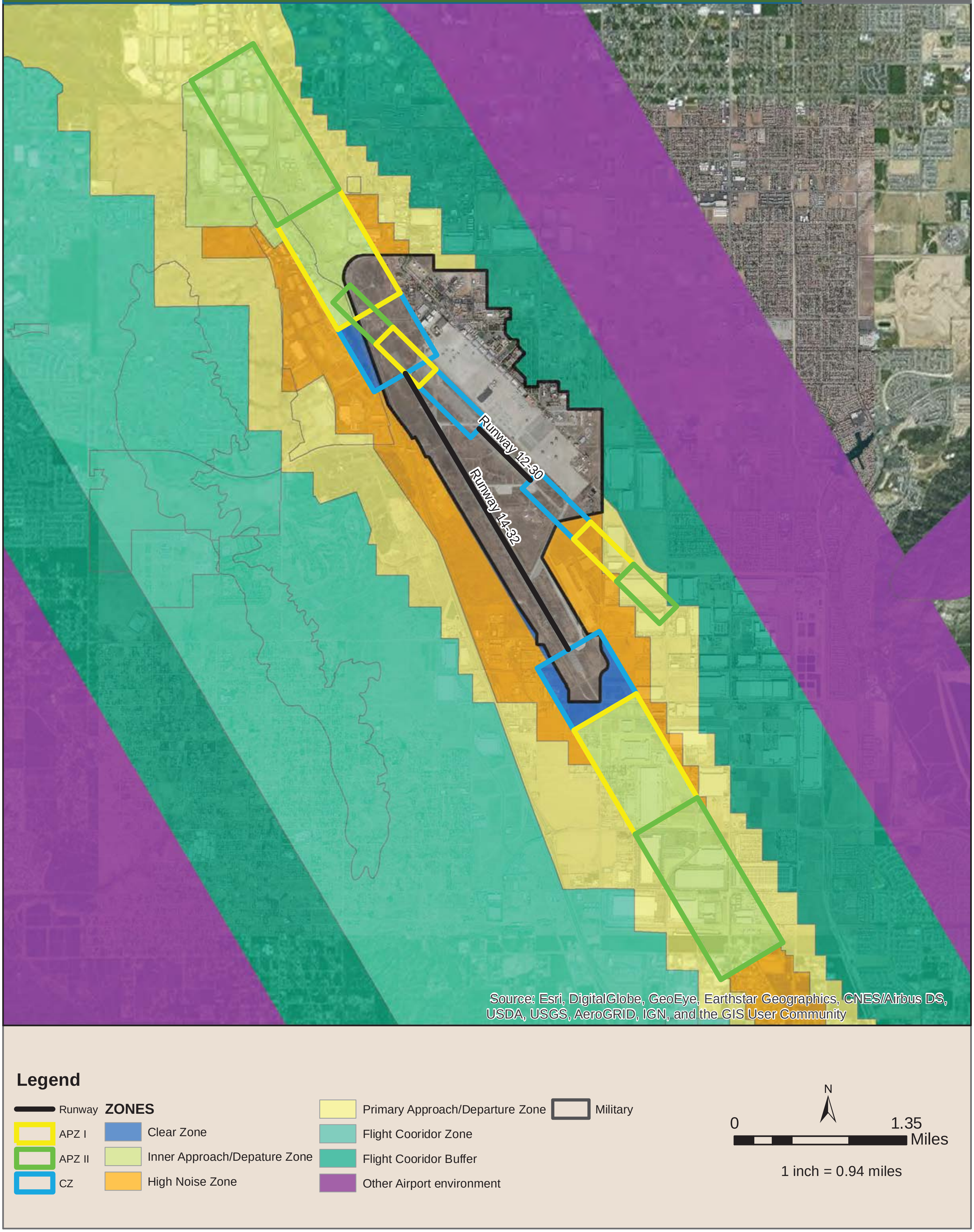
0 1.35 Miles

1 inch = 0.94 miles

March ARB Clear Zones/Accident Potential Zones and Surrounding Land Use

Figure 6-3




Runway 12-30
Runway 14-32
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Legend
Runway
ZONES
APZ I
APZ II
CZ
Clear Zone
Inner Approach/Depature Zone
High Noise Zone
Primary Approach/Departure Zone
Flight Cooridor Zone
Flight Cooridor Buffer
Other Airport environment
Military
N
0
1.35
Miles
1 inch = 0.94 miles

6.4 COMPATIBILITY

6.4.1 Land Use Analysis

Land use describes how land is developed and managed, and is characterized by the dominant function occurring within an area. To compare land use consistently across jurisdictions, this analysis uses generalized land use classifications illustrating land use compatibility across common land use types. These generalized land use categories do not exactly represent the local community's land use designations, but combine similar uses into the one of the following seven categories:

- **Residential.** All types of residential activity, such as single and multi-family residences and mobile homes, at a density greater than one dwelling unit per acre.
- **Commercial.** Offices, retail stores, restaurants and other types of commercial establishments.
- **Industrial.** Manufacturing, warehouses and other similar uses.
- **Public/Quasi-Public.** Publicly owned lands and land to which the public has access, including military reservations and training grounds, public buildings, schools, churches, cemeteries, and hospitals.
- **Recreational.** Land areas designated for recreational activity, such as parks, wilderness areas and reservations, conservation areas, and areas designated for trails, hikes, camping, etc.
- **Open/Agriculture/Low Density.** Undeveloped land areas, agricultural areas, grazing lands and areas with residential activity at densities less than or equal to one dwelling unit per acre.
- **Undesignated.** Applies to parcels that had no indicated value or were listed as 'undesignated' in the original datasets.

For the purpose of this analysis, the DoD AICUZ compatibility guidelines (Tables A-1 and A-2 of Appendix A) have been consolidated into the seven generalized land use classifications. Table 6-2 provides generalized compatibility guidelines. Land use compatibility falls into one of four categories: (1) Compatible, (2) Compatible with Restrictions, (3) Not Compatible, and (4) Not Compatible with Exceptions. The conditionally compatible land use may require incorporation of noise attenuation measures into the design and construction of structures and further evaluation to be considered "compatible" and may require density limitations for land in APZs.

Table 6-2. Generalized Land Use Categories and Noise/Safety Compatibility

Generalized Land Use Category[3]	Noise Zone (dB CNEL)						CZ	APZ I	APZ II
	<65	65-69	70-74	75-79	80-84	85+			
Residential	Yes	No[1]	No[1]	No	No	No	No	No	No
Commercial	Yes	Yes	Yes[2]	Yes[2]	No	No	No	Yes[2]	Yes[2]
Industrial	Yes	Yes	Yes	Yes	Yes[2]	No	No	Yes[2]	Yes[2]
Public/Quasi-Public	Yes	Yes[2]	Yes[2]	Yes[2]	No	No	No	No	Yes[2]
Recreation	Yes	Yes[2]	Yes[2]	No	No	No	No	Yes[2]	Yes[2]
Open/Agriculture/Low Density	Yes	Yes[2]	Yes[2]	Yes[2]	Yes[2]	Yes[2]	No	Yes[2]	Yes[2]
Undesignated	Yes	No	No	No	No	No	No	No	No

[1] Incompatible with exceptions
[2] Compatible with restrictions
[3] This generalized table demonstrates the land compatibility guidelines. Refer to Appendix A for use in determining land use compatibility.

6.4.2 Existing Land Use Compatibility

Land use compatibility determinations for areas that fall within the boundaries of March ARB CZs and APZs are presented in Figures 6-5 through 6-8 and Table 6-3. Existing land use compatibility for areas exposed to CNEL greater than or equal to 65 dB are presented in Figures 6-9 and 6-10, and Table 6-4. For land use to be considered compatible, it must meet the criteria listed in Table 6-2. Table 6-2 was compared to existing land use plans to determine what type of compatibility was associated with March ARB CZs and APZs and aircraft-generated CNEL.

