FINAL

INTEGRATED CULTURAL RESOURCES MANAGEMENT PLAN

for the

CHOCOLATE MOUNTAIN AERIAL GUNNERY RANGE, CALIFORNIA
MARINE CORPS AIR STATION YUMA, ARIZONA

VOLUME I

Prepared for:

Commanding Officer
Marine Corps Air Station Yuma
and
Naval Facilities Engineering Systems Command Southwest
Contract# N62470-18-D-7001

September 2021

Cover photograph *Bare Tree in the Desert Near the Salton Sea, California* by Carol M. Highsmith, 2012, from the Jon B. Lovelace Collection of California Photographs in Carol M. Highsmith's America Project, Library of Congress, Prints and Photographs Division (https://www.loc.gov/pictures/item/2013633070/) (Highsmith 2012).

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September 2021

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APPROVAL

2021-2026

This Integrated Cultural Resources Management Plan (ICRMP) documents the procedures and processes through which Marine Corps Air Station (MCAS) Yuma fulfills its commitment to compliance with applicable laws, regulations, and policies in the spirit of faithful stewardship of cultural resources on the Chocolate Mountain Aerial Gunnery Range (CMAGR). This document meets the requirements for ICRMPs pursuant to Department of Defense Instruction 4715.16, *Cultural Resources Management*; Secretary of the Navy Instruction 4000.35A, *Department of the Navy Cultural Resources Program*; and Marine Corps Order 5090.2 (Volume 8), *United States Marine Corps Environmental Compliance and Protection Program: Cultural Resources Management*.

Approving Official:

22 Nov 21

Charles E. Dudik
Colonel, U.S. Marine Corps
Commanding Officer
Marine Corps Air Station Yuma, Yuma, Arizona

Date

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UPDATES

This Integrated Cultural Resources Management Plan (ICRMP) is required to be reviewed and revised every five years as well as being updated annually (DoD Instruction 4715.16). Updates and revisions will ensure that this ICRMP contains the most up-to-date cultural resources information, which is necessary to maintain a proactive management plan. Changes and additions to this ICRMP will be documented below. This information will be incorporated into annual updates and is not intended to replace the five-year review and revision process.

Date of Annual Review/Update	**Name and Title of Reviewer(s)**
_____	_____
_____	_____
_____	_____
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ANNUAL REVIEW TRACKING FORM

DATE	SECTION/PAGE	COMMENT	REVIEWER

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ACRONYMS AND ABBREVIATIONS

ac.	acre
ACEC	Area of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
AD	anno domini (Latin), in the year of our Lord (English)
AIRFA	American Indian Religious Freedom Act of 1978
ARO	Army Research Office
ARPA	Archaeological Resources Protection Act
ARMR	Archaeological Resource Management Reports
ASA	Archaeological Survey Association
ASM	Arizona State Museum
ATCAA	Air Traffic Control Assigned Airspace
BC	before Christ
Bldg.	Building
BLM	Bureau of Land Management
BP	before present
BOR	Bureau of Reclamation
c.	circa
CA	California
CAs	Cooperative Agreements
CAMA	California-Arizona Maneuver Area
CAS	Cultural Affiliation Study
CBM	Camp Billy Machen
CDFW	California Department of Fish and Wildlife
CEPA	California Environmental Protection Agency
CFR	Code of Federal Regulations
CHU	Critical Habitat Unit
CMAGR	Chocolate Mountain Aerial Gunnery Range
CMBC	Circle Mountain Biological Consultants
CO	Commanding Officer
COLS	Common Output Levels of Service
CRM	Cultural Resources Manager
DoD	Department of Defense
DoDI	Department of Defense Instruction
DoN	Department of the Navy
DPR	Department of Parks and Recreation
DTC	Desert Training Center
DWTF	Desert Warfare Training Facility
DWMA	Desert Warfare Maneuver Area
EA	Environmental Assessment
e.g.	exempli gratia (Latin); for example (English)
EIS	Environmental Impact Study
EO	Executive Orders
ESA	Endangered Species Act
ESRI	Environmental Systems Research Institute
et al.	et alia (Latin); and others (English)

et seq.	et sequens (Latin); and the following (English)
etc.	et cetera (Latin); and other things (English)
°F	degree/degrees Fahrenheit
FARP	Forward Arming and Refueling Point
Fl.	Floor
FOIA	Freedom of Information Act
ft	foot/feet
FY	Fiscal Year
GIS	Geographic Information System
HARP	Historic and Archaeological Resources Protection
HST	Helicopter Support Team
ICM	Improved Conventional Munitions
ICRMP	Integrated Cultural Resources Management Plan
ID	identification
i.e.	id est (Latin); in other words (English)
IGE	Independent Government Estimate
Inc.	Incorporated
INRMP	Integrated Natural Resources Management Plan
IO	isolated occurrence
km	kilometer/kilometers
LATT	Low Altitude Tactics Training
LASER	Light Amplification by Stimulated Emission of Radiation
LZ	Landing Zone
m	meter/meters
MA	Master of Arts
MAGTFTC	Marine Air Ground Task Force Training Command
MCAGCC	Marine Corps Air Ground Combat Center
MCAS	Marine Corps Air Station
MCO	Marine Corps Order
MCIWEST	Marine Corps Installations West
mi	mile/miles
MOA	Memorandum of Agreement
NAD	North American Datum
NAGPRA	Native American Graves Protection and Repatriation Act
NAHC	Native American Heritage Commission
NAVFAC	Naval Facilities Engineering Systems Command
NCIS	Naval Criminal Investigative Service
n.d.	no date
NDAA	National Defense Authorization Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
nm^2	square nautical mile(s)
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSW	Naval Special Warfare
NSWG	Naval Special Warfare Group

OHP	Office of Historic Preservation
OPNAV	Office of the Chief of Naval Operations
OPNAVINST	Office of the Chief of Naval Operations Instruction
OVAI	Ohio Valley Archaeology, Inc.
PA	Programmatic Agreement
Pub. L.	Public Law
pp.	pages
RARD	Regional Archaeological Research Design
RMD	Range Management Department
RYBP	uncalibrated radiocarbon years before present
RPA	Registered Professional Archaeologist
SCIC	South Coastal Information Center
SDE	Spatial Data Engine
SDSFIE	Spatial Data Standards for Facilities, Infrastructure, and Environment
SEAL	Sea, Air, Land (US Navy military special forces team member)
SECNAV	Secretary of the Navy
SECNAVINST	Secretary of the Navy Instruction
SHPO	State Historic Preservation Officer
SOP	Standard Operating Procedure
SOW	Statement of Work
sp.	unknown singular species (within a known genus)
spp.	species pluralis (Latin), unknown multiple species (within a known genus) (English)
SSIC	Standard Subject Identification Codes
SWAT	Special Warfare Training Area
TCP	Traditional Cultural Property
THPO	Tribal Historic Preservation Office
UAS	Unmanned Aircraft System
U.S.	United States
USAF	U.S. Air Force
U.S.C.	United States Code
USDA-NRCS	U.S. Department of Agriculture, Natural Resources Conservation Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USMC	U.S. Marine Corps
WWII	World War II
YDB	Younger Dryas Boundary
YRCMP	Yuma Range Complex Management Plan
YTRC	Yuma Training Range Complex

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EXECUTIVE SUMMARY

The Integrated Cultural Resources Management Plan (ICRMP) for the Chocolate Mountain Aerial Gunnery Range (CMAGR), California, was prepared for Marine Corps Air Station (MCAS) Yuma, and Naval Facilities Engineering Systems Command Southwest by Ohio Valley Archaeology, Inc. (OVAI) under Contract # N62470-18-D-7001, Task Order N62473-19-F-5437 (X006), pursuant to Department of Defense Instruction 4715.16, *Cultural Resources Management*; Secretary of the Navy Instruction 4000.35A, *Department of the Navy Cultural Resources Program*; and Marine Corps Order 5090.2 (Volume 8), *United States Marine Corps Environmental Compliance and Protection Program: Cultural Resources Management*.

This document is intended to serve MCAS Yuma as "a multi-year plan that supports the military training mission by identifying compliance actions required by applicable federal laws and regulations concerning cultural resources management," as defined in the USMC ICRMP Guidance (USMC 2009:1).

Archaeological investigations have taken place on the CMAGR since the early twentieth century. Approximately 77,804 acres have been subject to archaeological survey, which is seventeen percent of the total 460,000-acre area of the CMAGR. Presently, all cultural resources documented on the CMAGR are archaeological. The Chocolate Mountain Archaeological District was established in the southern area of the CMAGR in 1973. Many of these cultural resources are prehistoric in origin, but examples of historical-period archeological sites are also common.

Native American cultural resources include:

- Cremations/Human Remains
- Trails
- Lithic Scatters and Flaking Stations
- Ceramic Scatters and Pot Drops
- Cleared Circles
- Rock Rings
- Prehistoric Cairns
- Habitation Sites
- Petroglyphs (Rock Art)
- Ground Figures – Geoglyphs, Intaglios, and Rock Alignments

Historical cultural resources present on the CMAGR include:

- Transportation Routes
- Camps
- Military (WWII)
- Military (Post -WWII)
- Water Works
- Mining Prospects
- Mines
- Cairns
- Rock Features
- Ranching Complexes

To date, there have been no Traditional Cultural Properties (TCPs), or historic buildings or structures designated on the CMAGR.

Eight archaeological sites have been determined eligible for listing on the National Register of Historic Places (NRHP). These sites are listed and briefly described in Table ES-1, below:

Table ES-1. NRHP Eligible Archaeological Sites.

MCAS Yuma Site Number	Trinomial	Primary Number	Description	Year Located	Data Source
CMAGR-1051	CA-IMP-1864	13-001864	**Cleared circles:** Originally recorded in 1977 as three cleared circles with the northernmost ringed by rocks. A quartz knife and chopper were originally recorded but were not relocated during subsequent surveys.	1977; 2002; 2005	Apple and Shaver 2005; Wahoff et al. 2002; Apple and Deis 2002; von Werlhof and von Werlhof 1977
CMAGR-1134	CA-IMP-4395	13-004395	**Petroglyphs:** First recorded in 1981 by Ed Collins as a petroglyph site containing three panels of mostly circular and triangular elements. There are 10+ circles and 2 triangles recorded; markings of "1906," a faint "1928," "2-6," and "HG" were found as well.	2013; 2011; 2005; 1981	Rudolph et al. 2013; Schaefer and Dalope 2011a (SWAT-4); Apple and Shaver 2005; Collins 1981
CMAGR-1165	CA-IMP-8257	13-008789	**Rock ring, chipping station:** Partially embedded rock ring with associated lithic flakes.	2002; 2005	Apple and Deis 2002;Wahoff et al. 2002
CMAGR-1196	CA-IMP-8444	13-009235	**Rock rings:** Two adjoining cleared circles with rock mounded perimeters.	2005; 2002	Apple and Shaver 2005; Apple and Deis 2002;Wahoff et al. 2002
CMAGR-1257	CA-IMP-11640	13-013568	**Cairn/rock feature:** Stacked rock feature constructed of 10 volcanic stones.	2011	Bryne 2013;Bryne 2011
CMAGR-1300	-	13-014931	**Trail, cairn, ceramics:** One trail feature, a collapsed cairn, and 15 associated ceramic artifacts. Although only 352 m of the trail was recorded, aerial imagery shows that the trail continues for several kilometers in either direction.	2016	Knighton-Wisor et al. 2016
CMAGR-1301	-	13-014932	**Trail, cairns, clearing:** Consists of a trail segment, three rock cairns, and a rock clearing. No artifacts were located within the site. The site is situated on a well-formed desert pavement, and measures 282-by-93 m. While only 271 m of trail was recorded, aerial imagery shows that this trail continues for several kilometers in either direction.	2016	Knighton-Wisor et al. 2016
CMAGR-3002	CA-RIV-2640	33-002640	**Petroglyph, habitation area:** Recorded in 1983 as a ceremonial petroglyph site with trails, hearths, cleared circles, cairns, and cremations. No artifacts were observed.	2013; 2005; 1983	Rudolph et al. 2013; Apple and Shaver 2005;IVCM 1983

MCAS Yuma has consulted with and continues to consult tribal governments regarding the treatment and preservation of prehistoric and Native American cultural resources present on the CMAGR, including as required for Section 106 undertakings and Section 110 surveys. The MCAS Yuma Cultural Resources Manager (CRM) has worked with tribal representatives and government entities to ensure cultural resources management goals have been met. This has included the following successes: initiating contact with affiliated tribes for proposed projects; requesting assistance from tribes on carrying out appropriate identification efforts for cultural resources that may be affected; providing copies of relevant reports to tribal officials when desired; arranging site visits for tribes; meetings and phone calls with cultural representatives and Tribal Councils; surveying the eastern boundary of the CMAGR at the request of a tribe seeking to locate a culturally significant Native American trail; and successfully executing a Programmatic Agreement (PA) to guide the Section 106 process for a project involving Special Warfare Training Areas (SWATs) 4 and 5.

The MCAS Yuma Cultural Resources Program has five major items with associated Common Output Levels of Service (COLS) in their Action Plan for the CMAGR. In meeting the standards mandated by Section 110 of the NHPA, the CRM will continue to face compliance challenges within the CMAGR to identify, evaluate, and preserve cultural resources under its control or jurisdiction. The following action plan (Table ES-2) details the cultural resources priorities as well as suggested management actions for the next five years:

Table ES-2

Action (COLS)	Current Status	Short-Term Plan	Long-Term Plan
Chocolate Mountain Archaeological District (COLS 1)	The district was determined eligible for listing on the NRHP in 1973. MCAS Yuma complies with Section 106 undertakings within the district on a case-by-case basis.	• Draft a SOW. • Develop an IGE. • Request and await funding. • Begin contracting effort.	• Work with NAVFAC to develop a Cooperative Agreement for execution. • Complete evaluations and determinations through consultation with SHPO and the tribes.
NRHP Evaluation of Undetermined Sites (COLS 3)	As of January 21, there are 256 recorded sites with undetermined NRHP eligibilities.	• Develop funding request, or • Develop field-going strategy.	• Execute short-term plan. • Make determinations. • Consult with SHPO and the tribes.
SWAT 4/5 PA (COLS 1)	Funding is required from the proponent to continue surveys within the APE. A majority of the sites have eligibility determinations and most portions of the undertaking result in a finding of No Historic Properties Affected.	• Enquire on status of funding from proponent for additional surveys. • Continue to survey APE and evaluate newly recorded sites as funded. • Finish eligibility determinations for previously recorded sites.	• Continue to educate the staff using SWAT 4/5 on PA stipulations. • Continue to manage the PA in accordance with its stipulations.
Inspect Collections (COLS 3)	Artifacts and associated records are housed at the MCAGCC in accordance with the MOA.	• Request funding for periodic inspections. • Periodically inspect collections and curation facility.	• Ensure all CMAGR collections are properly catalogued and curated.

Table ES-2

Action (COLS)	Current Status	Short-Term Plan	Long-Term Plan
Continue to Update Geographic Information System (COLS 3)	All of the MCAS Yuma cultural resources data are stored and managed within the Station's GIS database, but some of the data need to be verified and refined.	• Continue to update the GIS database with necessary corrections and additions.	• Have all MCAS Yuma cultural resources spatial data up-to-date in the GIS database. • Have all sites and survey polygons linked to their site record and survey report.

APE = Area of Potential Effects; COLS = Common Output Levels of Service; GIS = geographic information system; MCAGCC = Marine Corps Air Ground Combat Center

It is the policy of the U.S. Marine Corps (USMC) to responsibly manage and maintain cultural resources under its control through a comprehensive program that integrates the identification and preservation of archaeological sites and architectural properties with on-going MCAS Yuma activities, planning, and metrics. The ICRMP for the CMAGR is a multi-year plan designed to support the military training mission of MCAS Yuma by identifying compliance actions required by applicable federal laws and regulations concerning cultural resources management on MCAS Yuma-administered lands. This ICRMP serves to inform and assist the Commanding Officer in their stewardship of the cultural resources present at the CMAGR. Designed specifically for the management and regulatory compliance of cultural resources on the CMAGR, this ICRMP serves to guide day-to-day managers in an accessible format.

This ICRMP was modeled after the Barry M. Goldwater Range ICRMP, Parts I and III, and serves as a re-write of the 2011 CMAGR ICRMP prepared by AECOM, Inc. As required by *U.S. Marine Corps Guidance for Completion of an Integrated Cultural Resources Management Plan Update* (USMC 2009), this ICRMP will be reviewed annually and updated on an as-needed basis to consider new information and address any problems encountered with using this document.

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1 INTRODUCTION

1.1 INTEGRATED CULTURAL RESOURCES MANAGEMENT PLAN

The Integrated Cultural Resources Management Plan (ICRMP) for the Chocolate Mountain Aerial Gunnery Range (CMAGR) supports the military mission of Marine Corps Air Station (MCAS) Yuma by providing for the management of cultural resources in accordance with the legal obligations of the United States Marine Corps (USMC). This multi-year planning tool consolidates the inventory and management requirements of federal historic preservation law with project and operations planning necessary to facilitate the military mission of MCAS Yuma on the CMAGR and was prepared pursuant to the Department of Defense (DoD) Instruction 4715.16, *Cultural Resources Management*; SECNAV Instruction 4000.35B, *Department of the Navy Cultural Resources Program;* and the USMC Order 5090.2 (Volume 8), *United States Marine Corps Environmental Compliance and Protection Program: Cultural Resources Management*. This document follows *U.S. Marine Corps Guidance for Completion of an Integrated Cultural Resources Management Plan Update* (USMC 2009).

This document has three overarching cultural resources management goals designed to comply with the DoD and the USMC policies. The goals are defined as follows:

(1) Support military operations through proactive management of cultural resources;

(2) Fulfill legal obligations for the protection of historic properties; and

(3) Address Native American concerns, including disposition of cultural items.

MCAS Yuma's ICRMP seeks to achieve these goals by serving the following functions:

- Providing an assessment of the health of MCAS Yuma's cultural resources program.
- Providing a summary of known information about MCAS Yuma's cultural resources including the identification of data gaps.
- Prescribing standard operating procedures to address common situations relating to cultural resources.
- Serving as a reference guide for the MCAS Yuma Cultural Resources Manager (CRM) to the application of statutes and regulations relating to cultural resource management.
- Providing a forum to address the concerns and needs of internal and external stakeholders.

These functions are meant to embody and reflect fundamental principles including but not limited to the following:

- Cultural resources are nonrenewable resources.
- Cultural resource stewardship is a key component of strategic planning and land-use management.
- Investigation or documentation of cultural resources is only partial mitigation for their loss and archaeological excavation constitutes an adverse effect.

- Consideration of cultural resources should begin at the earliest stages of project planning and design.
- Consultation with tribes must recognize the government-to-government relationship between federal agencies and federally recognized Native American tribes, and be conducted in a culturally sensitive manner, in accordance with the DoD American Indian and Alaska Native Policy.

1.2 ORGANIZATION OF THE DOCUMENT

MCAS Yuma's ICRMP for the CMAGR is a two-volume informational document for the CRM and other decision-makers seeking to achieve regulatory compliance while supporting the military mission of MCAS Yuma. Volume I is organized as a condensed reference guide offering ready access to up-to-date facts, assessments, procedures, and recommendations key to the successful management of cultural resources on the CMAGR. Volume II contains appendices of documents and data that support the information presented in Volume I.

Volume I opens with a definition of the goals of this ICRMP and a summary of its organization. This introduction provides an understanding of the purpose of the document and the position of cultural resource management as it relates to operational planning. Following the introduction, the next chapter provides an overview of the mission at the CMAGR and MCAS Yuma. Chapter 3 details the legal and regulatory requirements governing the treatment and management of cultural resources. Chapter 4 is a description of the natural environment followed by a synopsis of the history and prehistory of the CMAGR and the people who have lived upon it. This information is vital to assessing the historical significance of cultural resources and continuing to communicate with the tribal entity or entities potentially concerned with those cultural resources. Those concerns and the consultation efforts of the MCAS Yuma Cultural Resources Program are then presented in Chapter 6. Next, an overview of cultural resources summarizes the investigations, surveys, reports, and findings compiled as of April 2021. The strategy currently in place to manage those resources is described in Chapter 8 as well as the roles and responsibilities of various agencies, personnel, and stakeholders. Next, knowledge gaps and management challenges are identified. Concluding remarks address these gaps and challenges with a comprehensive action plan designed to enable MCAS Yuma to meet its cultural resources management, compliance, and stewardship responsibilities.

Volume II contains the following Appendices:

A. Agreement Documents: contains copies of relevant agency agreement documents;

B. Archaeological District: contains relevant pages from an Environmental Assessment performed in the 1970s, in which the formation of the Chocolate Mountain Archaeological District is documented and its boundaries mapped;

C. MCAS Yuma Archaeological Survey and Report Standards;

D. State Historic Preservation Office (SHPO) and Advisory Council on Historic Preservation (ACHP) Correspondence: contains copies of correspondence between MCAS Yuma, the California SHPO, and the ACHP;

E. Standard Operating Procedures: the SOPs concerning the management of cultural resources on the CMAGR are presented in full;

F. Tribal Contacts;

G. Site Inventory.

1.3 PREPARATION OF THIS ICRMP

This document is based on reviews of the USMC policy information, previous cultural resources investigations, management plans, and interviews with personnel at MCAS Yuma. Additional information about consultation efforts is provided below, followed by a summary of relevant agency agreement documents that were reviewed and incorporated, when applicable, into the CMAGR ICRMP policies and guidelines. Copies of the agreement documents can be found in Volume II: Appendix A of this ICRMP.

According to the incomplete 2011 CMAGR ICRMP prepared by AECOM, Inc., prior consultation for this document was undertaken with MCAS Yuma RMD, Naval Special Warfare Group 1 (NSWG-1), Native American Tribes, and entities with an interest in the lands encompassed by the CMAGR. MCAS Yuma Range Management Department (RMD) and Naval Facilities Engineering Systems Command (NAVFAC) Southwest data were used and staff interviewed during the development of this ICRMP.

Native American tribes in the Colorado Desert maintain strong traditional ties to the land and to the cultural resources that have been left by their ancestors, and the MCAS Yuma Cultural Resources Program has repeatedly initiated consultation with affiliated tribes for proposed projects that have the potential to impact cultural resources. During the Cultural Affiliation Study (CAS) for the ICRMP project in 2007, consultation letters were sent to tribes (*federally recognized), entities, and individuals that expressed interest in the CMAGR or had been identified as having potential cultural affiliation to the project area:

- Agua Caliente Band of Cahuilla Indians*
- Ak-Chin Indian Community*
- Augustine Band of Cahuilla Mission Indians*
- Barona Band of Mission Indians*
- Cabazon Band of Mission Indians*
- Cahuilla Band of Mission Indians*
- Campo Kumeyaay Nation*
- Chemehuevi Indian Tribe*
- Cocopah Indian Tribe of Arizona*
- Colorado River Indian Tribe*
- Ewiiaapaayp Band of Kumeyaay Indians*
- Fort McDowell Yavapai Nation*
- Fort Mojave Indian Tribe*
- Quechan Tribe of the Fort Yuma Indian Reservation*
- Gila River Pima-Maricopa Indian Community*
- Inaja Band of Mission Indians*
- Jamul Indian Village*
- Kumeyaay Cultural Heritage Preservation
- Kumeyaay Cultural Historic Committee
- Kumeyaay Cultural Repatriation Committee
- La Posta Band of Diegueno Mission Indians*

- Los Coyotes Band of Cahuilla and Cupeño Indians*
- Manzanita Band of Diegueno Mission Indians*
- Mesa Grande Band of Diegueno Mission Indians*
- Morongo Band of Mission Indians*
- Quechan Tribe
- Ramona Band of Cahuilla Mission Indians*
- Salt River Pima-Maricopa Indian Community*
- San Luis Rey Band of Mission Indians
- San Manuel Band of Mission Indians*
- San Pasqual Band of Diegueno Mission Indians*
- Santa Rosa Band of Cahuilla Mission Indians*
- Santa Ysabel Band of Diegueno Indians Sycuan Band of Mission Indians*
- Tohono O'odham Nation*
- Torres Martinez Desert Cahuilla Indians*
- Twenty-Nine Palms Band of Mission Indians*
- Viejas Band of Mission Indians*
- AhaMaKav Cultural Society
- Kwaaymii
- Mr. Joseph R. Benitez

In 2013, consultation was initiated by the MCAS Yuma Cultural Resources Program with tribal entities regarding properties within the CMAGR that would be potentially impacted by the range reconfiguration project within SWAT Ranges 4 and 5, as well as a restricted airspace project. Contact with the entities listed in the CMAGR CAS as well as those on a contacts list held by the MCAS Yuma Cultural Resources Program, occurred via letters sent by certified mail with signature required, describing the proposed actions and requesting their desired input in identification efforts of cultural resources. Follow up phone calls and emails to establish contact and determine interest in consultation with the MCAS Yuma Cultural Resources Program were done over several months. Additionally, a sacred lands file search request was submitted to the Native American Heritage Commission (NAHC). The consultation matrix and copies of correspondence documenting tribal consultation efforts were submitted to CA SHPO. The following is a list confirmed by CA SHPO of entities that have expressed interest and are currently consulted with by the MCAS Yuma Cultural Resources Program for the CMAGR:

- Agua Caliente Band of Cahuilla Indians*
- Ak-Chin Indian Community*
- Augustine Band of Cahuilla Mission Indians*
- Cabazon Band of Mission Indians*
- Cocopah Indian Tribe of Arizona*
- Colorado River Indian Tribes*
- Fort Mojave Indian Tribe*
- Gila River Indian Community*
- Kwaaymii
- Jamul Indian Village*
- Manzanita Band of Diegueno Mission Indians*
- Morongo Band of Cahuilla Mission Indians*
- Quechan Tribe*
- Salt River Pima-Maricopa Indian Community*

- Tohono O'odham Nation*
- Torres Martinez Desert Cahuilla Indians*

2 CMAGR OVERVIEW AND MISSION

The CMAGR is in Imperial and Riverside counties in the southeastern corner of California, east of the Salton Sea and west of the Colorado River (Figure 1). The CMAGR has served as a military training range since 1942.

The CMAGR is one of two training ranges that make up the Yuma Training Range Complex; the other is the Barry M. Goldwater Range West (BMGRW). It is operated by MCAS Yuma principally for live-fire training with aircraft. The USMC also conducts ground combat activities on the CMAGR in support of aviation training. These ground combat activities include artillery and mortar fires and the insertion and extraction of ground combat forces. Naval Special Warfare (NSW) forces conduct basic individual and advanced small unit training in two ground-training areas that abut restricted airspace on the north and west perimeters of the CMAGR, known as Special Warfare Training Areas (SWATs) 4 and 5. These areas contain a variety of individual and small unit ranges used for the USMC and Naval land combat forces. All ground-based training on the CMAGR occurs in designated locations that are consistent with the priority needs of aviation training.

The CMAGR is indispensable to the Department of the Navy (DoN) and the USMC aviation and ground forces training programs. The USMC currently relies on the CMAGR to support training of operational and student aircrews stationed in the local operating area. In addition to these local squadrons, training deployments by the USMC, the DoN, the U.S. Air Force (USAF), Air National Guard (ANG), and Reserve Component units use the CMAGR on a frequent basis. Most aircraft that are used in training at the CMAGR originate from squadrons based at MCAS Yuma and MCAS Miramar. Other regionally based squadrons that regularly use the CMAGR are stationed in California at MCAS Camp Pendleton and Naval Air Station North Island, or on detachment to training at Naval Air Facility El Centro. Aircraft also originate from Luke Air Force Base in Arizona. Aircraft that originate from other USMC and Naval air stations, and the USAF bases or that are launched from the DoN aircraft carriers in the Pacific Ocean are also frequently flown in training missions on the CMAGR. In total, roughly 100 squadrons across the nation collectively fly more than 11,500 training flights annually on the CMAGR. The continuing need for the CMAGR is indicated by active plans to replace the AV-8B and F/A-18 aircraft flown by the USMC squadrons at MCAS Yuma and MCAS Miramar with F-35B aircraft, which began in 2012 and will extend through 2023.