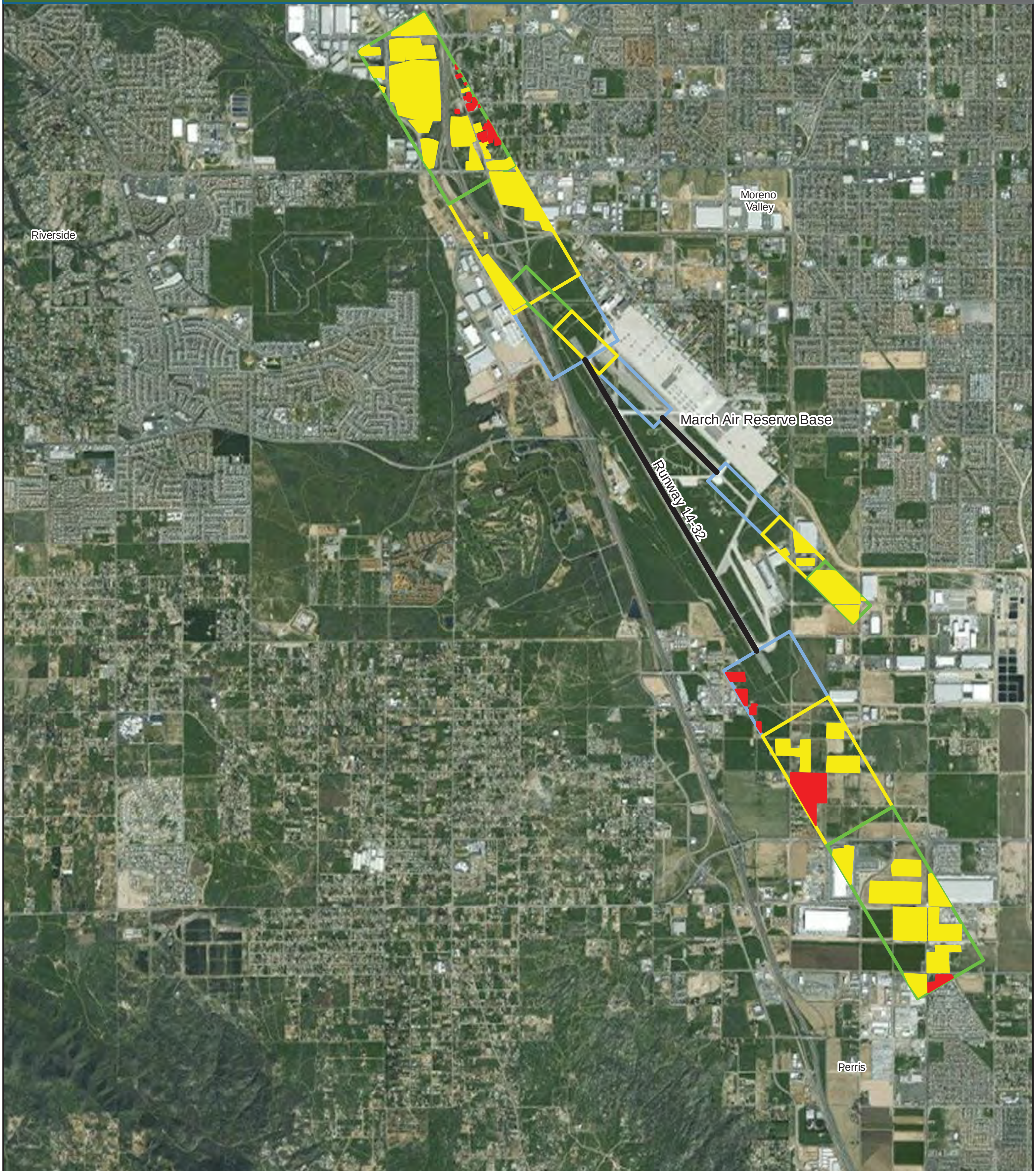
Table 6-3. Compatible and Not Compatible Land Use within March ARB Clear Zones and Accident Potential Zones (Acres)

Designation	Generalized Land Use Category	CZ	Note	APZ I	Note	APZ II	Note	Total
Not Compatible	Residential	-	-	38	(1)(3)	19	(1)(3)	57
	Commercial	30	-					30
	Industrial	31	-					31
	Public/Quasi-Public	-	-	3	-			3
	Recreation	-	-					-
	Open/Agriculture/ Low Density	36	-					36
	Undesignated	-	-	-	-	-	-	-
Compatible	Residential							
	Commercial			271	(2)	646	(2)	917
	Industrial			296	(2)	357	(2)	653
	Public/Quasi-Public					-	-	-
	Recreation			-	-	4	(2)	4
	Open/Agriculture/ Low Density			1	-	-	-	1
	Undesignated							
Subtotals	Not Compatible	97		41		19		157
	Compatible	-		568		1,007		1,575
TOTAL		**97**		**609**		**1,026**		**1,732**

Notes:
(1) Not Compatible with exceptions, Appendix A, Table A-1.
(2) Compatible with restrictions, Appendix A, Table A-1.
(3) Includes residences within commercial and industrial land use areas.
Sources: Amec Foster Wheeler 2017; City of Moreno Valley 2006; City of Perris 2016; City of Riverside 2013; Riverside County 2014.

March ARB Clear Zones/Accident Potential Zones and Land Use Compatibility

Figure 6-5



Legend

- Runway
- Compatible with Restrictions (refer to Section 6.4.2)
- Not Compatible (refer to Section 6.4.2)
- APZ I
- APZ II
- CZ

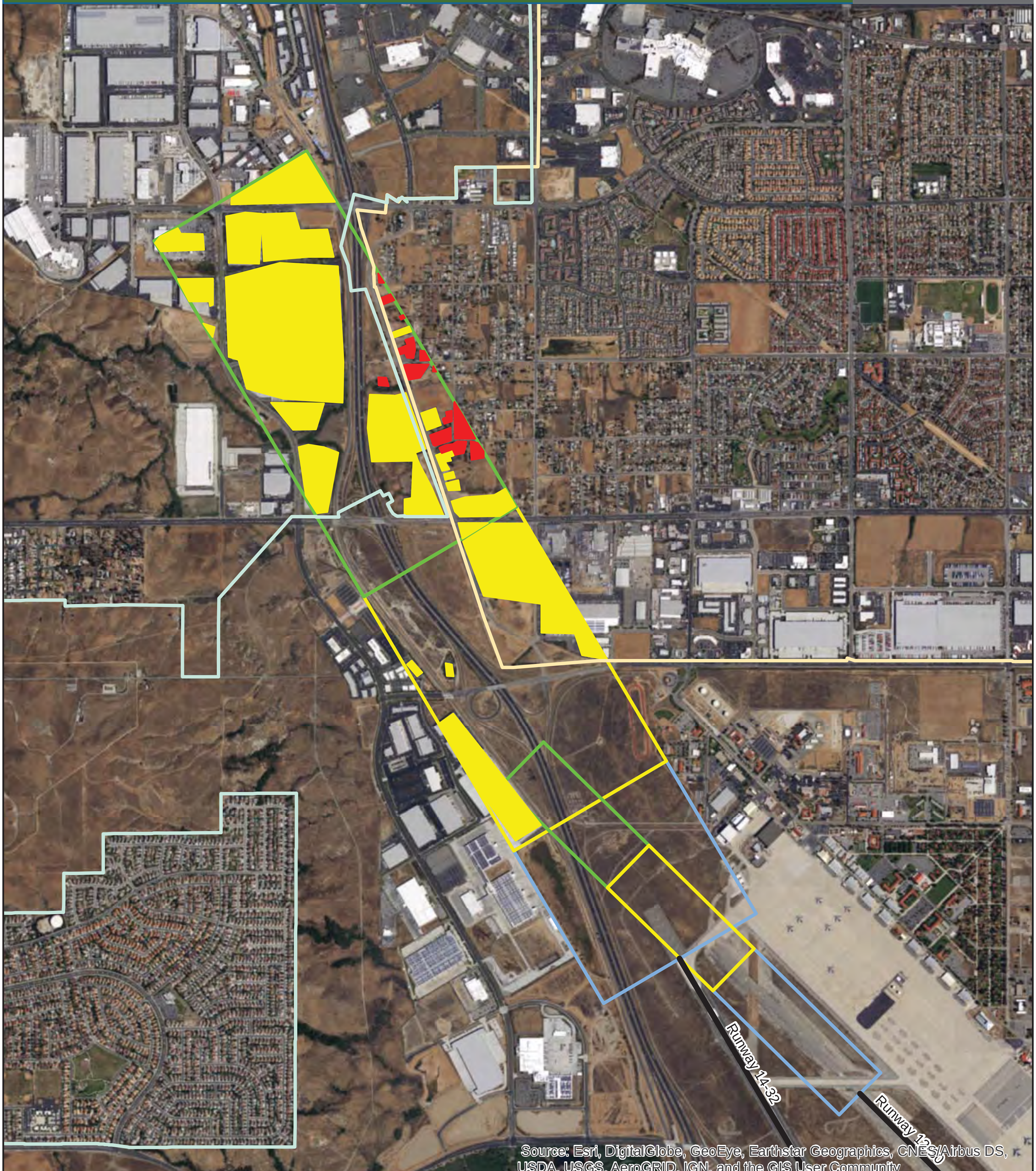
N

0 1.35 Miles

1 inch = 0.95 miles

March ARB Runway 12 and 14 Clear/Accident Potential Zones and Land Use Compatibility

Figure 6-6



Legend

- Runway
- City of Riverside
- City of Moreno Valley
- Compatible with Restrictions (refer to Section 6.4.2)
- Not Compatible (refer to Section 6.4.2)
- APZ I
- APZ II
- CZ

N

0 0.6 Miles

1 inch = 0.41 miles

March ARB Runway 30 Clear/Accident Potential Zones and Land Use Compatibility

Figure 6-7

Legend

- Runway
- City of Perris
- City of Moreno Valley
- Compatible with Restrictions (refer to Section 6.4.2)
- Not Compatible (refer to Section 6.4.2)
- APZ I
- APZ II
- CZ