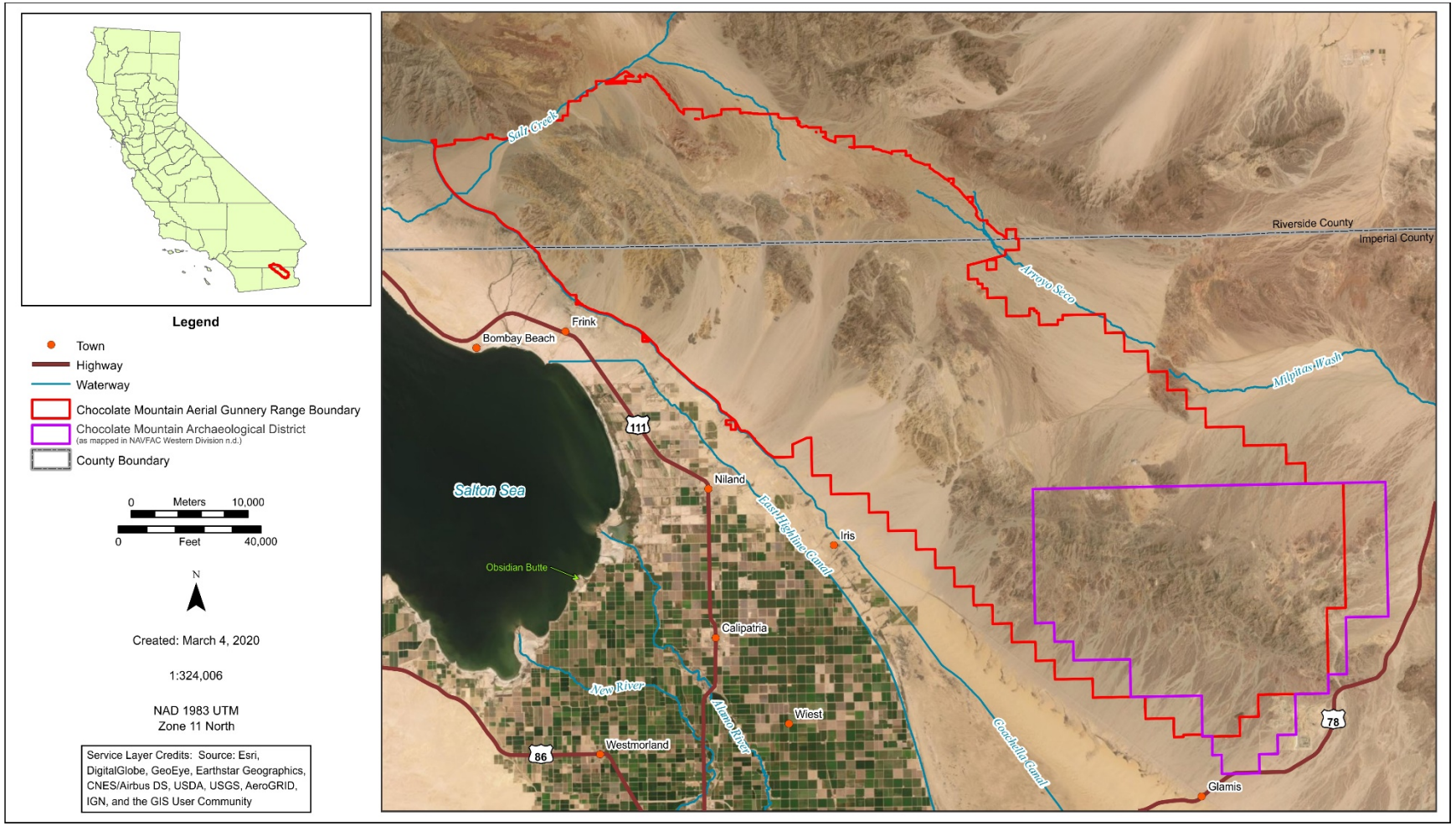

Figure 1. Location Map of CMAGR.

2.1 LAND USE ON THE CMAGR

Historically, the CMAGR consisted of approximately 460,349 acres of rugged desert terrain. This terrain previously included about 229,903 acres of federal land administered by the DoN, about 230,284 acres of withdrawn federal public land administered by the Bureau of Land Management (BLM), and about 162 acres of land not withdrawn but administered by the Bureau of Reclamation (BOR).

In April 2013, the DoN published the Final Legislative Environmental Impact Statement for the Renewal of the CMAGR Land Withdrawal, requesting that Congress renew that portion of the California Desert Protection Act of 1994, which was set to expire on October 31, 2014. On December 26, 2013, President Barack Obama signed the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2014. Title XXIX, Subtitle E of the FY 2014 NDAA directed the BLM to transfer the administrative jurisdiction of approximately 228,324 acres of land previously withdrawn in support of the military operations on the CMAGR to the DoN. The northwest boundary was realigned to the edge of the Bradshaw Trail, so the trail is now entirely on public land under the jurisdiction of the BLM. The DoN relinquished 629 acres of the DoN land and 1,960 acres of the BLM public land withdrawn for military use that is located immediately north of the Bradshaw Trail, and the BLM will manage the land in accordance with the applicable Land Use Plan developed under Section 202 of the Federal Land Policy and Management Act of 1976, Title 43 United States Code (U.S.C.) Section 1712. The post-NDAA acreage of the CMAGR is approximately 457,760.

2.1.1 Military Training Facilities and Uses

The CMAGR is one of the most intensively used ranges in the Yuma Training Range Complex (YTRC). The CMAGR provides large areas of land and airspace for military aviation training including fixed-wing aircraft, helicopters, and unmanned aircraft systems (Table 1; Figure 2). Portions of the CMAGR are subject to live-fire training. The CMAGR features a wide array of ground support areas, target complexes, individual target sites, and other facilities that are used during training activities. The individual targets include vehicle hulks, convoys, anti-air sites, simulated airfield, and headquarters complexes.

Table 1. The CMAGR Military Land and Air Use after the CMAGR INRMP (2017).

CMAGR and Associated Airspace	Area	
	Land (ac.)	Airspace (nm^2)
CMAGR (not including the DWTF)	416,438	
R-2507		530
Abel North MOA/ATCAA		190
Desert Warfare Training Facility (DWTF)	39,500	
Total	455,938	720

The CMAGR is comprised of airspace including R-2507N, R-2507S, R-2507E, R-2507W, and range lands that include target areas and SWATs 4 and 5, which encompass Camp Billy Machen (CBM) (Figure 2). The R-2507N is divided into four sectors: Dead Man's, Punch Bowl, Bald Mountain, and Iris Wash. The R-2507S is geographically divided into three sectors: Blue Mountain, Mount Barrow, and Mammoth. Bull sector is an additional training area that lies outside

the restricted airspace, located adjacent to Mount Barrow and Mammoth, within the military reservation boundary. These ranges are the location of air-to-air and air-to-ground, Low Altitude Tactics Training (LATT), Light Amplification by Stimulated Emission of Radiation (LASER), Landing Zone (LZ), Forward Arming and Refueling Point (FARP), Unmanned Aircraft System (UAS), and Helicopter Support Team (HST) operations.

Within the R-2507N, no high-explosive ordnance of any type is authorized in sectors Bald Mountain and Iris Wash, or south of the Inert Line. The area south of the Inert Line is designated for inert bombs, inert rockets, and strafing only. The R-2507N supports expenditures of Improved Conventional Munitions (ICM) in the target location of the ICM Box only. In addition to the ICM Box, there are six other target areas in the CMAGR listed below with their associated targets.

• Blue Mountain – 1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 10S, 11S, 12S, 13S, 14S, 15S, and Target Area Invader

• Punch Bowl – 2N, 9N, 10N, and 11N

• Dead Man's – 3N

• Iris Wash – 1N, 6N, 7N, 13N, and 14N

• Weapons Impact Scoring Set (WISS) Airfield – 15N

• Mount Barrow (Rotary Winged Aircraft only)

2.1.1.1 Desert Warfare Training Facility (DWTF)

Within R-2507N is the DWTF, consisting of the CBM and SWATs 4 and 5 (Figure 2). The CBM is located on the southwestern border of the CMAGR just east of Niland. SWAT 4 is within the CMAGR, along its western boundary. The DWTF includes one demolition range, one hand grenade range, one anti-mechanized range, one mortar range, six static small arms ranges, and fourteen live-fire and maneuver ranges.

The NSWG-1 uses the DWTF to train U.S. Navy military special forces team members (SEAL). The NSW's mission statement is to organize, train, equip, educate, sustain, maintain combat readiness, and deploy the NSW forces to accomplish special operations missions worldwide. The DWTF within the CMAGR is primarily used for SEAL platoon pre-deployment training and other NSW training requirements. Training activities include air/ground maneuvers, indirect weapons, and demolition firing. SEALs have used the CBM since 1968 for tactical patrolling and live-fire training.

R-2507W, in coordination with the Federal Aviation Administration, is developed and established over SWAT 4 and the CBM. The R-2507W is established to support all live-fire activities at the DWTF, support the NSW UAS utilization within SWAT ranges, and to increase Special Use Airspace availability and dimension for aviation training operations conducted within the CMAGR (NAVFAC SW 2018).

MCAS Yuma and the California SHPO have established a programmatic agreement (PA) that will facilitate Section 106 coordination as SWATs 4 and 5 undergo a range redesign (refer to Volume II: Appendix A of this ICRMP for the full text PA).

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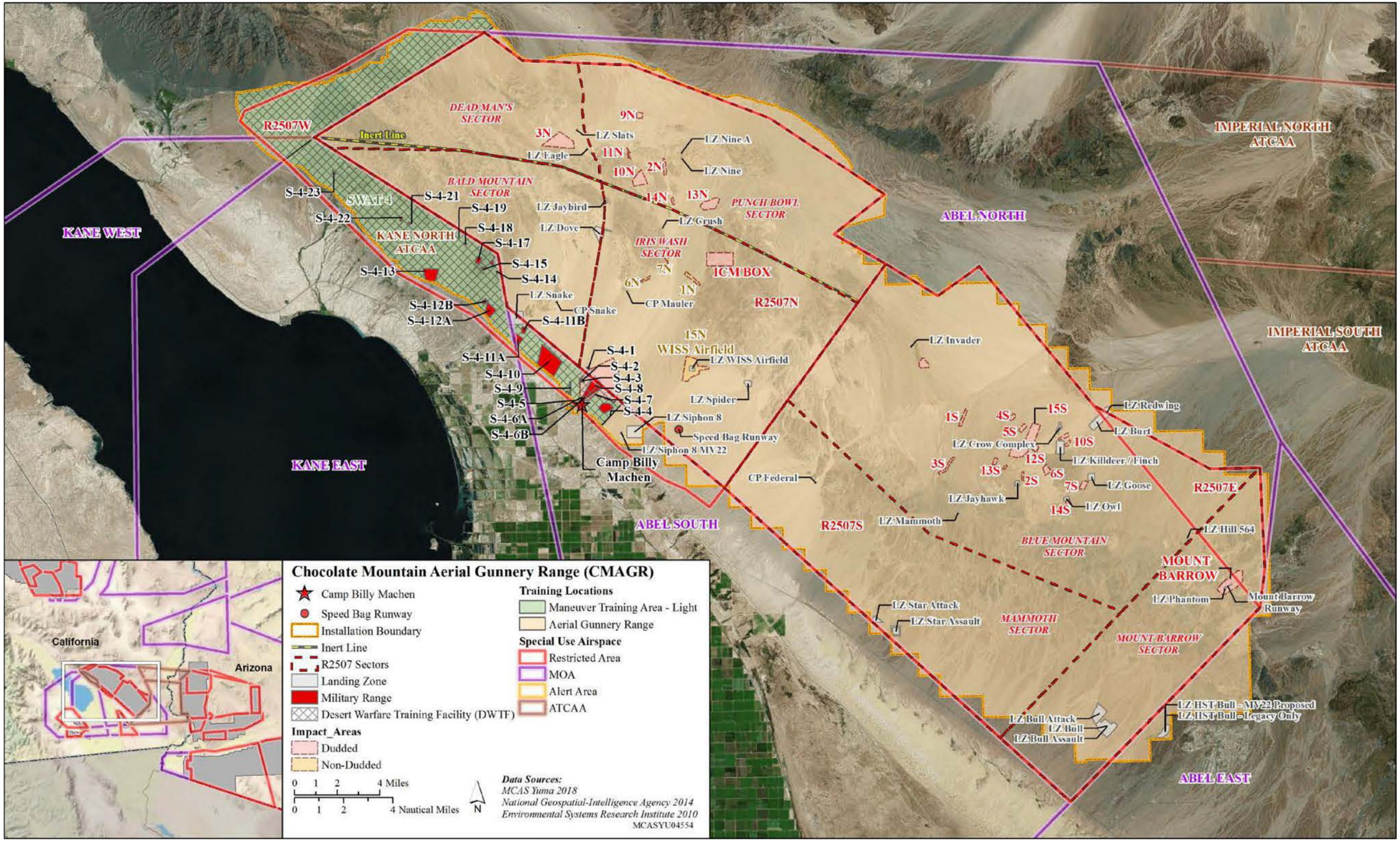

Figure 2. The CMAGR Military Land and Air Use. Figure Reproduced with Permission from NAVFAC SW (2018).

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2.1.2 Non-Military Uses

Approximately ninety-five percent of the CMAGR is roadless and remains in a relatively undeveloped, unstructured, and undisturbed condition.

2.1.2.1 Public Access

Public access is not permitted within the CMAGR, therefore, there are no recreational opportunities within the CMAGR's boundaries. Public access to its road network is always prohibited because of live ordnance hazards and to prevent interruption of military training.

2.1.2.2 Desert Tortoise (Gopherus agassizii) Critical Habitat

The Mojave Desert population of the Agassiz desert tortoise (*Gopherus agassizii*) is a federally threatened species known to inhabit the CMAGR. A critical habitat for this species has been designated in the eastern portion of the CMAGR. A critical habitat designation applies only when federal funding, permits, or projects are involved. Under Section 7 of the Endangered Species Act (ESA), all Federal agencies must ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species, or destroy and/or adversely modify its designated critical habitat.

2.1.2.3 Utility Access

The BOR maintains dikes to protect the Coachella Canal and the inactive Eagle Mountain Railroad from uncontrolled surface runoff. Some of the dikes and a portion of the inactive railroad are within the CMAGR along its western and northern boundaries. Together, these two nonmilitary surface uses encompass less than 100 acres. Three other nonmilitary surface uses cross the CMAGR, including a natural gas pipeline and two electric power transmission lines. Gas Line and Niland-Blythe roads are used by commercial utility companies to access, inspect, maintain, and/or repair the gas line and overhead electric transmission lines that cross the CMAGR. Although these utilities are designated as avoidance areas for ordnance delivery training, the roads that were developed for constructing and servicing these utilities are also used for military transportation.

3 LAWS, REGULATIONS, AND STANDARDS

Various statutes and regulations pertain to the management of cultural resources on USMC installations. Of chief importance are the Archaeological Resources Protection Act (ARPA), National Environmental Policy Act (NEPA), the National Historic Preservation Act (NHPA), Native American Graves Protection and Repatriation Act (NAGPRA), and Executive Order (EO) 13175. Additional direction is provided by DoD instructions, DoN instructions, and USMC orders. Table 2 provides a list of relevant statutes, regulations, orders, and guidance with links to full documentation.