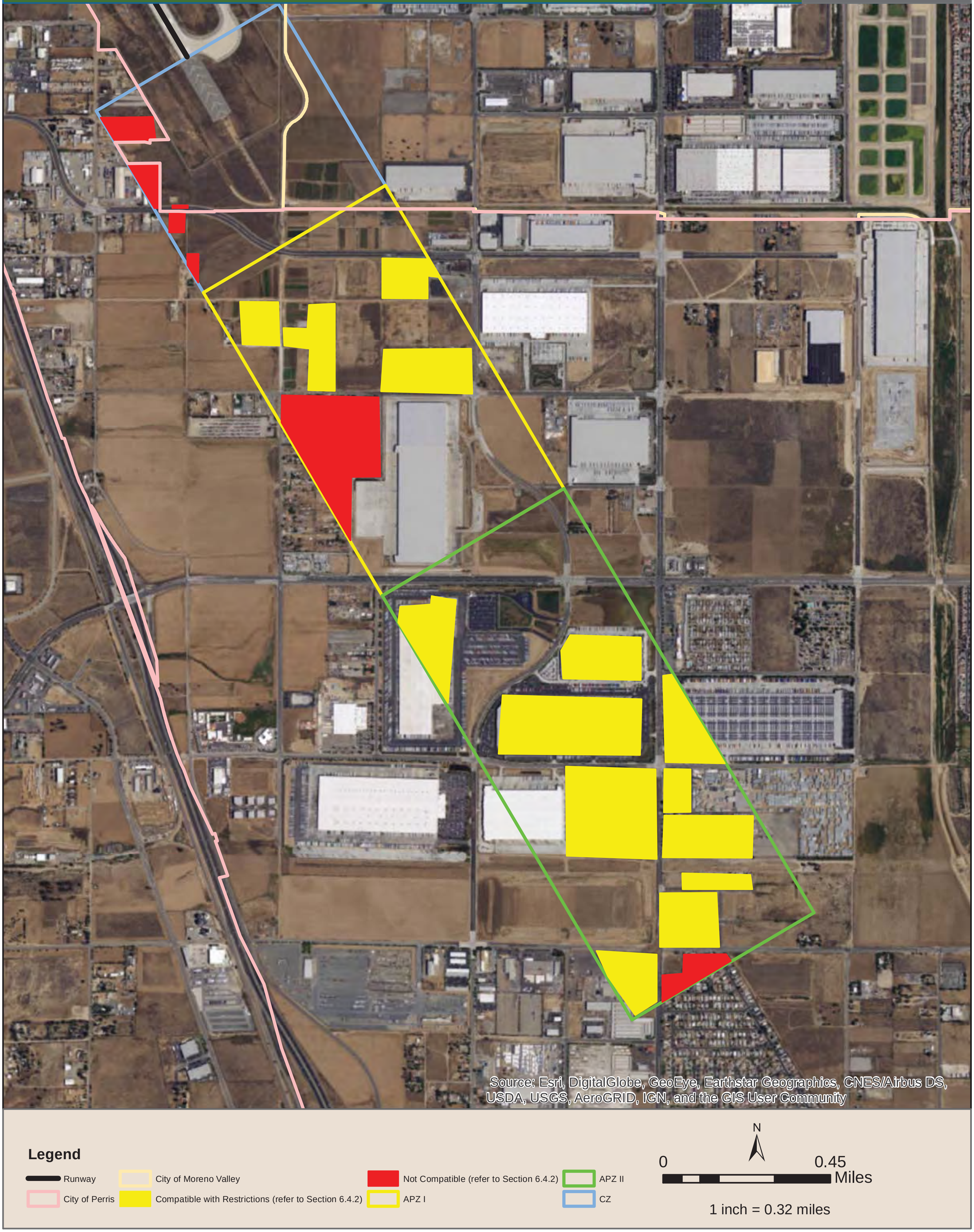
N

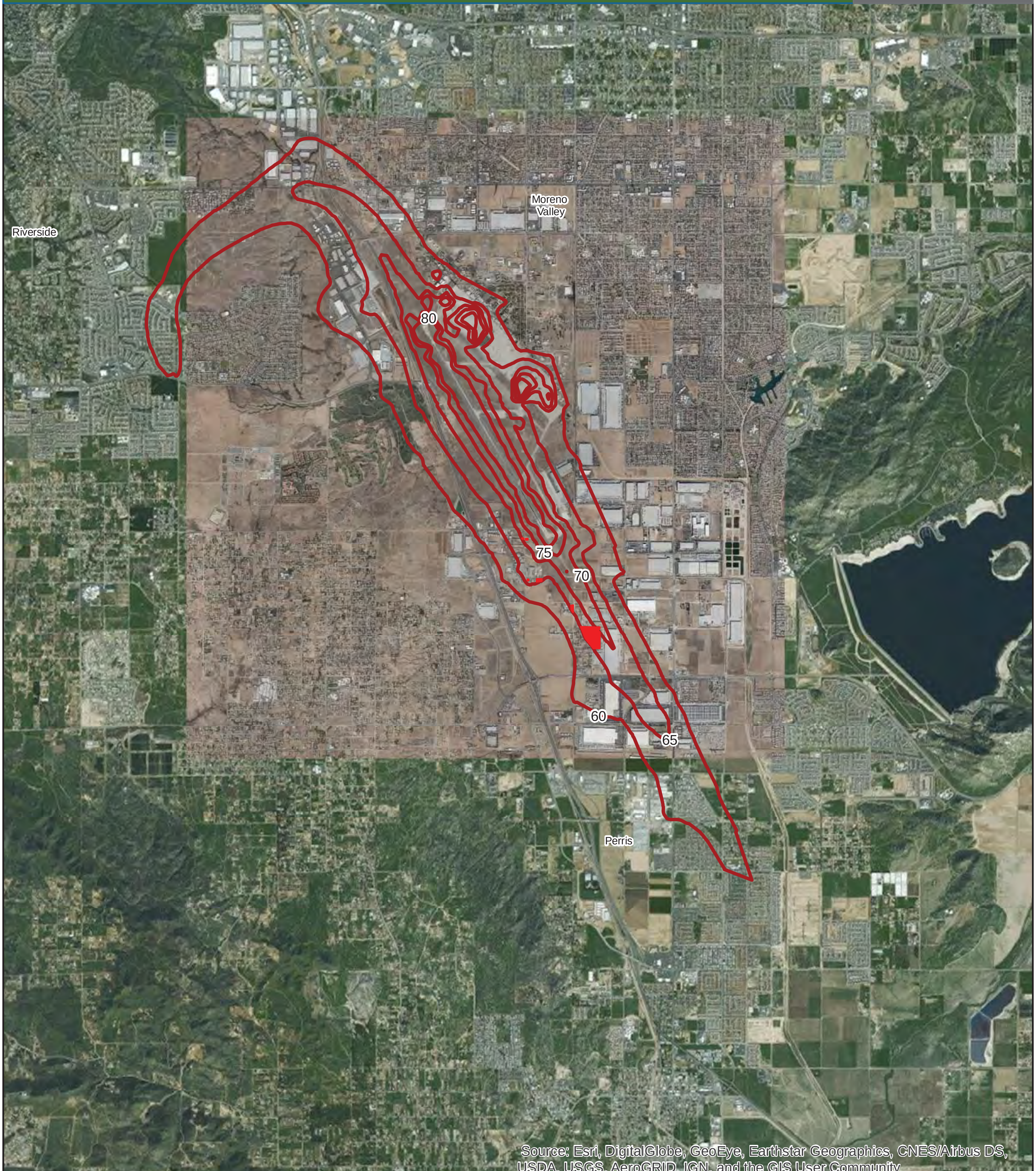
0 0.3 Miles

1 inch = 0.24 miles

March ARB Runway 32 Clear/Accident Potential Zones and Land Use Compatibility

Figure 6-8





Legend

Not Compatible with Exceptions (refer to Section 6.4.2)

March ARB 2018 Noise Contours

Noise Contour Levels (CNEL) 60dB, 65dB, 70dB, 75dB, 80dB

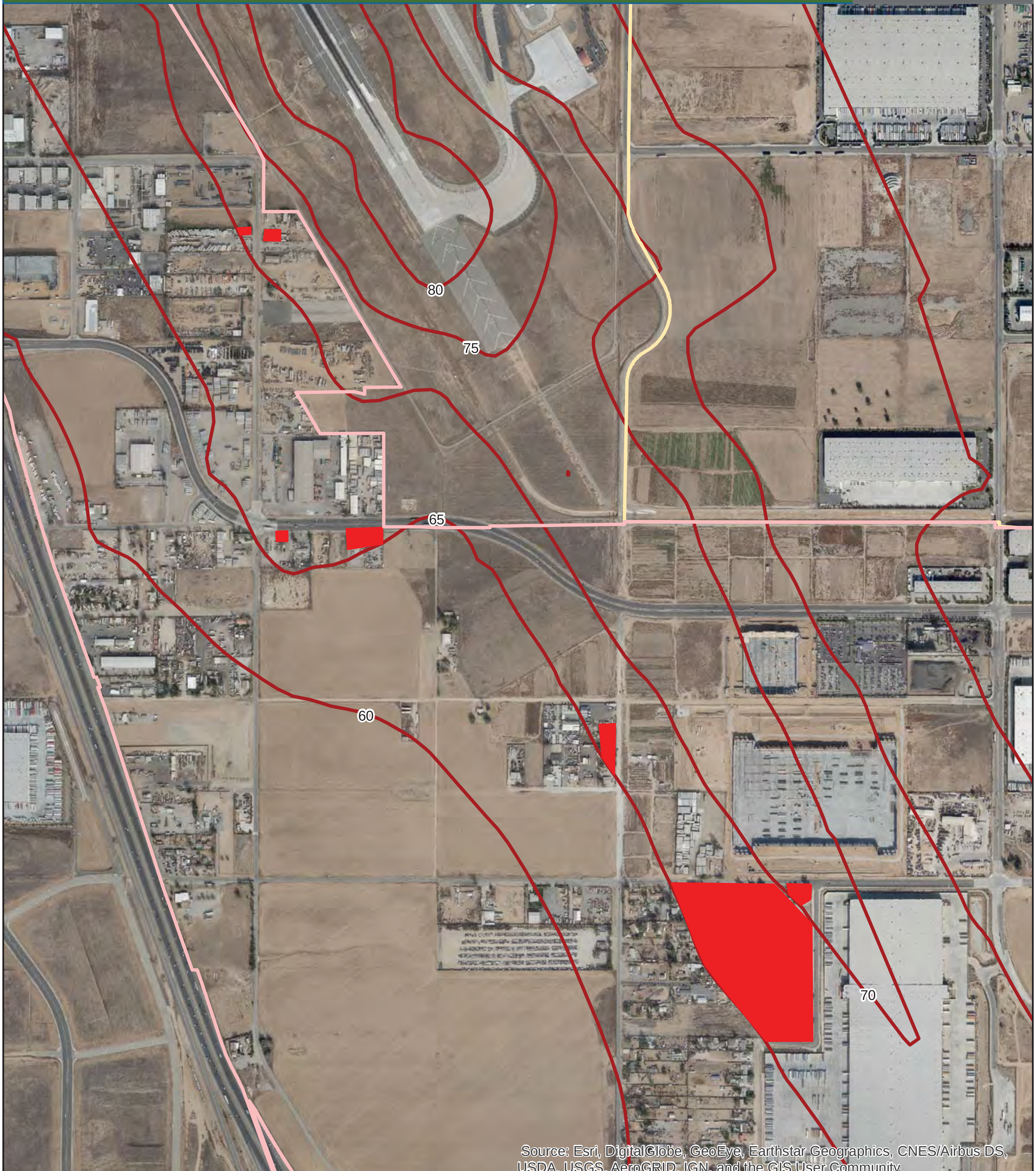
N

0 1.95 Miles

1 inch = 1.29 miles

March ARB 2018 Noise Contours and Land Use Compatibility

Figure 6-10



Legend

City of Perris

City of Moreno Valley

Not Compatible with Exceptions (refer to Section 6.4.2)