Full text versions of many federal laws, regulations, and court decisions are accessible online from the Cornell University Law Library at http://www.law.cornell.edu. Most laws, regulations, and standards relating to cultural resources are accessible through the National Park Service at http://www.nps.gov/history/laws.htm. The website http://www.dtic.mil/whs/directives provides DoD instructions. Defense Environmental Network and Information Exchange at https://www.denix.osd.mil provides the DoD cultural resources policy and guidance, and the DoN Issuances website at https://www.secnav.navy.mil/doni/default.aspx provides Office of the Chief of Naval Operations (OPNAV) and SECNAV instructions.

3.1 FEDERAL STATUTES

The descriptions of federal statutes supplied below were sourced directly from https://www.fedcenter.gov/programs/cultural (FedCenter 2020).

- American Antiquities Act of 1906 - Within this act, 54 U.S. Code (USC) 320301-320303, the President of the United States is authorized to declare historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest, that are situated upon the lands owned or controlled by the Federal Government, to be national monuments (54 USC 320301). Permits for the examination of ruins, the excavation of archaeological sites, and the gathering of objects of antiquity upon the lands under their respective jurisdictions, may be granted by the Secretaries of the Interior (SOI), Agriculture, and Army to institutions they may deem properly qualified to conduct such examination, excavation, or gathering, subject to such rules and regulations as they may prescribe (54 USC 320301).
- American Indian Religious Freedom Act of 1978 – This act, PL 95-341 (42 USC 1996), states the policy of the United States to protect and preserve for American Indians their inherent rights of freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and native Hawaiians. These rights include, but are not limited to, access to sites, use and possession of sacred objects, and the freedom to worship through ceremony and traditional rites. The act was amended in 1994.
- Archeological and Historical Preservation Act of 1974 –The purpose of this act, 16 USC 470aa-470mm is to secure, for the present and future benefit of the American people, the protection of archaeological resources and sites which are on public lands and Indian lands, and to foster increased cooperation and exchange of information between governmental authorities, the professional archaeological community, and private individuals having collections of archaeological resources and data which were obtained before 1 October 1979 (16 USC 470aa(b)).

- Archaeological Resources Protection Act of 1979 – The purpose of this act, 16 USC 470aa-470mm is to secure, for the present and future benefit of the American people, the protection of archaeological resources and sites which are on public lands and Indian lands, and to foster increased cooperation and exchange of information between governmental authorities, the professional archaeological community, and private individuals having collections of archaeological resources and data which were obtained before 1 October 1979 (16 USC 470aa(b)).
- Historic Sites Act of 1935 – This act, Public Law (PL) 74-292 (16 USC 470-470w-6), authorizes the designation of national historic sites and landmarks, authorizes interagency efforts to preserve historic resources, and establishes a maximum fine of $500 for violations of the act.
- National Environmental Policy Act – This act 42 U.S.C. 4321–4370c declares a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.
- National Historic Preservation Act of 1966, as amended – This act, 54 USC 300101-320101, last amended in December 2014, addresses the issue of preserving our national history. The Congress declares that the historical and cultural foundations of the nation should be preserved as a living part of our community life and development; and that the preservation of this irreplaceable heritage is in the public interest so its vital legacy of cultural, educational, aesthetic, inspirational, economic, and energy benefits will be maintained and enriched for future generations of Americans (54 USC 300101).
- Native American Graves Protection and Repatriation Act of 1990 – This act, 25 USC 3001-3013, permits the intentional removal from, or excavation of, Native American cultural items from Federal or tribal lands for purposes of discovery, study, or removal only if: (1) such items are excavated or removed pursuant to a permit issued which must be consistent with this act; (2) such items are excavated or removed after consultation with or, in the case of tribal lands, consent of the appropriate (if any) Indian tribe or Native Hawaiian organization; (3) the ownership and right of control of the disposition of such items must be as provided in subsections (a) and (b) of this section; (4) proof of consultation or consent is shown. Each Federal agency and museum which has possession or control over holdings or collections of Native American human remains and associated funerary objects must compile an inventory of such items and, to the extent possible, identify the geographical and cultural affiliation of such item. Each Federal agency or museum that has possession or control over holdings or objects of Native American unassociated funerary objects, sacred objects, or objects of cultural patrimony must provide a written summary of such objects based on available information held by such agency or museum.

3.2 FEDERAL REGULATIONS

The majority of cultural resources regulations, and specifically those that are of primary importance to the CMAGR, are listed below. Table 2 provides links to access the full text of these regulations.

- Protection of Archaeological Resources, 32 CFR 229
- National Register of Historic Places, 36 CFR 60
- Determinations of Eligibility for Inclusion in the National Register of Historic Places, 36 CFR 63
- The Secretary of the Interior's Standards for the Treatment of Historic Properties, 36 CFR 68
- Curation of Federally-Owned and Administered Archaeological Collections, 36 CFR 79
- Protection of Historic and Cultural Properties, Advisory Council on Historic Preservation (Section 106 Regulations as amended August 5, 2004), 36 CFR 800
- Council on Environmental Quality, Regulations Implementing the National Environmental Policy Act, 40 CFR 1500–1508
- Preservation of American Antiquities, 43 CFR 3
- Protection of Archaeological Resources, 43 CFR 7
- Native American Graves Protection and Repatriation Act Regulations, 43 CFR 10

3.3 EXECUTIVE ORDERS AND MEMORANDA

The descriptions of Executive Orders and Memoranda supplied below were sourced directly from https://www.fedcenter.gov/programs/cultural (FedCenter 2020).

- Presidential Memorandum, April 29, 1994, Government-to-Government Relations with Native American Tribal Governments/DoD American Indian and Alaska Native Policy states that United States Government has a unique legal relationship with Native American tribal governments as set forth in the Constitution of the United States, treaties, statutes, and court decisions. As executive departments and agencies undertake activities affecting Native American tribal rights or trust resources, such activities should be implemented in a knowledgeable, sensitive manner respectful of tribal sovereignty.
- The Protection and Enhancement of the Cultural Environment Executive Order (EO11593) states that the Federal Government shall provide leadership in preserving, restoring and maintaining the historic and cultural environment of the Nation. Agencies of the executive branch of the Government shall: (1) administer the cultural properties under their control in a spirit of stewardship and trusteeship for future generations, (2) initiate measures necessary to direct their policies, plans and programs in such a way that federally owned sites, structures, and objects of historical, architectural or archaeological significance are preserved, restored, and maintained for the inspiration and benefit of the people, and (3), in consultation with the Advisory Council on Historic Preservation (16 U.S.C. 470i), institute procedures to assure that Federal plans and programs contribute to

the preservation and enhancement of non-federally owned sites, structures and objects of historical, architectural or archaeological significance.

- The Indian Sacred Sites Executive Order (EO13007) directs federal land managing agencies to accommodate access to, and ceremonial use of, Indian sacred sites by Indian religious practitioners and to avoid adversely affecting the physical integrity of such sacred sites.
- The Consultation and Coordination with Indian Tribal Governments Executive Order (EO13175) charges all executive departments and agencies with engaging in regular, meaningful, and robust consultation with Tribal officials in the development of Federal policies that have Tribal implications.
- The Preserve America Executive Order (EO13287) directs federal agencies to advance the protection, enhancement, and contemporary use of federal historic properties and to promote partnerships for the preservation and use of historic properties, particularly through heritage tourism.

3.4 DEPARTMENT OF DEFENSE INSTRUCTIONS

- Department of Defense Directive 4710.01: Archaeological and Historic Resources Management – June 21, 1984, provides policy, prescribes procedures, and assigns responsibilities for the management of archeological and historic resources located in and on properties under the DoD control. This directive requires each DoD installation to implement and maintain an archaeological and historic preservation program; consult with SHPO concerning the DoD undertakings on the NRHP or eligible properties; use historical properties available before acquiring, constructing, or leasing buildings; locate, inventory, and nominate properties under their control that appear eligible for inclusion on the NRHP and provide for their protection; protect inadvertently discovered cultural resources until their significance has been evaluated; and provide for the protection and storage of cultural resources and records that result from the DoD historic preservation programs. Additionally, the directive requires each DoD component to assist licensing agencies in meeting the requirements of Section 106 of the NHPA; dispose of significant historic properties in accordance with appropriate regulations when exceeding the DoD need; designate an official to each military department who may sign and transmit nominations to the NRHP; and to ensure that monies requested for historic rehabilitation or restoration of the NRHP or eligible properties are spent only on historically significant characteristics of the structures.
- Department of Defense American Indian and Alaska Native Policy – October 20, 1998, establishes principles for interactions between the federal government and federally recognized American Indian and Alaska Native governments. These principles regard tribal concerns that should be addressed prior to the DoD decisions on matters that could affect protected tribal resources, tribal rights, or Indian lands.
- Department of Defense Instruction 4710.02: Department of Defense Interactions with Federally Recognized Tribes – reissued September 14, 2018, establishes policy, assigns responsibilities, and provides procedures for DoD interactions with federally recognized tribes.

- Secretary of the Navy Instruction (SECNAVINST) 4000.35B provides that the cultural resources program be directed by a cultural resources professional appointed by the Secretary of the Navy who is supported and supervised by the Assistant Secretary of the Navy (Installations and Environment). Consultation is initiated with SHPOs, the ACHP, Native Americans, and other interested agencies and public groups at any time that the Department of the Navy conducts or supports activities that may affect any property deemed eligible for the NHRP.
- SECNAVINST 5090.8A provides guidance for implementing the Navy's policy to integrate environmental protection, natural resources, and cultural resources program considerations into all Navy operations and activities, as appropriate; and addresses the identification, protection, and preservation of significant cultural, artistic, and historic resources in the custody and care of the Navy. Section 4.f also requires that responsible and appropriate relationships be maintained with federally recognized Indian tribes.
- SECNAVINST 11010.14 and 11010.14A, *Department of the Navy Policy for Consultation with Federally Recognized Indian Tribes* SECNAV INST 11010.14A cancels and updates SECNAVINST 11010.14 regarding issues of Navy policy for consulting with representatives of federally recognized Indian tribes, including Alaska Native governments, on issues with the potential to impact protected tribal resources, tribal rights, or Indian lands in accordance with the Executive Memorandum: "Government-to-Government Relationships with Tribal Governments," of April 29, 1994.
- Secretary of the Navy Manual 5210.1 provides direction regarding the disposition of records. Goals of the Records Management Program include preservation of records having long-term, permanent worth because of their continuing administrative, legal, scientific, or historical value. Standard Subject Identification Codes (SSIC) 5750 addresses Historical Matters Records. SSIC 5751 addresses Research Records. Navy Records Centers are listed, along with Navy Records Groups, both extant and disestablished.
- Office of the Chief of Naval Operations Instruction (OPNAVINST) 5090.1B, change 3, *Department of the Navy Environmental and Natural Resources Program Manual* defines responsibilities and procedures for compliance with NEPA and the NHPA, among other areas of environmental compliance. Chapter 23 of the instruction addresses Navy policy regarding the management of cultural resources.
- OPNAVINST 5090.1C CH 27 provides instruction for implementing Navy policy regarding the management of cultural resources and establishes Navy responsibilities under pertinent legislation. Under this instruction it is Navy policy to incorporate preservation considerations in routine Navy management of historic buildings, districts, sites, ships, aircraft, and other cultural resources. Identifies relevant references and definitions and provides a synopsis of applicable legislation. Provides direction on permitting for archaeological investigations and the curation of collected materials. Section 27-5.2(b) provides for development of ICRMPs.
- OPNAVINST 11010, *Indian Sacred Sites on Navy Lands* requires U.S. Department of the Navy offices to protect and accommodate access to Native American sacred sites located

on property owned or controlled by the agency. Because Navy lands encompass large tracts of Native American ancestral homelands, Navy installations with responsibilities for land management are thus required to evaluate and inventory historical and archaeological resources, including resources associated with Native Americans.

- OPNAVINST 11170.2, *Navy Responsibilities Regarding Undocumented Human Burials or Cemeteries* provides guidance regarding the discovery and handling of undocumented human burials.
- *Environmental Compliance and Protection Manual*, Chapter 8 Marine Corps Order (MCO) 5090.2 establishes updated DoD environmental compliance and protection policy to provide guidance and instruction to installations, enabling them to meet environmental legislation at the federal, state, and local levels. Chapter 8 establishes the USMC policy and responsibilities for compliance with statutory requirements to protect historic and archaeological resources. Chapter 8 also addresses the USMC installation requirements for the development and implementation of a Historic and Archaeological Resources Protection (HARP) plan and outlines the specifications of the NHPA and ARPA.
- *Manual for the USMC Historical Program* MCO P5750.1G delineates the objectives, policies, responsibilities, and certain procedures incident to the planning and conduct of the USMC Historical Program. The manual outlines procedures for documenting, preserving, and displaying the USMC history. It is published for the instruction and guidance of commanders, staff members, and individuals involved in the execution of the program.
- *USMC Guidance for Completion of an Integrated Cultural Resources Management Plan Update*, February 2009, Provides guidance on the preparation of the USMC ICRMP updates. Outlines the required content of ICRMP or ICRMP updates.

Table 2. Legal Authorities and Statutes Governing the Management of Cultural Resources at the CMAGR.

Name	Regulation	Hyperlinks
Public Law		
National Defense Authorization Act for Fiscal Year 2014	Pub. L. 113-66	https://www.congress.gov/bill/113th-congress/house-bill/3304
Archaeological Resources Protection Act of 1979	16 U.S.C. §§ 470aa–mm	https://www.law.cornell.edu/uscode/text/16/chapter-1B
Sikes Act	16 U.S.C. § 670	https://www.law.cornell.edu/uscode/text/16/chapter-5C/subchapter-I
Native American Graves Protection and Repatriation Act of 1990	25 U.S.C. §§ 3001–3013	https://www.law.cornell.edu/uscode/text/25/chapter-32
American Indian Religious Freedom Act of 1978	42 U.S.C. §§ 1996 and 1996a	https://www.law.cornell.edu/uscode/text/42/1996
National Environmental Policy Act of 1969	42 U.S.C. §§ 4321–4370m	https://www.law.cornell.edu/uscode/text/42/chapter-55
National Historic Preservation Act of 1966	54 U.S.C. §§ 100101, 300101–307108	https://www.law.cornell.edu/uscode/text/54/subtitle-III/division-A
Historic Sites Act of 1935	54 U.S.C. §§ 102303–102304, 309101, 320101–320106	https://www.law.cornell.edu/topn/historic_sites_act_of_1935
Antiquities Act of 1906	54 U.S.C. §§ 320301–320303	https://www.law.cornell.edu/topn/antiquities_act_of_1906
Federal Regulation		
Protection of Archaeological Resources: Uniform Regulations	32 CFR Part 229	https://www.law.cornell.edu/cfr/text/32/part-229
National Register of Historic Places Regulations	36 CFR Part 60	https://www.law.cornell.edu/cfr/text/36/part-60
Procedures for State, Tribal, and Local Government Historic Preservation Programs	36 CFR Part 61	https://www.law.cornell.edu/cfr/text/36/part-61
Determination of Eligibility for Inclusion in the National Register of Historic Places	36 CFR Part 63	https://www.law.cornell.edu/cfr/text/36/part-63
The Secretary of the Interior's Standards for the Treatment of Historic Properties	36 CFR Part 68	https://www.law.cornell.edu/cfr/text/36/part-68
Curation of Federally-Owned and Administered Archaeological Collections	36 CFR Part 79	https://www.law.cornell.edu/cfr/text/36/part-79
Protection of Historic Properties	36 CFR Part 800	https://www.law.cornell.edu/cfr/text/36/part-800
Federal Property Management Regulations	41 CFR Part 101	https://www.law.cornell.edu/cfr/text/41/chapter-101
Preservation of American Antiquities	43 CFR Part 3	https://www.law.cornell.edu/cfr/text/43/part-3
Protection of Archaeological Resources	43 CFR Part 7	https://www.law.cornell.edu/cfr/text/43/part-7

Name	Regulation	Hyperlinks
Marine Corps Orders and Guidance		
Environmental Compliance and Protection Program, Volume 8	MCO 5090.2	https://www.marines.mil/Portals/1/Publications/MCO%205090.2_Vol_8.pdf?ver=2018-06-19-090351-240
Manual for the Marine Corps Historical Program	MCO 5750.1H	http://www.marines.mil/Portals/59/Publications/MCO%205750.1H.pdf
U.S. Marine Corps Guidance for Completion of an Integrated Cultural Resources Management Plan Update, 2009	U.S. Marine Corps Guidance	http://www.miramar-ems.marines.mil/Portals/60/Docs/MEMS/Cult_Res/USMC_ICRMP_Guidance_(Feb09).pdf

- CFR = Code of Federal Regulations; DoD = Department of Defense; MCO = Marine Corps Order; OPNAV = Office of the Chief of Naval Operations; Pub. L. = Public Law; SECNAV = Secretary of the Navy; U.S. = United States; U.S.C. = United States Code

4 THE NATURAL ENVIRONMENT

The natural environment in and around the CMAGR is composed of unique vegetation, colorful wildlife, meandering water sources, high mountain tops, and low basins. This section will provide a brief introduction to the geophysical features that impact the Colorado Desert and thus the CMAGR. The text below describes the topography, superficial geology, climate, hydrology, and ecology of the area in and around the CMAGR. Portions of Section 4 here are directly from the CMAGR INRMP (MCAS Yuma 2017). Such paragraphs are attributed to that document. Refer to the INRMP itself for more detailed information on the natural environment of the CMAGR.

4.1 TOPOGRAPHY AND SURFICIAL GEOLOGY

Southern California is composed of unique geological structures formed from the interaction of tectonic plates, erosion, and depositional processes (Norris and Webb 1990). Four major geomorphic provinces, the Peninsular Range, Transverse Range, Mojave Desert, and Colorado Desert provinces, define the region and encapsulate its complex geological history. The CMAGR is specifically located between two of these geomorphic provinces: the Mojave Desert and Colorado Desert. Extensive seismic activity from the Pacific and North American plates, generated the Salton Trough, Gulf of California, the San Andreas Fault, and mountains and valleys that define the region's major geomorphic features (Babcock 1974; Morton 1977; Schaefer 2018). The tensional force from the plates coming together formed numerous mountain ranges such as San Jacinto, Santa Rosa, and Laguna that are located within the Peninsular Range, west and northwest of the CMAGR (Norris and Webb 1990; Schoenherr 1992). These mountain ranges impact the regional climate by creating irregular precipitation distribution. Commonly called the rain shadow effect, rainfall is confined to the western slopes creating the Colorado Desert to the east of the mountain ranges (Norris and Webb 1990; Schaefer 2018; Schoenherr 1992). The Peninsular Range province has since moved northward by way of the San Andreas Fault that stretches across California, largely running northwest to southeast over more than 1,600 km (994 mi). The Peninsular range has been shifted approximately 322 km (200 mi) northward, leading to the formation of a basin depression known as the Salton Trough or Salton basin (Schaefer 2018; Schoenherr 1992)

The Colorado Desert province comprises a small portion of the CMAGR's western boundary as it extends to the base of the Chocolate Mountains (Morton 1977). The Colorado Desert province is defined as a low desert basin that reaches an average depth of 72 m (235 ft) below sea level (Norris and Webb 1990). Bounded by mountain ranges to the west and east, this low-lying arid basin is the on-land extension of the Gulf of California. Located atop a major rift zone between oceanic plates, the Colorado Desert province is one of the most seismically active places in California (Greeley 1978; Norris and Webb 1990; Schaefer 2018; Schoenherr 1992). The Salton Trough has at times been the site of an extensive freshwater lake fed by the meandering Colorado River. These periodic inundations transported lacustrine sediments into the basin, creating thick horizontal and rippled-laminated fine sand to silt stratigraphic layers (Norris and Webb 1990; Schoenherr 1992; Waters 1983). These deposits along with remnants of an extensive shoreline are associated with Paleolake Cahuilla that previously stretched a maximum of 160 km (99.4 mi) in length by 66 km (41.0 mi) wide, reaching a depth of 88 m (288 ft). The lake has been known by a number of names such as the Blake Sea in the 1800s, Lake LeCont, and its modern day name, the Salton Sea (Schaefer 2018; Schaefer and Laylander 2007).

The Algodones Dunes, located to the southwest, are a relic of the paleolake's sands. The sands of the Algodones Dunes were placed via alluvial processes when the lake was filled, followed by aeolian deposition when the lake receded to a dry lakebed (Greeley 1978; Schoenherr 1992). The dunes are now home to unique vegetation and wildlife (Bunn et al. 2007). Presently, the Salton Sea occupies a smaller area than the paleolake, stretching approximately 144 km (90 mi) in length by 40 km (25 mi) wide across the Colorado Desert province (Norris and Webb 1990).

A majority of the CMAGR is situated within the Mojave Desert province, which is bounded by a series of faults that run parallel to, or branch off from, the San Andreas Fault that lies to the west (Fuller et al. 2015). The Mojave Desert province is a broad interior region of isolated mountain ranges separated by expanses of desert plains. Drainages do not empty into riverine watersheds, but are enclosed within interior valleys characterized by playas and alluvial fans (Norris and Webb 1990). The Chocolate and Orocopia mountains fall within the Mojave Desert province.

The major geological feature of the CMAGR is the Chocolate Mountains that stretch approximately 75 km (47 mi) across southern California, reaching Salton Creek to the north and California State Highway 78 to the south (Powell et al. 2018). The basement geology is primarily composed of Precambrian-aged crystalline rocks (syenite, anorthosite, gneiss, etc.) which are identical to the Orocopia Mountains to the northwest (Powell et al. 2018). Mesozoic igneous and metamorphic rocks (orthogneiss, greenschist, marble, Orocopia schist, etc.) are primarily located in the southern CMAGR while Tertiary plutonic, hypabyssal, sedimentary, and volcanic rocks (granite, quartz diorite, porphyry, etc.) characterize a large portion of the north. Quaternary-aged surficial deposits are dispersed throughout the CMAGR (Powell et al. 2018). Figure 3 depicts the geology of the CMAGR in more detail.

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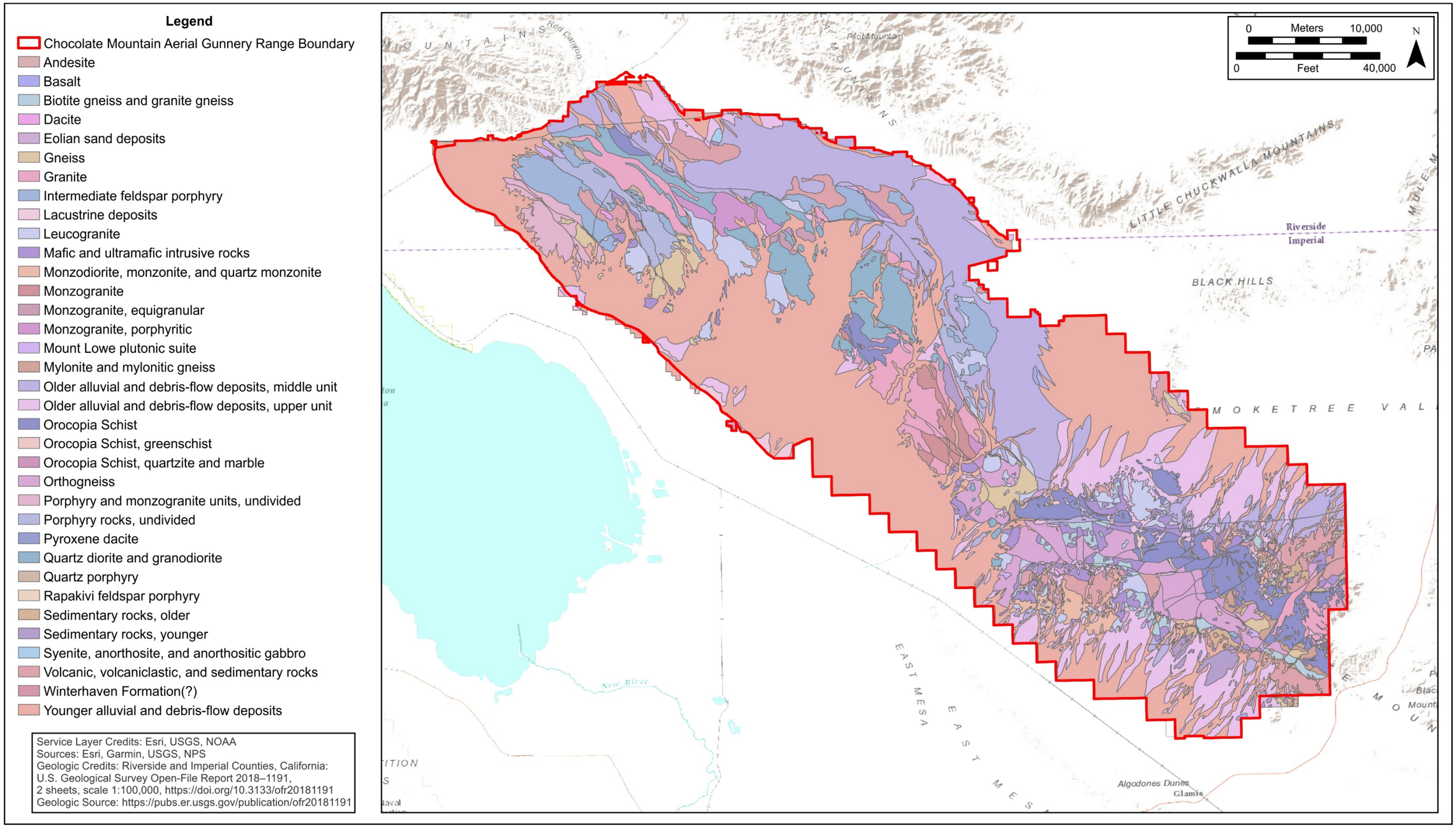

Figure 3. Geology of the CMAGR.

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4.1.1 Raw Materials Important to Prehistoric Populations

Prehistoric populations spent a large amount of time procuring, collecting, and crafting the tools that have become a part of the archaeological record. In the Colorado Desert, raw materials such as chalcedony, rhyolite, basalt, obsidian, and quartz were used by prehistoric populations. A group of remnant volcanoes, known as Obsidian Butte, produced large sources of obsidian, south of the Salton Sea. This obsidian source was periodically submerged with the inundation of Paleolake Cahuilla, leaving outcrops along the southern coast to be exploited in the intermissions (Schaefer and Laylander 2007). In the same area, outcrops of rhyolite have been recorded, with an extension further north around Travertine Point in Death Valley National Park (Laylander 1997). Travertine Point is well known for outcrops of various cherts such as Piedra de Lumbre (Laylander 1997; Pigniolo 1994). Prehistoric people are known to have traveled great distances to procure high-quality chert, suggesting that these areas further north would have been exploited along with local sources (Boulanger et al. 2014). Additionally, basalt, andesite, granite, quartz, and pyroclastic rocks have all been documented in scattered outcrops throughout the Chocolate Mountains (Laylander 1997). Numerous quarries and lithic processing sites have been recorded on the CMAGR (see Volume II: Appendix of this ICRMP).

4.2 SOILS

Desert depositional environments are defined by two soil orders referred to as Aridisols and Entisols. Entisols are soils with an undeveloped subsurface horizon due to erosional processes that prevent deposition. Found throughout the Colorado Desert, Entisols are commonly documented on alluvial fans and steep slopes. The second soil order, Aridisols, are defined by a subsurface horizon that generally accumulates clays, calcium carbonates, silicates, salts, and/or gypsum. Aridisols are also well documented throughout the desert landscape (Eswaran and Reich 2005).

Pedogenic processes in the desert are dynamic with accumulation and displacement events generating geophysical features of the desert topography. Much of the Colorado Desert is comprised of a hard surface known as a desert pavement that forms on flat, gentle slopes; alluvial fans; and piedmonts below mountain ranges. Pavements form as eolian sediments are progressively accumulated on desert surfaces. On these surfaces, a stony monolayer rises and organizes atop a thickening cumulic eolian epipedon (Wells et al. 1985, 1987). This creates thick beds of fine grain sediment below these coarse clasts. Desert pavements continue to mature as the coarse grain materials on the surface breakdown and the fine cracks between them are filled in, forming an interlocking sediment layer (Adelsberger et al. 2013). The maturing of the desert pavement has been described as occurring in a thousand years or taking as long as hundreds of thousands of years. Over time, a desert varnish forms on the surface of the pavement, composed of clay minerals, manganese, and iron oxides. This creates a brown, patinaed finish. The formation of a desert pavement affects the hydrology and ecology of the region by limiting the potential for water to reach deep below the surface. Sporadic rainfall becomes runoff that spreads to more penetrable areas where scrubs tend to reside (Wood et al. 2005). Much of the CMAGR is comprised of desert pavement, especially below the slopes of the Chocolate Mountains.