March ARB 2018 Noise Contours

Noise Contour Levels (CNEL) 60dB, 65dB, 70dB, 75dB, 80dB

N

0 0.255 Miles

1 inch = 0.18 miles

Table 6-4. Compatible and Not Compatible Land Use within March ARB 2018 CNEL Zones (Acres)

Designation	Generalized Land Use Category	Noise Zone (dB CNEL)								Total
		65-69	Note	70-74	Note	75-79	Note	80+	Note	
Not Compatible	Residential	20	(1)	`1	(1)	-	-	-	-	21
	Commercial							-	-	-
	Industrial									
	Public/Quasi-Public							-	-	-
	Recreation					-	-	-	-	-
	Open/Agriculture/Low Density									
	Undesignated	-	-	-	-	-	-	-	-	-
Compatible	Residential									
	Commercial (3)	539		42	-	-	-			581
	Industrial (3)	447		42	-	-		-	-	489
	Public/Quasi-Public	23	(2)	-	-	-	-			23
	Recreation	-	-	-	-					-
	Open/Agriculture/Low Density	23	(2)	5	(2)	-	-	-	-	28
	Undesignated									
Subtotals	Not Compatible	20	(1)	1	(1)	-	-	-	-	21
	Compatible	1,032		89		-		-	-	1,121
Total		**1,052**		**90**		**-**		**-**		**1,142**

Notes: All contour areas on-base are excluded from the counts.
(1) Not Compatible with exceptions, Appendix A, Table A-2.
(2) Compatible with restrictions, Appendix A, Table A-2.
(3) Includes residences within commercial and industrial land use areas.
Sources: Amec Foster Wheeler 2017; City of Moreno Valley 2006; City of Perris 2016; City of Riverside 2013; Riverside County 2014.

6.4.2.1 Riverside County/Riverside Airport Land Use Commission

Clear Zones and Accident Potential Zones

Within Riverside County, approximately 236 acres within APZ I and APZ II were identified as commercial/industrial, thus *Compatible with Restrictions* (i.e., buildings should meet recommended APZ I FAR criteria). This area is within the

Approach/Departure Zones identified by the Riverside ALUC where industrial and commercial land use is permitted, but not in excess of 25 people per gross acre.

Noise

The 65 dB CNEL noise zone (noise levels between 65 dB and 69 dB CNEL) associated with aircraft operations at March ARB extends into Riverside County over areas designated commercial/industrial and public/quasi-public land use, which is *Compatible* and *Compatible with Restrictions* (i.e., noise level reduction measures included in building development), respectively. With regards to ALUC, the 65-69 dB CNEL noise zone associated with March ARB aircraft operations is within the area designated *Inner Approach/Departure Zones* and *High Noise Zones*; both areas are noted to be subject to high noise levels and “within or near the 65 dB CNEL contour.”

6.4.2.2 City of Moreno Valley

Clear Zones and Accident Potential Zones

Within APZ II, 12.2 acres have been determined *Not Compatible;* this includes 44 residences that do not meet the *Not Compatible with Exceptions* criteria (i.e., 2 du/acre). Within APZ I and APZ II, approximately 186 acres of commercial and industrial land use has been identified as *Compatible with Restrictions*, conditioned on these buildings meeting the recommended FAR criteria described in the SLUCM table (Appendix A, Table A-1).

Noise

The 65-69 dB CNEL noise zone associated with aircraft operations at March ARB that extends into the city of Moreno Valley is compatible with the city’s existing land use designation (industrial) in this area.

6.4.2.3 City of Perris

Clear Zones and Accident Potential Zones

The CZs and APZs associated with the southern end of Runway 14/32 extend into the city of Perris which has assigned land use via the *City of Perris Specific Plan* which encourages commercial and industrial land use but also includes existing residences. Approximately 11.4 acres within the CZ would be considered *Not Compatible*. An additional 38.1 acres within APZ I would also be considered *Not Compatible* including 37 residences. Within APZ II, 6.6 acres have been determined *Not Compatible* including 38 residences that do not qualify as *Not Compatible with Exceptions* (i.e., 2 du/acre).

Both APZ I and APZ II associated with the south end of Runway 14/32 contain commercial and industrial land use that would be considered *Compatible with Restrictions*, conditioned on buildings meeting the recommended FAR criteria described in the SLUCM table (Appendix A, Table A-1).

Noise

The approximately 20 acres and 18 residences that exist within the 65- 69 dB CNEL noise zone are considered *Not Compatible with Exceptions*. Further, 0.8 acres and 3 residences within the 70 -74 dB CNEL noise zone are considered *Not Compatible with Exceptions*.

6.4.2.4 City of Riverside

Clear Zones and Accident Potential Zones

Within the city of Riverside, an area of approximately 367 acres within APZ II was identified as commercial, thus *Compatible with Restrictions* (i.e., buildings should meet recommended APZ II FAR criteria).

Noise

The 65 dB CNEL noise zone associated with aircraft operations at March ARB that extends into the city of Riverside is compatible with the city's existing land use designation (commercial) in this area.

6.5 AVIGATION EASEMENTS

While the majority of the CZs associated with March ARB runways are within the March ARB boundaries, small areas of the CZs are within the City of Perris and Riverside County jurisdiction, to the south and north, respectively. March ARB has engaged in the establishment of avigation easements with specific land holders to deal with these CZ areas outside of the base boundaries. Currently, March ARB has approximately 39 avigation clearance easements associated with Runway 14/32 CZs that extend beyond the base boundary (March ARB 2016d).

SECTION 7
IMPLEMENTATION

Implementation of the AICUZ Study must be a joint effort between March ARB and the surrounding communities. This AICUZ study provides the best source of information to ensure land use planning decisions made by the local municipalities are compatible with a future installation presence. This chapter discusses the roles of all the partners in the collaborative planning.

7.1 AIR FORCE ROLE

The goal of the Air Force AICUZ program is to minimize the noise and safety concerns on the surrounding communities and to advise these communities on potential impacts from base operations on the safety, welfare, and quality of life of their citizens.

March ARB's AICUZ responsibilities encompass the areas of flight safety, noise abatement, and participation in the land use planning process.

Air Force policy and guidance requires that base leadership periodically review existing practices for flight operations and evaluate these factors in relationship to populated areas and other local situations.

- March ARB should ensure that wherever possible flights be routed over sparsely populated areas as to reduce the exposure of lives and property to a potential accident.
- March ARB should periodically review existing traffic patterns, instrument approaches, weather conditions, and operating practices and evaluate these factors in relationship to populated areas and other local situations. This is done in order to limit, reduce and control the impact of noise from flying operations on surrounding communities.
- March ARB should establish a community forum between the installation and surrounding stakeholders to discuss land use and other issues of concern; these meetings should be held on a quarterly basis.
- March ARB should schedule land use planning meetings to provide a forum for agencies to meet and discuss future developments and to address issues that may surface as a result of new proposals. In an effort to further

facilitate and promote straightforward, consistent two-way discussion and information sharing.

- March ARB should provide copies of AICUZ studies to local, county, tribal, and regional planning departments and zoning administrators to aid in the planning process. Also provide copies of the AICUZ study to appropriate state and federal agencies.

Preparation and presentation of this March ARB AICUZ Study is one phase of continuing Air Force participation in the local planning process. The Air Force recognizes that as the local community updates its land use plans, March ARB must be ready to provide additional input as needed.

7.2 State and Regional Roles

Community and Military Compatibility Planning, a supplement to California General Plan Guidelines prepared by the State of California Governor's Office of Planning and Research (OPR), assists cities and counties in addressing military compatibility issues when developing, updating or significantly amending their general plans. The State recommends that cities and counties near military facilities consider such facilities to be part of the community and, therefore, there is a need to address these facilities and local land use impacts within the general plan to reduce land use conflicts between civilian development and military readiness activities.

The State of California requires the OPR to prepare and publish an advisory planning handbook for local officials, planners and developers to include information about how to reduce land use conflicts between the effects of civilian development and military readiness. This document, known as the California Advisory Handbook for Community and Military Compatibility Planning (OPR Handbook), was published in 2006 and updated in 2016.

OPR's handbook outlines instruction for collaboration on land use compatibility between local governments and the military particularly with regard to the general plan.

To further aid in the promotion and long-term operation of March ARB, the State should consider the following (Association of Defense Communities 2016):

- Economic Impact / Strategic Planning Study;
- Encroachment Mitigation Planning; and
- Funding of Encroachment Efforts.

7.3 LOCAL GOVERNMENT ROLE

The role of the local government is to enact planning, zoning, and development principles and practices that are compatible with the base and which protect the base's mission. The residents of the surrounding community have a long history of working with personnel from March ARB. Adoption of the following recommendations during the revision of relevant land use planning or zoning regulations will strengthen this relationship, increase the health and safety of the public, and protect the integrity of the base's flying mission:

- Recommend local government planners consider AICUZ policies and guidelines when developing or revising city comprehensive plans and use AICUZ overlay maps and Air Force Land Use Compatibility Guidelines (see Appendix A) to evaluate existing and future land use proposals.
- Ensure that new development applications or "changed use of property" are submitted to March ARB to afford the opportunity to assess those applications for potential impacts on defense missions. The March ARB Public Affairs Office can provide a land use planning point of contact.
- Recommend zoning ordinances be adopted or modified to reflect the compatible land uses outlined in the AICUZ report, including the creation of military airport overlay zones.
- Recommend local government and county planners establish procedures to consult on land use matters within overlapping extra-territorial jurisdictions near March ARB.
- Recommend local governments review their capital improvement plan, infrastructure investments and development policies to ensure they do not encourage incompatible land use patterns near March ARB, with particular emphasis on utility extension and transportation planning.
- Recommend local governments implement height and obstruction ordinances that reflect current Air Force and Title 14 of the Code of Federal Regulations Part 77 requirements, presented in this study as Hazards to Aircraft Flight Zones.

- Recommend fair disclosure ordinances be enacted to require disclosure to the public for those AICUZ items that directly relate to aircraft operations at March ARB.
- Recommend local governments, where allowed, require real estate disclosure for individuals purchasing property within noise contours or CZs/APZs.
- Enact or modify building/residential codes to ensure that any new construction near March ARB has the recommended noise-level reduction measures incorporated into the design and construction of structures.
- Recommend government planning bodies monitor proposals for tall structures such as wind turbines and communication towers to ensure that new construction does not pose a hazard to navigable airspace around March ARB. Where appropriate coordinate with the FAA on height of structures.
- Recommend that local government land use plans and ordinances reflect AICUZ recommendations for development in CZs/APZs and noise zones.
- Recommend that local governments consult with March ARB on planning and zoning actions that have the potential to affect base operations.
- Invite the Air Force leadership to sit on as an ex officio member on boards, commissions and regional councils addressing long range development and other planning policies.
- Encourage the development of a working group of city, county, and March ARB representatives to discuss land use concerns and major development proposals that could affect aircraft operations.

7.4 Community Roles

Neighboring residents and base personnel have a long-established history of working together for the mutual benefit of the March ARB mission and local community. Adoption of the following recommendations will strengthen this relationship, protect the health and ensure the safety of the public, and help protect the integrity of the base‘s flying mission:

Real Estate Professionals and Brokers:

- Adhere to the State of California Business and Professions Code Section 11010. (13)(A), as it relates to real estate professional responsibility to disclose the location of all existing airports, and all proposed airports shown on the general plan of any city or county, located within two-statute miles of real property / subdivision.

- Know where the noise zones and CZs / APZs encumber land near the airbase and invite base representative to brokers' meeting to discuss the AICUZ program with the real estate professionals.
- Disclose noise impact to all prospective buyers of properties within areas greater than 60 dB CNEL or within the CZs / APZs.
- Require the Multiple Listing Service to disclose noise zones and CZs / APZs on all listings.

Developers:

- Know where the noise zones and CZs / APZs encumber land near the airbase. Consult with March ARB on proposed developments within the AICUZ.
- Make recommendations regarding existing zoning ordinances and subdivision regulations to support the compatible land uses outlined in this study through implementation of a zoning overlay district based on noise contours and CZs / APZs.

Local Citizens:

- Participate in local forums with the base to learn more about the base's missions.
- Become informed about the AICUZ Program and learn about the program's goals, objectives, and value in protecting the public's health, safety, and welfare.
- When considering property purchases, ask local real estate professionals, city planners, and base representatives about noise and accident potential.

Whereas the base and community are separated by a fence, what the Air Force does affects the community and conversely what the community does, can affect the Air Force mission. Collaborative planning, forging partnerships, open communications, and close relationships help the Air Force and its neighbors achieve their mutual goals.

7.5 JOINT LAND USE STUDY PROGRAM AND NOMINATIONS

To assist local communities to determine what steps they need to take to incorporate the AICUZ land use recommendations into their land use and comprehensive plans and zoning, Congress has authorized DoD to provide planning assistance to local communities to address encroachment issues.

The Office of Economic Adjustment's (OEA) Compatible Use Program provides direct federal assistance to help states and communities work with the Military Services to prevent and mitigate impacts where encroachment of the civilian community impairs the use of military installations. Technical and financial assistance is available through a JLUS to partner with the local military leadership to plan and carry out strategies promoting compatible civilian use adjacent to an installation complex, including related ranges, special use airspace and associated military training routes and military operations areas. Through the community-driven JLUS planning process, adjacent communities and often the state, in partnership with the installation, identify and evaluate a wide range of both existing and potential future encroachment challenges that may impair the continued operational utility of the military installation complex. The affected communities then develop a strategic action plan to identify specific actions, responsible parties, and a proposed timeline to address the encroachment challenges. The JLUS is a partnership between OEA and the local communities. The military's role in the JLUS process is advisory, providing technical information on noise, safety and installation flight and/or ground training activities.

JLUS nominations are submitted to OEA by the MAJCOM, and communities should consider nominating an installation or range if civilian development has impaired or is likely to impair the continued operational utility of the installation complex.

Given that March ARB CZs and APZs fall within jurisdictions of the surrounding municipalities, and the desire for the municipalities to both protect the operational ability of the base and encourage compatible development, a JLUS update would be a logical next step, and is recommended.

SECTION 8
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March ARB 2016c. Personal communication via interview with MSGT Cesar Covarrubias 452 MXG and TSGT Christopher Randles 336 ARS. November.

March ARB 2016d. Personal communication via e-mail with Malia Rabago, 452 MSG/CERR. 7 November.

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Appendix A. Land Use Compatibility Tables

Table A-1. Land Use Compatibility Recommendations in APZs and CZs

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
10	Residential				
11	Household Units				
11.11	Single units: detached	N	N	Y[2]	Maximum density of 2 Du/Ac
11.12	Single units: semi-detached	N	N	N	
11.13	Single units: attached row	N	N	N	
11.21	Two units: side-by-side	N	N	N	
11.22	Two units: one above the other	N	N	N	
11.31	Apartments: walk-up	N	N	N	
11.32	Apartment: elevator	N	N	N	
12	Group quarters	N	N	N	
13	Residential hotels	N	N	N	
14	Mobile home parks or courts	N	N	N	
15	Transient lodgings	N	N	N	
16	Other residential	N	N	N	
20	Manufacturing [3]				
21	Food and kindred products; manufacturing	N	N	Y	Maximum FAR 0.56 IN APZ II
22	Textile mill products; manufacturing	N	N	Y	Maximum FAR 0.56 IN APZ II
23	Apparel and other finished products; products made from fabrics, leather and similar materials; manufacturing	N	N	N	
24	Lumber and wood products (except furniture); manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
25	Furniture and fixtures; manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
26	Paper and allied products; manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
27	Printing, publishing, and allied industries	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
28	Chemicals and allied products; manufacturing	N	N	N	
29	Petroleum refining and related industries	N	N	N	
30	**Manufacturing[3] (continued)**				
31	Rubber and miscellaneous plastic products; manufacturing	N	N	N	
32	Stone, clay, and glass products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
33	Primary metal products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
34	Fabricated metal products; manufacturing	N	N	Y	Maximum FAR 0.56 in APZ II
35	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks	N	N	N	
39	Miscellaneous manufacturing	N	Y	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
40	**Transportation, communication, and utilities[3, 4]**				
41	Railroad, rapid rail transit, and street railway transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
42	Motor vehicle transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
43	Aircraft transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
44	Marine craft transportation	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
45	Highway and street right-of-way	Y[5]	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
46	Automobile parking	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
47	Communication	N	Y[6]	Y	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
48	Utilities[7]	N	Y[6]	Y[6]	Maximum FAR of 0.28 in APZ I & 0.56 in APZ II
48.5	Solid waste disposal (landfills, incinerators, etc.)	N	N	N	
49	Other transportation, communication, and utilities	N	Y[6]	Y	See Note 6 below
50	Trade				
51	Wholesale trade	N	Y	Y	Maximum FAR of 0.28 in APZ I & .56 in APZ II
52	Retail trade – building materials, hardware and farm equipment	N	Y	Y	See Note 8 below
53	Retail trade – including, discount clubs, home improvement stores, electronics superstores, etc.	N	N	Y	Maximum FAR of 0.16 in APZ II
53	Shopping centers-Neighborhood, Community, Regional, Super-regional[9]	N	N	N	
54	Retail trade – food	N	N	Y	Maximum FAR of 0.24 in APZ II
55	Retail trade – automotive, marine craft, aircraft, and accessories	N	Y	Y	Maximum FAR of 0.14 in APZ I & 0.28 in APZ II
56	Retail trade – apparel and accessories	N	N	Y	Maximum FAR of 0.28 in APZ II
57	Retail trade – furniture, home, furnishings and equipment	N	N	Y	Maximum FAR of 0.28 in APZ II