The United States Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS) Web Soil Survey does not currently provide data on the soils within the CMAGR. To obtain the most up-to-date soil information, data were gathered from the State Soil Geographic

Database (STATSGO2). Thirty-four soil series make up fourteen soil units mapped by STATSGO2 Database. The soils are listed and described below in Table 3. The descriptions were obtained from the USDA-NRCS Official Soil Series Description Database (USDA-NRCS 2020). Figure 4 is a map of the soils documented throughout the CMAGR. All soils within the CMAGR are described as well-drained to excessively well-drained. Areas with well-drained soils and elevated landforms have a higher potential for cultural resources.

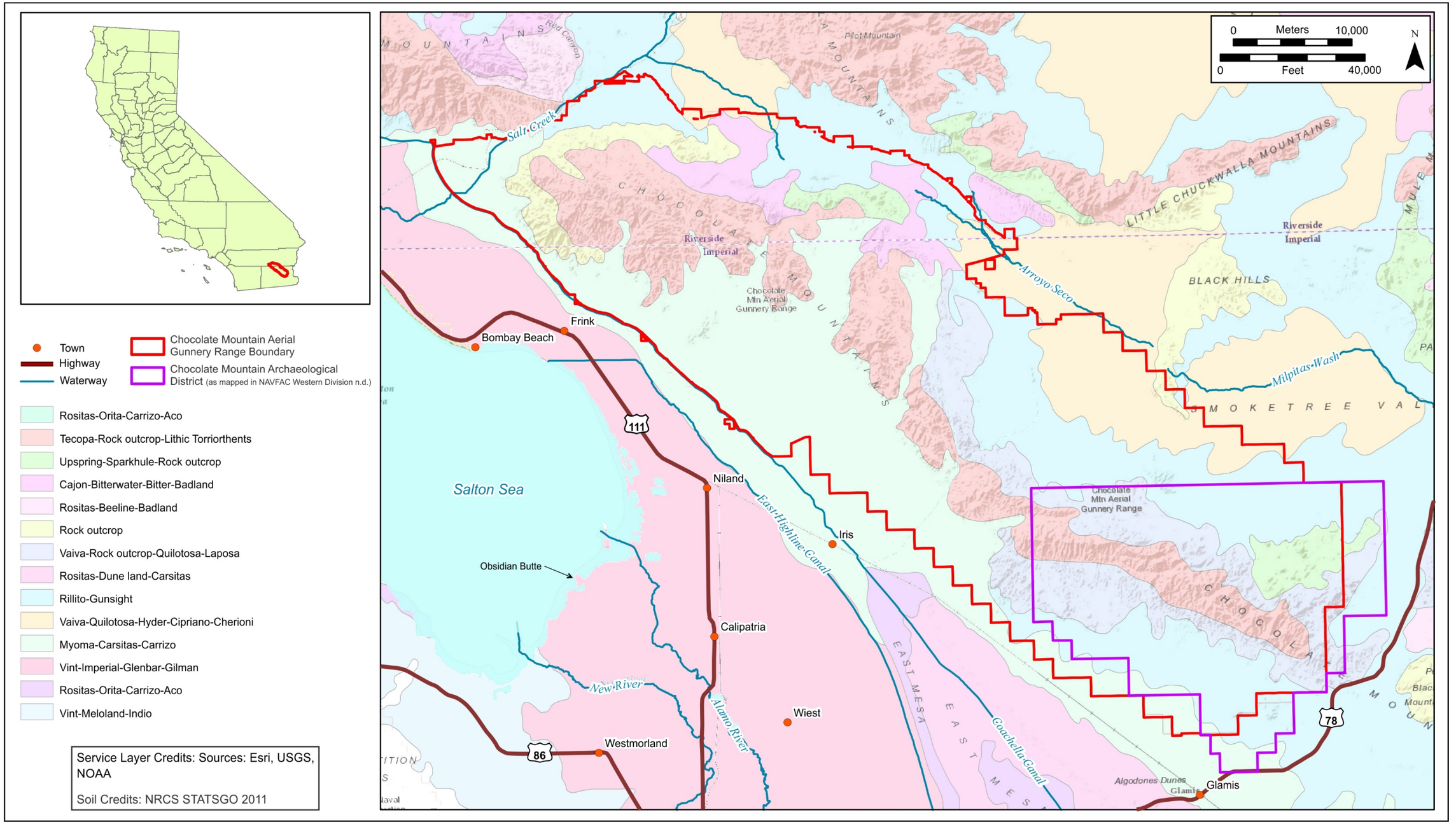

Figure 4. Soil Types Present on the CMAGR.

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Table 3. Soils Unit within the CMAGR, identified by STATSGo2.

Soil Association	Description	Slope Percentage	Drainage
Myoma-Carsitas-Carrizo (s991)			
Myoma Series	very fine alkaline sand formed from recent alluvium, located in altered drainages	0-15	excessively well-drained
Carsitas Series	deep soils formed from coarse granitic cobbles and gravel deposited as an alluvium, located in altered drainages, alluvial fans, and beach ridges	0-30	somewhat excessively drained
Carrizo Series	deep soils formed from igneous alluvium, generally located on alluvial fans, flood plains, and drainage from mountains to valleys	0-15	excessively drained
Vint-Imperial-Glenbar-Gilman (s993)			
Vint Series	very fine sand formed from alluvial or aeolian deposition on flood plains and alluvial basins	0-2	somewhat excessively drained
Imperial Series	deep silty clay soils formed in recent alluvial deposits on flood plains and alluvial basins	-	moderately well-drained
Glenbar Series	deep well stratified soils formed from stream alluvium, located on flood plains and alluvial fans	0-2	well-drained
Gilman Series	deep well stratified soils formed from stream alluvium, located on flood plains and alluvial fans	0-3	well-drained
Rositas-Orita-Carrizo-Aco (s994)			
Rositas Series	deeply deposited sandy soils, generally formed from eolian processes and located on dunes and sand sheets	0-30	somewhat excessively well-drained
Orita Series	deep soils formed from mixed alluvium, generally found on alluvial fan remnants and terraces	0-2	well-drained
Carrizo Series	deep soils formed from igneous alluvium, generally located on alluvial fans, flood plains, and drainages from mountains to valleys	0-15	excessively drained
Aco Series	deep soils formed terraces above flood plains	0-8	somewhat excessively well-drained
Vint-Meloland-Indio (s996)			
Vint Series	very fine sand formed from alluvial or aeolian deposition on flood plains and alluvial basins	0-2	somewhat excessively drained
Meloland Series	coarse stratified soils formed in mixed alluvium on flood plains and alluvial basins	0-2	well-drained
Indio Series	coarse silty soils comprised of mixed alluvial or aeolian material on flood plains, lacustrine basins, and alluvial fans	0-3	moderately well-drained
Tecopa-Rock Outcrop-Lithic Torriorthents (s1126)			
Tecopa	shallow soils weathered from quartzite, schists, and gneiss, generally found on low sloping hills and mountainsides	15-75	well-drained
Rock outcrop-Lithic Torriorthents	out crops composed of sedimentary rocks, granite and granodiorite, or gabbro	9-50	well-drained

Upspring-Sparkhule-Rock Outcrop (s1127)			
Upspring Series	very shallow soils weathered from igneous and pyroclastic rocks, generally found on hills, mountains, and plateaus	8-75	excessively well-drained
Sparkhule Series	soil formed from volcanic and granitic rocks, generally found on rock piedmonts and hills	5-50	well-drained
Rock Outcrop	outcrops of granite, gneiss, mica schist, and sandstone with sand in between outcrops, mountainous areas	very steep	excessively well-drained
Cajon-Bitterwater-Bitter-Badland (s1128)			
Cajon Series	deep soils formed in sandy alluvium derived from granitic rock, generally located on river terraces and alluvial fan skirts, inset and aprons	0-15	somewhat excessively well-drained
Bitterwater Series	formed from weathered sandstone, these soils are generally deep and found along hills and slopes	9-75	well-drained
Bitter Series	deep soils formed from weathered granitic rock, gneiss, schist, limestone, and quartzite, generally located on fan terraces and slopes	2-20	well-drained
Badland Series	compact sand alluvium, eroded by channels and drainages, steep areas	very steep	excessively well-drained
Rositas-Beeline-Badland (s1129)			
Rositas Series	deeply deposited sandy soils, generally formed from eolian processes and located on dunes and sand sheets	0-30	somewhat excessively well-drained
Beeline Series	shallow soils composed of mixed alluvium, generally located on fan terraces and hillslopes	3-45	well-drained
Badland Series	compact sand alluvium, eroded by channels and drainages, steep areas	very steep	excessively well-drained
Rock Outcrops (s1131)			
Rock Outcrop	outcrops of granite, gneiss, mica schist, and sandstone with sand in between outcrops, mountainous areas	very steep	excessively well-drained
Rositas Series	deeply deposited sandy soils, generally formed from eolian processes and located on dunes and sand sheets	0-30	somewhat excessively well-drained
Carrizo Series	deep soils formed from igneous alluvium, generally located on alluvial fans, flood plains, and drainages from mountains to valleys	0-15	excessively drained
Hyder Series	shallow soils formed from rhyolite and other volcanic rocks, generally located along hills and slopes	1-70	somewhat excessively drained
Gachado Series	very shallow soils formed from volcanic rock, found along hills and mountains	0-55	well-drained
Laveen Series	very deep soils formed in alluvium, found on terraces, stream terraces, and relict basin floors	0-3	well-drained
Lomitas Series	shallow soils formed in alluvium and colluvium, documented along hills and mountain slopes	5-65	somewhat excessively
Vaiva-Rock Outcrop-Laposa (s1133)			
Vaiva Series	shallow soils formed from weathered granitic rock and gneiss, generally located on hills and mountain slopes	1-65	well-drained
Rock Outcrop	outcrops of granite, gneiss, mica schist, and sandstone with sand in between outcrops, mountainous areas	very steep	excessively well-drained
Laposa Series	deep soil formed from weathered schist, granite and gneiss, and rhyolite, generally located on hills and mountains	10-75	somewhat excessively well-drained
Rositas-Dune land-Carsitas (s1136)			
Rositas-Dune land Series	deeply deposited sandy soils, generally formed from eolian processes and located on dunes and sand sheets	0-30	somewhat excessively well-drained
Carsitas Series	deep soils formed from coarse granitic cobbles and gravel deposited as an alluvium, located in altered drainages, alluvial fans, and beach ridges	0-30	somewhat excessively drained

Rillito-Gunsight (s1140)			
Rillito Series	deep soils formed from mixed alluvium, generally found on lower terraces and stream terraces	0-40	somewhat excessively well-drained
Gunsight Series	deep calcareous soils that form in mixed alluvium, generally located on fan terraces and stream terraces	0-60	somewhat excessively drained
Rositas-Orita-Carrizo-Aco (s1041)			
Rositas Series	deeply deposited sandy soils, generally formed from eolian processes and located on dunes and sand sheets	0-30	somewhat excessively well-drained
Orita Series	deep soils formed from mixed alluvium, generally found on alluvial fan remnants and terraces	0-2	well-drained
Carrizo Series	deep soils formed from igneous alluvium, generally located on alluvial fans, flood plains, and drainages from mountains to valleys	0-15	excessively drained
Aco Series	deep soils formed on terraces above flood plains	0-8	somewhat excessively well-drained
Vaiva-Quilotosa-Hyder-Cipriano-Cherioni (s1141)			
Vaiva Series	shallow soils form from weathered granitic rock and gneiss, generally located on hills and mountain slopes	1-65	well-drained
Quilotosa Series	shallow soils formed from granitic and metamorphic rocks, generally located on hills and mountainsides	3-65	somewhat excessively drained
Hyder Series	shallow soils formed from rhyolite and other volcanic rocks, generally located along hills and slopes	1-70	somewhat excessively drained
Cipriano Series	shallow, likely dense soil layer formed from volcanic rock, generally located in alluvial fan terraces	0-55	somewhat excessively drained
Cherioni Series	shallow, likely dense soil layer formed from volcanic rock, generally located in alluvial fan terraces and hillslopes	0-70	somewhat excessively drained

4.3 CLIMATE AND HYDROLOGY

4.3.1 Temperature and Precipitation

The Mojave and Sonoran deserts are some of the driest and hottest places in the United States. The CMAGR is located within the Colorado Desert, a northwest subregion of the Sonoran Desert that experiences greater climatic extremes with higher temperatures and less rainfall. The following temperature and precipitation data for the CMAGR are directly from the installation's INRMP (MCAS Yuma 2017).

Data from the Western Regional Climate Center are available for Eagle Mountain, California, which is to the west of the CMAGR near Joshua Tree National Park. Data from this location indicate that July is the hottest month, with an average maximum temperature of 104.9 degrees Fahrenheit (ºF) (40.5 degrees Celsius [°C]). January is the month with the lowest average maximum temperature, 64.4 ºF (18 ºC). July has the highest average minimum temperature, 82.6 ºF (28.1 ºC). The month with the lowest average minimum temperature is January at 44.3 ºF (6.8 ºC) (DoN 2010; Western Regional Climate Center 2011).

Average precipitation measured at the Eagle Mountain meteorological station is 3.67 inches per year. The driest months are from April through June. August is the wettest month due to the influence of the summer monsoon rain pattern (DoN 2010).

4.3.2 Hydrology

Most of the water resources in the Colorado Desert are surface waters collected during the rainy winter and summer monsoonal seasons (Hopkins 2018). Perennial or enduring water resources are

extremely limited in the Colorado Desert due to the sporadic nature of precipitation and the high evaporation rates that occur in this hot and arid climate (Hopkins 2018). Major perennial resources are limited to the Colorado River and the Salton Sea, outside of the CMAGR to the east and west.

Within the CMAGR boundaries, there are no natural perennial water resources (CEPA Regional Water Control 2003). Precipitation collects in natural surface water features like tinajas (surface depressions), springs, playa lakes, arroyos (dry creeks), and charcos (mud holes) that become inundated during flash flooding events. Although the east side of the Salton Sea contains several springs along the San Andreas Fault, the CMAGR has only one recorded spring within its boundaries—Tortuga Spring—which has been dry since 1976 (Lesicka 1990).

The CMAGR also maintains wildlife water "guzzlers," which serve as a supplementary water source. The following details on the artificial wildlife water sources comes directly from the CMAGR INRMP (MCAS Yuma 2017).