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
58	Retail trade – eating and drinking establishments	N	N	N	
59	Other retail trade	N	N	Y	Maximum FAR of 0.16 in APZ II
60	**Services[10]**				
61	Finance, insurance and real estate services	N	N	Y	Maximum FAR of 0.22 in APZ II
62	Personal services	N	N	Y	Office uses only. Maximum FAR of 0.22 in APZ II.
62.4	Cemeteries	N	Y[11]	Y[11]	
63	Business services (credit reporting; mail, stenographic, reproduction; advertising)	N	N	Y	Maximum FAR of 0.22 in APZ II
63.7	Warehousing and storage services[12]	N	Y	Y	Maximum FAR of 1.0 in APZ I; 2.0 in APZ II
64	Repair Services	N	Y	Y	Maximum FAR of 0.11 APZ I; 0.22 in APZ II
65	Professional services	N	N	Y	Maximum FAR of 0.22 in APZ II
65.1	Hospitals, nursing homes	N	N	N	
65.1	Other medical facilities	N	N	N	
66	Contract construction services	N	Y	Y	Maximum FAR of 0.11 APZ I; 0.22 in APZ II
67	Government Services	N	N	Y	Maximum FAR of 0.24 in APZ II
68	Educational services	N	N	N	
68.1	Child care services, child development centers, and nurseries	N	N	N	
69	Miscellaneous Services	N	N	Y	Maximum FAR of 0.22 in APZ II
69.1	Religious activities (including places of worship)	N	N	N	
70	**Cultural, entertainment and recreational**				
71	Cultural activities	N	N	N	
71.2	Nature exhibits	N	Y[13]	Y[13]	
72	Public assembly	N	N	N	

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
72.1	Auditoriums, concert halls	N	N	N	
72.11	Outdoor music shells, amphitheaters	N	N	N	
72.2	Outdoor sports arenas, spectator sports	N	N	N	
73	Amusements – fairgrounds, miniature golf, driving ranges; amusement parks, etc.	N	N	Y[20]	
74	Recreational activities (including golf courses, riding stables, water recreation)	N	Y[13]	Y[13]	Maximum FAR of 0.11 in APZ I; 0.22 in APZ II
75	Resorts and group camps	N	N	N	
76	Parks	N	Y[13]	Y[13]	Maximum FAR of 0.11 in APZ I; 0.22 in APZ II
79	Other cultural, entertainment and recreation	N	Y[11]	Y[11]	Maximum FAR of 0.11 in APZ I; 0.22 in APZ II
80	Resource production and extraction				
81	Agriculture (except live-stock)	Y[4]	Y[14]	Y[14]	
81.5-81.7,	Agriculture-Livestock farming, including grazing and feedlots	N	Y[14]	Y[14]	
82	Agriculture related activities	N	Y[15]	Y[15]	Maximum FAR of 0.28 in APZ I; 0.56 in APZ II, no activity which produces smoke, glare, or involves explosives
83	Forestry activities[16]	N	Y	Y	Maximum FAR of 0.28 in APZ I; 0.56 in APZ II, no activity which produces smoke, glare, or involves explosives

SLUCM NO.	LAND USE NAME	CLEAR ZONE Recommendation[1]	APZ-I Recommendation[1]	APZ-II Recommendation[1]	DENSITY Recommendation[1]
84	Fishing activities[17]	N[17]	Y	Y	Maximum FAR of 0.28 in APZ I; 0.56 in APZ II, no activity which produces smoke, glare, or involves explosives
85	Mining activities[18]	N	Y[18]	Y[18]	Maximum FAR of 0.28 in APZ I; 0.56 in APZ II, no activity which produces smoke, glare, or involves explosives
89	Other resource production or extraction	N	Y	Y	Maximum FAR of 0.28 in APZ I; 0.56 in APZ II, no activity which produces smoke, glare, or involves explosives
90	Other				
91	Undeveloped land	Y	Y	Y	
93	Water areas[19]	N[19]	N[19]	N[19]	

1. A "Yes" or a "No" designation for compatible land use is to be used only for general comparison. Within each, uses exist where further evaluation may be needed in each category as to whether it is clearly compatible, normally compatible, or not compatible due to the variation of densities of people and structures. In order to assist air installations and local governments, general suggestions as to FARs are provided as a guide to density in some categories. In general, land use restrictions that limit occupants, including employees, of commercial, service, or industrial buildings or structures to 25 an acre in APZ I and 50 an acre in APZ II are considered to be low density. Outside events should normally be limited to assemblies of not more than 25 people an acre in APZ I, and maximum assemblies of 50 people an acre in APZ II. Recommended FARs are calculated using standard parking generation rates for various land uses, vehicle occupancy rates, and desired density in APZ I and II. For APZ I, the formula is FAR = 25 people an acre/ (Average Vehicle Occupancy x Average Parking Rate x (43560/1000)). The formula for APZ II is FAR = 50/ (Average Vehicle Occupancy x Average Parking Rate x (43560/1000)).

2. The suggested maximum density for detached single-family housing is two Du/Ac. In a planned unit development (PUD) of single family detached units, where clustered housing development results in large open areas, this density could possibly be increased slightly provided the amount of surface area covered by structures does not exceed 20 percent of the PUD total area. PUD encourages clustered development that leaves large open areas.

3. Other factors to be considered: Labor intensity, structural coverage, explosive characteristics, air-pollution, electronic interference with aircraft, height of structures, and potential glare to pilots.

4. No structures (except airfield lighting and navigational aids necessary for the safe operation of the airfield when there are no other siting options), buildings, or above-ground utility and communications lines should normally be located in Clear Zone areas on or off the air installation. The Clear Zone is subject to the most severe restrictions.

5. Roads within the graded portion of the Clear Zone are prohibited. All roads within the Clear Zone are discouraged, but if required, they should not be wider than two lanes and the rights-of-way should be fenced (frangible) and not include sidewalks or bicycle trails. Nothing associated with these roads should violate obstacle clearance criteria.

6. No above ground passenger terminals and no above ground power transmission or distribution lines. Prohibited power lines include high-voltage transmission lines and distribution lines that provide power to cities, towns, or regional power for unincorporated areas.

7. Development of renewable energy resources, including solar and geothermal facilities and wind turbines, may impact military operations through hazards to flight or electromagnetic interference. Each new development should to be analyzed for compatibility issues on a case-by-case basis that considers both the proposal and potentially affected mission.

8. Within SLUCM Code 52, maximum FARs for lumberyards (SLUCM Code 521) are 0.20 in APZ-I and 0.40 in APZ-11; the maximum FARs for hardware, paint, and farm equipment stores, (SLUCM Code 525), are 0.12 in APZ I and 0.24 in APZ II.

9. A shopping center is an integrated group of commercial establishments that is planned, developed, owned, or managed as a unit. Shopping center types include strip, neighborhood, community, regional, and super-regional facilities anchored by small businesses, a supermarket or drug store, discount retailer, department store, or several department stores, respectively.

10. Ancillary uses such as meeting places, auditoriums, etc. are not recommended.

11. No chapels or houses of worship are allowed within APZ I or APZ II.

12. Big box home improvement stores are not included as part of this category.

13. Facilities must be low intensity, and provide no playgrounds, etc. Facilities such as club houses, meeting places, auditoriums, large classes, etc., are not recommended.

14. Activities that attract concentrations of birds creating a hazard to aircraft operations should be excluded.

15. Factors to be considered: labor intensity, structural coverage, explosive characteristics, and air pollution.

[16]. Lumber and timber products removed due to establishment, expansion, or maintenance of Clear Zone lands owned in fee will be disposed of in accordance with applicable DoD guidance.
[17]. Controlled hunting and fishing may be permitted for the purpose of wildlife management.
[18]. Surface mining operations that could create retention ponds that may attract waterfowl and present bird/wildlife aircraft strike hazards (BASH), or operations that produce dust or light emissions that could affect pilot vision are not compatible.
[19]. Naturally occurring water features (e.g., rivers, lakes, streams, wetlands) are pre-existing, nonconforming land uses. Naturally occurring water features that attract waterfowl present a potential BASH. Actions to expand naturally occurring water features or construction of new water features should not be encouraged. If construction of new features is necessary for storm water retention, such features should be designed so that they do not attract waterfowl.
[20]. Amusement centers, family entertainment centers or amusement parks designed or operated at a scale that could attract or result in concentrations of people, including employees and visitors, greater than 50 people per acre at any given time are incompatible in APZ II.

Table A-2. Recommended Land Use Compatibility for Noise Zones

LAND USE		SUGGESTED LAND USE COMPATIBILITY				
SLUCM NO.	LAND USE NAME	DNL or CNEL 65-69	DNL or CNEL 70-74	DNL or CNEL 75-79	DNL or CNEL 80-84	DNL or CNEL 85+
10	Residential					
11	Household units	N[1]	N[1]	N	N	N
11.11	Single units: detached	N[1]	N[1]	N	N	N
11.12	Single units: semidetached	N[1]	N[1]	N	N	N
11.13	Single units: attached row	N[1]	N[1]	N	N	N
11.21	Two units: side-by-side	N[1]	N[1]	N	N	N
11.22	Two units: one above the other	N[1]	N[1]	N	N	N
11.31	Apartments: walk-up	N[1]	N[1]	N	N	N
11.32	Apartment: elevator	N[1]	N[1]	N	N	N
12	Group quarters	N[1]	N[1]	N	N	N
13	Residential hotels	N[1]	N[1]	N	N	N
14	Mobile home parks or courts	N	N	N	N	N
15	Transient lodgings	N[1]	N[1]	N[1]	N	N
16	Other residential	N[1]	N[1]	N	N	N
20	Manufacturing					
21	Food and kindred products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
22	Textile mill products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
23	Apparel and other finished products; products made from fabrics, leather, and similar materials; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
24	Lumber and wood products (except furniture); manufacturing	Y	Y[2]	Y[3]	Y[4]	N
25	Furniture and fixtures; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
26	Paper and allied products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
27	Printing, publishing, and allied industries	Y	Y[2]	Y[3]	Y[4]	N
28	Chemicals and allied products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
29	Petroleum refining and related industries	Y	Y[2]	Y[3]	Y[4]	N
30	Manufacturing (continued)					
31	Rubber and misc. plastic products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N

LAND USE		SUGGESTED LAND USE COMPATIBILITY				
SLUCM NO.	LAND USE NAME	DNL or CNEL 65-69	DNL or CNEL 70-74	DNL or CNEL 75-79	DNL or CNEL 80-84	DNL or CNEL 85+
32	Stone, clay and glass products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
33	Primary metal products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
34	Fabricated metal products; manufacturing	Y	Y[2]	Y[3]	Y[4]	N
35	Professional scientific, and controlling instruments; photographic and optical goods; watches and clocks	Y	25	30	N	N
39	Miscellaneous manufacturing	Y	Y[2]	Y[3]	Y[4]	N
40	**Transportation, communication and utilities**					
41	Railroad, rapid rail transit, and street railway transportation	Y	Y[2]	Y[3]	Y[4]	N
42	Motor vehicle transportation	Y	Y[2]	Y [3]	Y[4]	N
43	Aircraft transportation	Y	Y[2]	Y[3]	Y[4]	N
44	Marine craft transportation	Y	Y[2]	Y[3]	Y[4]	N
45	Highway and street right-of-way	Y	Y	Y	Y	N
46	Automobile parking	Y	Y	Y	Y	N
47	Communication	Y	255	305	N	N
48	Utilities	Y	Y[2]	Y[3]	Y[4]	N
49	Other transportation, communication and utilities	Y	255	305	N	N
50	**Trade**					
51	Wholesale trade	Y	Y[2]	Y[3]	Y[4]	N
52	Retail trade – building materials, hardware and farm equipment	Y	25	30	Y[4]	N
53	Retail trade – including shopping centers, discount clubs, home improvement stores, electronics superstores, etc.	Y	25	30	N	N
50	**Trade (continued)**					
54	Retail trade – food	Y	25	30	N	N
55	Retail trade – automotive, marine craft, aircraft and accessories	Y	25	30	N	N
56	Retail trade – apparel and accessories	Y	25	30	N	N

LAND USE			SUGGESTED LAND USE COMPATIBILITY			
SLUCM NO.	LAND USE NAME	DNL or CNEL 65-69	DNL or CNEL 70-74	DNL or CNEL 75-79	DNL or CNEL 80-84	DNL or CNEL 85+
57	Retail trade – furniture, home, furnishings and equipment	Y	25	30	N	N
58	Retail trade – eating and drinking establishments	Y	25	30	N	N
59	Other retail trade	Y	25	30	N	N
60	Services					
61	Finance, insurance and real estate services	Y	25	30	N	N
62	Personal services	Y	25	30	N	N
62.4	Cemeteries	Y	Y[2]	Y[3]	Y[4,11]	Y[6,11]
63	Business services	Y	25	30	N	N
63.7	Warehousing and storage	Y	Y[2]	Y[3]	Y[4]	N
64	Repair services	Y	Y[2]	Y[3]	Y[4]	N
65	Professional services	Y	25	30	N	N
65.1	Hospitals, other medical facilities	25	30	N	N	N
65.16	Nursing homes	N[1]	N[1]	N	N	N
66	Contract construction services	Y	25	30	N	N
67	Government services	Y[1]	25	30	N	N
68	Educational services	25	30	N	N	N
68.1	Child care services, child development centers, and nurseries	25	30	N	N	N
69	Miscellaneous Services	Y	25	30	N	N
69.1	Religious activities (including places of worship)	Y	25	30	N	N
70	Cultural, entertainment and recreational					
71	Cultural activities	25	30	N	N	N
71.2	Nature exhibits	Y[1]	N	N	N	N
72	Public assembly	Y	N	N	N	N
72.1	Auditoriums, concert halls	25	30	N	N	N
72.11	Outdoor music shells, amphitheaters	N	N	N	N	N
72.2	Outdoor sports arenas, spectator sports	Y[7]	Y[7]	N	N	N
73	Amusements	Y	Y	N	N	N
74	Recreational activities (including golf courses, riding stables, water recreation)	Y	25	30	N	N
75	Resorts and group camps	Y	25	N	N	N
76	Parks	Y	25	N	N	N

LAND USE		SUGGESTED LAND USE COMPATIBILITY				
SLUCM NO.	LAND USE NAME	DNL or CNEL 65-69	DNL or CNEL 70-74	DNL or CNEL 75-79	DNL or CNEL 80-84	DNL or CNEL 85+
79	Other cultural, entertainment and recreation	Y	25	N	N	N
80	**Resource production and extraction**					
81	Agriculture (except live-stock)	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
81.5-81.7	Agriculture-Livestock farming including grazing and feedlots	Y[8]	Y[9]	N	N	N
82	Agriculture related activities	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
83	Forestry activities	Y[8]	Y[9]	Y[10]	Y[10,11]	Y[10,11]
84	Fishing activities	Y	Y	Y	Y	Y
85	Mining activities	Y	Y	Y	Y	Y
89	Other resource production or extraction	Y	Y	Y	Y	Y

1. General

a. Although local conditions regarding the need for housing may require residential use in these zones, residential use is discouraged in DNL 65-69 and strongly discouraged in DNL 70-74. The absence of viable alternative development options should be determined and an evaluation should be conducted locally prior to local approvals indicating that a demonstrated community need for the residential use would not be met if development were prohibited in these zones. Existing residential development is considered as pre-existing, non-conforming land uses.

b. Where the community determines that these uses must be allowed, measures to achieve outdoor to indoor NLR of at least 25 decibels (dB) in DNL 65-69 and 30 dB in DNL 70-74 should be incorporated into building codes and be considered in individual approvals; for transient housing, an NLR of at least 35 dB should be incorporated in DNL 75-79.

c. Normal permanent construction can be expected to provide an NLR of 20 dB, thus the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation, upgraded sound transmission class ratings in windows and doors, and closed windows year round. Additional consideration should be given to modifying NLR levels based on peak noise levels or vibrations.

d. NLR criteria will not eliminate outdoor noise problems. However, building location, site planning, design, and use of berms and barriers can help mitigate outdoor noise exposure particularly from ground level sources. Measures that reduce noise at a site should be used wherever practical in preference to measures that only protect interior spaces.

2. Measures to achieve NLR of 25 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

3. Measures to achieve NLR of 30 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

4. Measures to achieve NLR of 35 must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

5. If project or proposed development is noise sensitive, use indicated NLR; if not, land use is compatible without NLR.

6. Buildings are not permitted.

7. Land use is compatible provided special sound reinforcement systems are installed.

8. Residential buildings require an NLR of 25

9. Residential buildings require an NLR of 30.

10. Residential buildings are not permitted.

11. Land use that involves outdoor activities is not recommended, but if the community allows such activities, hearing protection devices should be worn when noise sources are present. Long-term exposure (multiple hours per day over many years) to high noise levels can cause hearing loss in some unprotected individuals.

Appendix B. Key Terms

Community Noise Equivalent Level (CNEL) – CNEL is a composite noise metric accounting for the sound energy of all noise events in a 24-hour period. In order to account for increased human sensitivity to noise in the evening and at night, a 5 dB penalty is applied to events that occur between 7 p.m. and 10 p.m. and a 10 dB penalty is applied to events occurring during the acoustical nighttime period (10 p.m. through 7 a.m.).

Decibel (dB) – Decibel is the unit used to measure the intensity of a sound.

Flight Profiles – Flight profiles consist of aircraft conditions (i.e. altitude, speed, power setting, etc.) defined at various locations along each assigned flight track.

Flight Track – The flight track locations represent the various types of arrivals, departures, and closed patterns accomplished at March ARB. The location for each track is representative for the specific track and may vary due to air traffic control, weather, and other reasons (e.g. one pilot may fly the on one side of the depicted track, while another pilot may fly slightly to the other side of the track).

Operation – An aircraft operation is defined as one takeoff or one landing. A complete closed pattern or circuit is counted as two operations because it has a takeoff component and a landing component. A sortie is a single military aircraft flight from the initial takeoff through the termination landing. The minimum number of aircraft operations for one sortie is two operations, one takeoff (departure) and one landing (approach).

APPENDIX I:

SAMPLE ANNUAL REVIEW AND

COORDINATION CERTIFICATION PAGE

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U.S. AIR FORCE RESERVE COMMAND
MARCH AIR RESERVE BASE
CALIFORNIA

INRMP ANNUAL REVIEW AND COORDINATION CERTIFICATION

This letter certifies that the Integrated Natural Resources Management Plan (INRMP) for March Air Reserve Base, dated June 2012, and updated 2021, has undergone the required annual review and any necessary updates have been made in accordance with Air Force Manual 32-7003, Paragraph 3.7. This INRMP provides for management and stewardship of all natural resources present on the Base.

By their signatures below, or an enclosed letter of concurrence, all parties grant their concurrence and acceptance of the following document.