The artificial water sources have largely been constructed by Desert Wildlife Unlimited in cooperation with the California Department of Fish and Wildlife (CDFW), USFWS, Navy, and USMC and are designed to collect rainwater using concrete basins and/or natural topography to support on-range wildlife populations. Historically, the CDFW managed 26 existing guzzlers within the CMAGR that provide supplemental source of water for desert bighorn sheep and mule deer in the Chocolate Mountains (BLM 2009). In 2009, the USMC, BLM, USFWS, and CDFW approved the installation of eight additional guzzlers; all have been completed (BLM 2009). The storage capacity of the tanks and guzzlers ranges from 1,000 to 24,000 gallons. Water can be retained in these systems for several months to more than one year, depending on weather and wildlife use.

4.4 PLANT AND WILDLIFE COMMUNITIES: THE BIOTIC ENVIRONMENT

The CMAGR is located in the center of the Colorado Desert ecological zone. The species that live in the Colorado Desert include drought-enduring scrubs, small cacti, and several species of Fabaceae trees (Schoenherr 1992). Plants in this region are often found in areas where water runoff collects in ephemeral surface water features. Vegetation mapping is ongoing in the CMAGR (e.g., Malusa and Sanders 2018), and preliminary results classify the vegetation communities under three National Vegetation Classification Macrogroups that cover most of the Mojave and Sonoran deserts in the southwestern United States. These macrogroups include: (1) Mojave-Sonoran Semi-Desert Scrub; (2) North American Cliff, Scree and Rock Vegetation; and (3) North American Warm-Desert Xeric-Riparian Scrub.

Within these macrogroups there are at least seven alliances: (1) *Opuntia bigelovii* Cacti Scrub Alliance, (2) *Larrea tridentata* - Ambrosia dumosa Bajada & Valley Desert Scrub Alliance, (3) *Larrea tridentata* - *Fouquieria splendens* Upper Bajada & Rock Outcrop Desert Scrub Alliance, (4) *Ambrosia dumosa* Desert Dwarf Scrub Alliance, (5) *Encelia farinosa* Desert Scrub Alliance, (6) *Atriplex hymenelytra* Scrub Alliance, and (7) *Acacia greggii* - *Hyptis emoryi* - *Justicia californica* Desert Wash Scrub Alliance (Schultz et al. 2014). Within these 7 alliances, there are likely to be at least 15 vegetation associations present in the CMAGR. By way of comparison, 25 associations were described from the Barry M. Goldwater Range West, an area that is about 40% larger than the CMAGR (Malusa and Sundt 2015).

The southwestern corner of the CMAGR is home to the Orocopia sage (*Salvia greatae*), a purple-flowering perennial species that is considered a sensitive species by the Bureau of Land Management (BLM) and has a threatened status issued by the California Native Plant Society. Recent discoveries by Malusa and Sanders (pers comm) include two shrubs that had previously never been documented in the United States. The first, found near the south entrance to Salvation Pass, is a Baja California species, *Hoffmannseggia peninsularis*, commonly known as hog potato or camote de raton. The second, found atop the highest point on the CMAGR (approx. 3,050 feet) is a 'fagonbush' (*Fagonia densa*) whose closest kin are about 125 miles to the southeast, in the Sierra del Rosario of Sonora, Mexico.

4.4.1 Vegetation with Economic Importance for Indigenous Groups

Plants from both desert and montane environments were a source of food, shelter, clothing, hunting implements, and medicine for the Native inhabitants of the Colorado Desert. Construction materials for houses and fences were harvested from plants like the California fan palm (*Washingtonia filifera*) and California juniper (*Adenostoma fasciculatum*). Fiber for rope, nets, baskets, and sandals was sourced from Yuccas such as *Y. whipplei*, *Y. baccata*, and *Y. schidegera*. Sagebrushes (Artemisia spp.) served as the principal medicinal plant in this region. The aromatic leaves of white sage (*Salvia apiana*) were used as a deodorant. Agave, mesquite beans, screw beans, and acorns supplied staple foods, but easily over one hundred distinct species contributed to the subsistence and economic needs of desert groups (Lightfoot and Parrish 2009; Wake and Flad 1999).

4.5 WILDLIFE

Approximately 481 wildlife species are documented in the Colorado Desert, exploiting ephemeral water resources and inhabiting the mountain ranges, sandy dunes, desert floors, and washes that comprise the region (Bunn et al. 2007; Gonzales and Hoshi 2015; Schaefer 2018). Pollinators, small rodents, larger mammals including mule deer, bighorn sheep, diverse reptiles, fish, and migratory birds are some of the fauna that currently occupy this region. These species are uniquely adapted to survive in the hot and arid desert environment. The following sections describe the main categories of fauna documented in the Colorado Desert and more specifically, species that reside within the CMAGR. At present, small mammal, reptile, and amphibian baseline surveys are being conducted on the CMAGR. Additional, detailed information on the wildlife of the CMAGR can be found in the installation's INRMP (MCAS Yuma 2017).

4.5.1 Birds

A variety of migratory birds, raptors, and songbirds are known to exploit the resources of the CMAGR. These birds are drawn to this region's microphyllic woodland plants like ironwood, various palm species for nesting, and the fish and small rodents available as a food resource (Bunn et al. 2007; CMBC 2013; Gonzales and Hoshi 2015). A detailed list of general bird species observed on the CMAGR can be found in Appendix A of the CMAGR INRMP (MCAS Yuma 2017).

Specifically, the Cooper's hawk (*Accipiter cooperii*), Vaux's swift (*Chaetura vauxi*), Swainson's hawk (*Buteo swainsoni*), loggerhead shrike (*Lanius ludovicianus*), and the burrowing owl (*Athene cunicularia*) are recorded in the CMAGR INRMP as "special status species" for the installation

(MCAS Yuma 2017). The CMAGR INRMP provides further detail on the relationship between bird populations and the environment of the CMAGR (MCAS Yuma 2017).

4.5.2 **Fish, Invertebrates, Amphibians, and Reptiles**

Thirty-five different species of fish can be found in the waters of the Colorado River and the Salton Sea (Bunn et al. 2007; Gonzales and Hoshi 2015). The diverting of the Colorado River into the Salton Trough, both prehistorically and historically, has created an additional habitat for fish in the desert. Species like the razorback sucker (*Xyrauchen texanus*), bonytail chub (*Gila elegans*), striped mullet (*Mugil cephalus*), various minnows (Cyprinidae), machete (*Elops affinis*), and apache trout *(Oncorhynchus gilae apache)* are known to be abundant (Schaefer 2018). Although these species are not currently known to reside within the bounds of the CMAGR, they were important food sources for animals and indigenous populations who occupied the region (Sutton 1993).

Documented invertebrates include the leptonetid spider *(Calileptoneta oasa)*, Bradley's chrysidid wasp (*Ceratochrysis bradleyi)*, Casey's June beetle (*Dinacoma caseyi),*and white desert snail (*Eremarionta immaculata*) (Bunn et al. 2007).

Lizards, iguanas, tortoises, and snakes account for most of the species representing reptiles and amphibians. Examples include the fringed-toed lizard (*Uma inornata*), Couch's spadefoot toad (*Scaphiopus couchii),* small desert iguana (*Dipsosaurus dorsalis*), the sand snake (*Chilomeniscus cinctus*), and the Agassiz desert tortoise (*Gopherus agassizii*) (Schoenherr 1992). The Agassiz desert tortoise inhabits the Colorado Desert slopes between mountain ranges, taking advantage of the creosote bush, cactus, and shadscale scrubs that thrive in these areas (Schneider and Everson 1989).

As stated in the CMAGR INRMP (MCAS Yuma 2017), on 8 February 1994, the USFWS designated approximately 6.44 million acres of critical habitat for the Mojave population of the desert tortoise in portions of California (4,750,000 acres), Nevada (1,220,000 acres), Arizona (339,000 acres), and Utah (129,000 acres) (59 FR 5820- 5846, also see corrections in 59 FR 9032-9036). These designations became effective on 10 March 1994. A desert tortoise Recovery Plan was published in June 1994 (USFWS 1994a). The Recovery Plan is the basis and key strategy for recovery and delisting. The Recovery Plan identified six recovery units and recommended the establishment of 14 Desert Wildlife Management Areas (DWMA) within the recovery units. DWMA surveys began in 1996. The 1994 Recovery Plan for the desert tortoise was recently updated in 2011 (USFWS 2011). Presently, the Mojave Desert population of the Agassiz desert tortoise (desert tortoise) primarily occurs in the bajadas, mountain foothills, and valleys of the Mojave and Colorado deserts west of the Colorado River. This species usually occurs below 4,000 feet in creosote bush and saltbush scrub habitats, tree yucca (Joshua tree and Mojave yucca) communities, and some ocotillo-creosote habitats (Brennan and Holycross 2006; Stebbins 2003).

4.5.3 **Mammals**

Mammals in the Colorado Desert represent the second largest group of fauna with eighty-two species, ranging from small rodents to large herding animals. Small rodents and rabbits such as the grasshopper mouse (*Onychomys* spp.) and the black-tailed jackrabbit (*Lepus californicus*) inhabit the flat desert scrub lands that are essential for burrowing and concealment from predators like coyotes and bobcats (Schoenherr 1992). A variety of native herd animals like mule deer

(*Odocoileus hemionus*) and bighorn sheep (*Ovis canadensis*)—more specifically in this region is Nelson's bighorn sheep (*Ovis canadensis nelsoni*)—inhabit the mountain environments that compose a large part of the CMAGR (MCAS Yuma 2017; Schneider et al. 2014). The CMAGR is also home to non-native burros and horses, which are remnant populations from nineteenth century mining operations (Bunn et al. 2007; Menke et al. 2016). Previously, a portion of the eastern CMAGR was defined by the BLM as a herd management area (HMA) for burros and horses under the Wild Free-Roaming Horses and Burros Act of 1971 (Bunn et al. 2007). The BLM no longer actively manages this land (their current HMAs are southeast of the CMAGR), however horses and burros still reside within the CMAGR boundaries.

4.5.4 **Wildlife and Prehistoric People**

Terrestrial fauna, including bighorn sheep, rabbits, small rodents, and reptiles were exploited by the Indigenous populations of the Colorado Desert (Schaefer 1994, 2018). Hares and rabbits were an abundant source of meat as evidenced in archaeological faunal assemblages as well as in ethnographic accounts (Hohenthal 2001; Lightfoot and Parrish 2009; Wake and Flad 1999). Insects such as ants, cicadas, grasshoppers, and grubs were also consumed. When full, Lake Cahuilla was a source of pelagic fauna including bonytail chub *(Gila elegans)*, razorback sucker *(Xyrauchen texanus),* Colorado squawfish *(Ptychocheilus lucius);* and waterfowl (*Anas genus* and *Fulica Americana*) (Schaefer 1994; Sutton 1993). Animals like the desert tortoise, chuckwalla, and land snails were also important sources of food (Sutton 1993).

4.6 PALEOCLIMATE

During the Last Glacial Maximum (approximately 23,000-18,000 years ago), glaciers of the Cordilleran ice sheet extended as far south as the San Bernardino Mountains of southern California (Owen et al. 2003). These glaciers gave rise to the extensive pluvial lake systems of the Basin and Range province of California (Ibarra et al. 2014). Conventional geological dating places the Pleistocene/Holocene boundary at circa 10,000 BP (Harland et al. 1982:44). Though this transition is generally marked by a warming environment and rising sea levels, it was still a much cooler and wetter world than today. As the Pleistocene waned, climatic and vegetational change coincided with the extinction of several species of megafauna including mastodon, mammoth, long-nosed peccary, Harlan's ground sloth, horse, camel, giant bison, dire wolf, and saber-toothed tiger (Graham and Mead 1987; Kay 1998).

The warming environment experienced a dramatic climatic reversal during the last glacial cold spell known as the Younger Dryas, which occurred approximately 11,000 to 10,000 years ago (Broecker et al. 1988; Dansgaard et al. 1989). Kennett et al. (2008), found evidence in the sedimentary records of California's Northern Channel Islands and the adjacent Santa Barbara Basin, that the onset of the Younger Dryas coincided with the extinction of the pygmy mammoths (*Mammuthus exilis*—among other species such as those listed above), intense regional wildfires, landscape transformation, vegetational shifts, and the beginning of an apparent 600 to 800 year gap in the archaeological record. However, these findings have been interpreted as evidence supporting the Younger Dryas Boundary (YDB) impact hypothesis. This hypothesis, advanced by Firestone et al. (2007), posits that a cosmic impact (comet) approximately 12,900 years ago caused both the Younger Dryas climatic oscillation and the disappearance of Pleistocene megafauna in North America. The notion of the YDB impact event remains the subject of intense debate in the paleosciences (Jones and Kennett 2012).

Paleoenvironmental data for the Sonoran Desert of southern California is limited to three packrat midden localities near the Colorado River that date from approximately 17,000 years ago (Van Devender 1990). Evidence extracted from these middens indicates a general trend of desert scrub replacing Terminal Pleistocene/Early Holocene vegetation of extensive conifer woodlands (Table 4). As remnant woodlands retreated upslope to higher elevations, desert scrub species followed. This transition was marked by a shift in the relative composition of shrub species from cooler species, to arid-adapted species, and the final establishment of modern assemblages (Spaulding 1990).

Table 4. Paleoenvironment and Prehistoric Chronology of Colorado Desert after Van Devender (1990), and Schaefer (2018).