Approving Officials:

____________________________________ ____________________
WILLIAM R. MARTIN II, Colonel, USAF Date
Vice Commander, 452d Air Mobility Wing

____________________________________ ____________________
Mr. David Palmer Date
Chief, Environmental Flight

____________________________________ ____________________
Mr. Paul Souza Date
U.S. Fish and Wildlife Service
Regional Director, Region 8

____________________________________ ____________________
Mr. Charlton Bonham Date
California Department of Fish and Wildlife
Director

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APPENDIX J:

AGENCY CORRESPONDENCE AND DOCUMENTATION

FOR 2021 MARCH ARB INRMP

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The following teleconference meetings were held with the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW) to discuss the revisions to the Integrated Natural Resources Management Plan (INRMP):

Teleconference Meetings with USFWS	**Teleconference Meetings with USFWS and CDFW**
16 September 2020	10 December 2020
30 September 2020	06 January 2021
28 October 2020	03 February 2021
18 November 2020	03 March 2021
	11 May 2021
	02 June 2021

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DEPARTMENT OF THE AIR FORCE
AIR FORCE RESERVE COMMAND

14 December 2020

MEMORANDUM FOR U.S. Fish and Wildlife Service
ATTENTION: Scott Sobiech, Field Supervisor
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Suite 250
Carlsbad, CA 92008

FROM: 452 MSG/CEV
610 Meyer Drive, Building 2403
March ARB, CA 92518

SUBJECT: March Air Reserve Base Draft Integrated Natural Resources Management Plan Revision, Riverside County, California

1. The U.S. Air Force Reserve Command and March Air Reserve Base (ARB) have prepared a Draft Integrated Natural Resources Management Plan (INRMP) Revision pursuant to the Sikes Act, as amended (16 U.S.C § 670a et seq.). An Environmental Assessment and Biological Assessment are also being prepared and will be provided to you in the future for review.

2. Changes and updates from the previous March ARB INRMP include utilizing the updated Air Force INRMP template; incorporating natural resource surveys that were conducted in 2019 for burrowing owl, fairy shrimp, and the Stephens' kangaroo rat; and making general updates to the management goals and actions.

3. March ARB respectfully requests your review on the Draft INRMP Revision. We would appreciate receiving your comments within 60 days of receipt of the Draft INRMP Revision. Please address questions or comments to March ARB, Attention: Chris Wagner, Natural Resource Manager, 452 MSG/CEV, 610 Meyer Drive, Building 2403, March ARB, CA 92518; or by email at: christhild.wagner@us.af.mil. Thank you for your assistance.

PALMER.DAVID.G.1387648808
Digitally signed by PALMER.DAVID.G.1387648808
Date: 2020.12.14 08:07:35 -08'00'

DAVID PALMER
Chief, Environmental Flight

1 Attachment:
1. Draft INRMP Revision

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DEPARTMENT OF THE AIR FORCE
AIR FORCE RESERVE COMMAND

14 December 2020

MEMORANDUM FOR California Department of Fish and Wildlife
ATTENTION: Heather Pert
CDFW Regional Office, Inland Deserts Region (Region 6)
3602 Inland Empire Blvd, Suite C-220
Ontario, CA 91764

FROM: 452 MSG/CEV
610 Meyer Drive, Building 2403
March ARB, CA 92518

SUBJECT: March Air Reserve Base Draft Integrated Natural Resources Management Plan Revision, Riverside County, California

1. The U.S. Air Force Reserve Command and March Air Reserve Base (ARB) have prepared a Draft Integrated Natural Resources Management Plan (INRMP) Revision pursuant to the Sikes Act, as amended (16 U.S.C § 670a et seq.). An Environmental Assessment is also being prepared and will be provided to you in the future for review.

2. Changes and updates from the previous March ARB INRMP include utilizing the updated Air Force INRMP template; incorporating natural resource surveys that were conducted in 2019 for burrowing owl, fairy shrimp, and Stephens' kangaroo rat; and making general updates to the management goals and actions.

3. March ARB respectfully requests your review on the Draft INRMP Revision. We would appreciate receiving your comments within 60 days of receipt of the Draft INRMP Revision. Please address questions or comments to March ARB, Attention: Chris Wagner, Natural Resource Manager, 452 MSG/CEV, 610 Meyer Drive, Building 2403, March ARB, CA 92518; or by email at: christhild.wagner@us.af.mil. Thank you for your assistance.

PALMER.DAVID.G.1387648808 Digitally signed by PALMER.DAVID.G.1387648808 Date: 2020.12.14 08:10:05 -08'00'

DAVID PALMER
Chief, Environmental Flight

1 Attachment:
1. Draft INRMP Revision

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APPENDIX K:

NATURAL RESOURCES REFERENCES FOR MARCH ARB

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Appendix K. March ARB Natural Resources Reference Documents

DOCUMENT NAME	DATE	LOCATION
PLANS		
Asbestos Management and Operating Plan	October 2018	452 MSG/CEV
Base Comprehensive Plan - Maps	August 2004	452 MSG/CEV
Bird/Wildlife Aircraft Strike Hazard (BASH) Plan 91-212	September 2017	452 MSG/SE
Draft Bird/Wildlife Aircraft Strike Hazard (BASH) Plan 91-212	April 2019	452 MSG/SE
Environmental Assessment of Implementation of the Integrated Natural Resources Management Plan	TBD	452 MSG/CEV
Hazardous Material Emergency Planning and Response (HAZMAT) Plan	July 2018	452 MSG/CEV
Hazardous Waste Management Plan	October 2019	452 MSG/CEV
Integrated Natural Resources Management Plan	TBD	452 MSG/CEV
Installation Development Plan	July 2019	
Jurisdictional Determination Regarding Presence/Absence of Geographic Wetland Jurisdiction on March Air Reserve Base – Section 404 of the Clean Water Act	February 2011	452 MSG/CEV
Lead-Based Paint Management Plan	August 2002	452 MSG/CEOM
Facility Response Plan	March 2018	452 MSG/CEV
Spill Prevention, Control, and Countermeasure (SPCC) Plan	July 2015	452 MSG/CEV
Stormwater Pollution Prevention Plan	July 2019	452 MSG/CEV
Wetland Habitat Assessment and Delineation Report	August 2010	452 MSG/CEV
GIS DATA LAYERS		
Bait Traps	2019	452 MSG/CEV
Stephens' Kangaroo Rat	August 2019	452 MSG/CEV
Vernal Wetlands	April 2019	452 MSG/CEV
Invasive Plants	2019	452 MSG/CEV
Wildlife	2019	452 MSG/CEV
Ground Squirrels	2019	452 MSG/CEV
Burrowing Owls	August 2019	452 MSG/CEV
Installation Boundary	January 2019	452 MSG/CEV
Water Features	March 2018	452 MSG/CEV
General (Roads, Facilities, Buildings, etc.)	October 2019	452 MSG/CEV

Appendix K. March ARB Natural Resources Reference Documents

DOCUMENT NAME	DATE	LOCATION
AFIs/AFMANs /FEDERAL, STATE, AND LOCAL REGULATIONS		
AFMAN 32-1053, Integrated Pest Management Program	6 August 2019	452 MSG/CEV
AFI 32-7061, Environmental Impact Analysis Process	12 March 2003	452 MSG/CEV
AFMAN 32-7003, Environmental Conservation	20 April 2020	452 MSG/CEV
AFI 91-212, Bird/Wildlife Aircraft Strike Hazard Program	31 May 2018, as amended 12 June 2020	452 MSG/CEV
Clean Water Act (CWA); P.L. 95-217, as amended	1977	452 MSG/CEV
Conservation Programs on Military Reservations; Sikes Act U.S.C. 670 et seq	2004	452 MSG/CEV
Riverside County Tree Law Ordinance Number 89-8	26 October 2000	452 MSG/CEV
DoD Instruction 4150.07, DoD Pest Management Program	26 December 2019	452 MSG/CEV
Endangered Species Act; 16 U.S.C. 1531 et seq.	1973	4482 MSG/CEV
Executive Order 11514, Protection and Enhancement of Environmental Quality	24 May 1977	452 MSG/CEV
Executive Order 11988, Floodplains Management	24 May 1977	452 MSG/CEV
Executive Order 11990, Wetlands Management	24 May 1977	452 MSG/CEV
Federal Insecticide, Fungicide, and Rodenticide Act as amended; 7 U.S.C. 136 et seq.	1996	452 MSG/CEV
Federal Land Policy and Management Act; 43 U.S.C. 1701	October 2001	452 MSG/CEV
Federal Noxious Weed Act; 7 U.S.C. 2809 et seq.	28 November 1990	452 MSG/CEV
Fish and Wildlife Conservation Act; P.L. 96-366, 16 U.S.C. 2901	23 October 1992	452 MSG/CEV
Fish and Wildlife Coordination Act; 16 U.S.C. 661 et seq.	09 July 1965	452 MSG/CEV
Migratory Bird Conservation Act; P.L. 89-699, 16 U.S.C. 715	10 November 1986	452 MSG/CEV
National Environmental Policy Act; 42 U.S.C. 4341	1970	452 MSG/CEV
Secretary of the Air Force Order 780.1, Wetlands	-	452 MSG/CEV
Secretary of the Air Force Order 790.1, Floodplains	-	452 MSG/CEV
Soil and Water Conservation Act; P.L. 95-193, 16 U.S.C. 2001	1977	452 MSG/CEV
Other		
March ARB Base Layout Map-Tab Number C-1	1994	452 MSG/CEV
March Air Reserve Base Existing Topography Maps	1995	452 MSG/CEV
March ARB Conceptual Stormwater Management Plan Map	1995	452 MSG/CEV