Approximate Date	Archaeological Period	Time Period	Climate	Vegetation	Great Basin Neothermal Climatic Sequence (Antevs 1948, 1955)
2000	Modern era	Late Holocene (2000 BC-Present)	Modern climatic regime with high summer temperatures, mild winters, and low precipitation in the lowlands. Periodic wetter and drier intervals evident in the uplands.	Lowlands (<300 m): Modern creosote scrub. Uplands (300-600 m): Modern Sonoran Desert habitat distributions.	Medithermal (present-3500 BC)
1000	Late Prehistoric (AD 500-1900)				
BC 0 AD	Archaic (5000 BC-AD 500)				
1000					
2000					
3000					
4000		Middle Holocene (7000-2000 BC)	Winter-dominant rainfall pattern replaced by modern bimodal pattern. Rainfall 20% greater than present.	Lowlands (<300 m): Modern desert scrub with creosote bush, Mormon tea, white bursage, pygmy cedar, ironweed, and catclaw acacia. Uplands (300-600 m): Juniper disappears. Modern transition boundary between the Mojave and Sonoran Deserts established. Desert riparian species found on hot, dry, south-facing slopes.	Altithermal (3500-7000 BC) Hot, dry period associated with prolonged drought
5000					
6000	Paleoindian (10,000-5000 BC)				
7000					
8000		Early Holocene (8000-7000 BC)	Transitional to present climate with still cooler summers. Rainfall 20-40% greater annually and 70% greater in winter than present.	Lowlands (<300 m): Desert scrub already established. Mojavean scrub persisted at sites closest to Colorado River. Uplands (300-600 m): Mesic woodland plants and singleleaf pinyon ascended to above 1,315 m. Xeric juniper-scrub live oak woodland or chaparral continued.	Anathermal (7000-10,000)
9000		Terminal Pleistocene/Late Wisconsin (16,000-8000 BC)	Summers cooler, winters not much cooler than present but with more freezes. Rainfall 40-60% greater than present with winter-dominant pattern.	Lowlands (<300 m): Mojavean scrub with creosote bush, black bush, Joshua tree, and Whipple yucca. Uplands (300-600 m): Woodland-scrub ecotone at 240-300 m. Xeric juniper woodland with California juniper, shrub live oak, Joshua tree, Whipple yucca, and Bigelow beargrass from 300-600 m. Singleleaf pinyon started above 460 m	
10,000					
11,000					
12,000					
13,000					
14,000					
15,000					
16,000					

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5 PREHISTORIC AND HISTORICAL OVERVIEW

5.1 PRECONTACT

The precontact cultural sequence for the Colorado Desert can be divided into three, broadly defined periods: Paleoindian, Archaic, and Late Prehistoric. These periods describe the broad span of human occupation in the area from the Late Pleistocene through the Holocene. This culture history relies on the extensive compilations and distillations of regional archaeological investigations found principally in Arnold (et al. 2004), Love and Dahdul (2002), Schaefer (1994, 2018), and Schaefer and Laylander (2007). Emphasis is placed on data collected within or near the Chocolate Mountains or of significant relevance to the interpretation of cultural resources on the CMAGR.

5.1.1 **Paleoindian (>10,000-5000 BC)**

Current paleogenomic models indicate that ancestral Native American populations dispersed southward from Beringia around 15,000 BP (Goebel and Graf 2019). It is now generally accepted that the first Americans traversed the ice free corridor and/or a Pacific coast route, during the terminal Pleistocene (Braje et al. 2020). The archaeology of coastal California has contributed to the Pacific coastal route as numerous sites with an age of more than 11,000 years old have been documented in the Northern Channel Islands. Chipped stone crescents, stemmed points, and foliate bifaces, often in situ within stratified and well-dated deposits, have been recovered (Braje et al. 2020; Erlandson et al. 1996, 2011; Gusick and Erlandson 2019; Johnson et al. 2002; Rick et al. 2013). The biface, blade, and osseous technologies of these earliest Americans are thought to have set the stage for the emergence of the Clovis and Western Stemmed Traditions (Jenkins et al. 2012; Waters 2019; Waters and Stafford 2007).

Clovis is currently the best documented cultural complex of the Late Pleistocene in North America (Jennings and Smallwood 2019). Clovis-bearing populations are thought to have been small bands of highly mobile people – traversing the landscape to exploit seasonal biotic resources. The association of megafauna remains, particularly mammoth, with large, fluted projectile points is characteristic of Clovis sites, which have been found from coast to coast and from Canada to Venezuela (Jennings and Smallwood 2019; Waters and Stafford 2007). Waters and Stafford (2007) propose Clovis dates from 13,050 to 12,650 calibrated (cal) BP. While the start and end dates of the Clovis culture continue to be refined, regional stylistic and adaptive variations in technology, and diversity in settlement and subsistence practices have been recognized (Jennings and Smallwood 2019).

Recently, radiocarbon dates obtained from the Paisley Caves site in Oregon have demonstrated the Western Stemmed Tradition to be equally ancient (Jenkins et al. 2012). Morphologically and technologically distinct from fluted Clovis points, Western Stemmed projectile points are generally narrow bifaces with sloping shoulders and relatively thick contracting bases. Like Clovis, regional variations in point styles have been recognized and

multiple types defined. These types include, among others, Windust, Lake Mohave, Silver Lake, Hell Gap, and Haskett (Beck and Jones 2010; Lohse and Moser 2014; Scott 2016). And, like Clovis, Western Stemmed Tradition populations are thought to have been small, highly mobile groups who exploited a wide range of biota over extensive foraging ranges. Such reconstructions are based, in large part, on the distant locations from which exotic toolstones such as obsidian and wonderstone were procured (Boulanger et al. 2014; Garfinkel et al. 2008).

The lithic tool type known as "crescents" or "lunates" has often been found within Terminal Pleistocene and Early Holocene assemblages associated with wetland and coastal environments in California and the Great Basin. Crescents have been found at sites located along many ancient lakes, including Honey Lake, Lake Mohave, Panamint Lake, China Lake, Owens Lake, Buena Vista Lake, Tulare Lake, and Borax Lake. Crescents are typically thin, flat, bilaterally symmetrical, and often have intentional edge grinding around the midline (probably to facilitate hafting or hand use). These tools are thought to have been used to hunt large migratory waterfowl such as geese and swans (Moss and Erlandson 2013).

Crescents and a Lake Mohave type point were found at the Salton Sea Test Base near the southwestern shoreline of Paleolake Cahuilla (Wahoff 1999). Grayson (2011) has dated Lake Mohave and Silver Lake points from 11,400 to 8700 RYBP (approximately 9500 to 6700 BC). Davis (1978:57–58) noted that crescents were found in proximity to lakes and marshes, and that they fell out of use c. 7000 RYBP "probably because of extinction of the habitats in which they were useful." A woodrat midden dating from 8170 to 7510 BC located above Salt Creek, between the Chocolate and Orocopia mountains, produced Lake Cahuilla fish bones, presenting further evidence that the Salton Trough was inundated at the beginning of the Holocene (Rinehart and McFarlane 1995).

Other firmly dated evidence of human occupation in the Colorado Desert during the Paleoindian period remains rare, though Terminal Pleistocene/Early Holocene occupations have been documented in the Mojave Desert to the north, coastal southern California to the west, and the Mexican Sonoran Desert to the south (Gaines et al. 2009; Riddell and Olsen 1969; Schaefer and Laylander 2007). Most believe this evidence has simply yet to be found due to a combination of factors including geomorphology of landforms and lack of investigation in the area (Schaefer and Laylander 2007:247). The problem has been further compounded by the fact that aceramic lithic assemblages, rock features, and cleared circles in the Salton Basin were routinely assigned to the San Dieguito Phase III complex by many of the initial investigators in the region. The San Dieguito Complex is an archaeological pattern postulated by Malcolm Rogers to represent the initial human occupation of the Colorado Desert (Rogers 1939, 1958, 1966; Warren 1967; Warren and True 1961). The San Dieguito complex has come to be associated with a component of the C. W. Harris Site (CA-SDI-147) located near Rancho Santa Fe. Initially excavated by Rogers in 1938, the Harris Site has been the subject of numerous investigations (e.g., Warren 1966; Warren and Ore 2011; Warren and True 1961). Despite the work at the Harris Site, the San Dieguito Complex remains poorly defined. Currently, there is no consensus on how this complex is

to be recognized or interpreted archaeologically, especially regarding questions of local chronology, cultural tradition, or site function (Gallegos 2017; Laylander n.d.; Moratto 1984; Warren et al. 2008).

5.1.2 **Archaic (5000 BC-AD 500)**

The Archaic in the Colorado Desert is marked by changes in lithic technology. Clovis and Western Stemmed point types are replaced by smaller Pinto and Elko point types (Jennings 1986). This transition is thought to mark the replacement of thrusting spears with atlatl and dart technology as populations adapted to a changing environment (Chartkoff and Chartkoff 1984; Moratto 1984). Schroth (1994) argues that the shift from flake blank reduction to biface core reduction occurred around 5,000 years ago and that this technological shift is the best indicator of temporal association. Archaic populations can generally be understood as aceramic regional specialists in the procurement and exploitation of local resources.

The recent excavation of numerous Archaic archaeological sites in the Colorado Desert has revealed a diversity of living strategies. Variability in site location, site size, artifact densities, and artifact types has been observed. The Indian Hill Rockshelter (McDonald 1992) in Anza Borrego Desert State Park, the Truckhaven cairn burial and preceramic occupation along the Paleolake Cahuilla shoreline (Moratto 1984:404), Tahquitz Canyon near Palm Springs (Bean et al. 1995), and sites in the Coachella Valley (Love and Dahdul 2002) are some of the most well-dated Archaic sites in the region.

Found within these various Archaic site components were inhumations, cremations, clay-lined features, hearths, rock-lined caches, and living surfaces. Artifacts include Elko Eared dart points, milling stone tools, shell ornaments, and flaked lithic tools. Wonderstone, presumably from the nearby Rainbow Rock area, seemed to be the toolstone of choice. Obsidian sourced from the Coso Volcanic field was also popular. Imported basalt, chalcedony, and jasper were common (Love and Dahdul 2002; McDonald 1992).

Species recovered in faunal assemblages included razorback suckers (*Xyrauchen texanus*); Lagomorphs such as black-tailed jackrabbits (*Lepus californicus*), and cottontail (*Sylvilagus* sp.); ducks and coots; snakes; desert tortoise; and *Anodonta* sp. shell fragments (Love and Dahdul 2002; Wake and Flad 1999). The fluctuating presence of Paleolake Cahuilla over the millennia can be recognized in the faunal assemblages from these Archaic contexts. The degree of dependence on lacustrine compared to terrestrial resources is reflected in the relative preponderance of Lagomorph versus razorback sucker remains (Love and Dahdul 2002).

5.1.3 **Late Prehistoric (AD 500–1900)**

Sites dating to the Late Prehistoric are numerous in the Colorado Desert. Investigations at these sites have revealed that the transition from the Archaic to the Late Prehistoric periods was marked both by continuity and change. Love and Dahdul (2002) observed a great deal of continuity in subsistence practices in archaeological sites in the Coachella Valley where

faunal assemblages from Late Prehistoric contexts were consistent with earlier Archaic deposits:

> The current review suggests that the introduction or change in projectile points had little to do with subsistence strategies, settlement patterns or long-distance trade. Faunal analysis suggests heavy reliance on rabbit with complements of fish, fowl, reptile and other sources of protein, none of which would be necessarily hunted by atlatl or bow-and-arrow. Driving, netting, clubbing, and trapping can account for all the animal capture necessary to maintain a healthy protein intake without the use of projectile points at all. Indeed, as shown above, there is nothing to distinguish the faunal record from before or after the introduction of the bow and arrow (Love and Dahdul 2002:82).

Several technological changes, observed in the archaeological record, have contributed to the understanding of this period. The bow and arrow was introduced, as evidenced by the presence of Cottonwood Triangular, Desert Side-notched, and Dos Cabezas Serrated form projectile points. Paddle and anvil pottery, which is commonly classified as Lower Colorado Buff Ware, Tizon Brown Ware, and Salton Brown Ware, was introduced as well as floodplain horticultural practices (Rogers 1945; Schroeder 1979, 1975).

The Patayan complex, dates from approximately A.D. 500 to the historical period, including a 300-year period of sporadic European and Euroamerican exploration and colonization that left aboriginal lifeways relatively unaffected. There is a clear correspondence between the geographical distribution of Patayan cultural materials and the historical period territories of the Yuman-speaking peoples: the Quechan, Mohave, Cocopah, Paipai, Yavapai, Havasupai, and others. Thus, Patayan can be seen as directly ancestral to the ethnographic cultures of the region. The Patayan complex is characterized by marked changes in artifact assemblages, economic systems, and settlement patterns (Rogers 1945; Schroeder 1975, 1979).

Around A.D. 900 -1100 in southwestern Arizona, Patayan interior desert foragers were interacting with Hohokam irrigation agriculturalists on the western edge of the Hohokam territory. Ceramic exchange was a major component of the system. Ancestral Yuman (Patayan) populations participated in this economic system through trade while producing their own wares (albeit at a smaller scale) from alluvial clays located along the lower Gila River Valley, west of the Hohokam core (Beck and Neff 2007). Beck and Neff (2007) speculate that this pattern reflects the extended movement of not only objects but also people when some Patayan individuals and groups joined Hohokam communities.

Cultigens contributing to the Late Prehistoric diet included but were not limited to maize, beans, squash, and other crops. Agricultural practices first enter prehistoric California via the Colorado Desert. Exact dating for the presence of early domesticated plants or the origins of agriculture and irrigation practices is not available (Laylander 1995; Schroeder 1979; Schaefer and Huckleberry 1995). These technological advancements were presumably introduced either directly from Mexico or indirectly through the Hohokam culture of the Gila River (Rogers 1945; Schiffer and McGuire 1982; Schroeder 1975, 1979). Burial practices shifted from inhumations to cremations; kinship systems became

increasingly elaborate, and trade networks expanded, as evidenced by the trails and trade routes crisscrossing through the Chocolate Mountains (Davis 1961; Schiffer and McGuire 1982).

Working in the pre-radiocarbon era and lacking stratified contexts, Malcolm Rogers (1945) established the prevailing chronological framework of what is now called Lowland Patayan culture history. Extrapolating from published and unpublished work by Rogers, Waters, a geologist by training, produced a ceramic typology to reflect Rogers' proposed chronology: Patayan I (A.D. 700-1000); Patayan II (A.D. 1000-1500); and Patayan III (A.D. 1500-1900) (Waters 1982:289-291). Unlike regional cultural sequences such as the Hohokam, the Patayan periods are temporal designations that do not necessarily imply cultural changes (Slaughter et al. 2000). This chronology has changed little over the intervening 75 years since Rogers first ascribed it to what he then termed the Yuman culture, though Schaefer (1994b:84) did propose extending the Patayan II period to AD 1650/1700, and Porcayo Michelini (2019) has recently advocated for the addition of a fourth phase to account for the continued and ongoing manufacture of traditional ceramics by indigenous potters of the Colorado Delta region of Baja California, Mexico. Unfortunately, the ceramic typology promulgated by Waters (1982) has been a persistent source of confusion and frustration for area researchers (e.g., Laylander 2009, 2017; McCormick 2010; Wright 2020). Water's types have been criticized as "vaguely defined" and "arbitrary" and have repeatedly been found in contradictory temporal contexts (Wright 2020: 459).

The influence of Paleolake Cahuilla on the migrations, displacements, and interactions of different ethnic groups in the Colorado Desert was likely quite profound during Late Prehistoric and earlier periods. Though a consensus on the number and dates of infillings has yet to be reached, archaeologists and geologists recognize that anywhere between three to six high lake stands have occurred within the Late Prehistoric period (Laylander 1997; Moratto et al. 2007; Philibosian et al. 2011; Waters 1983; Table 5).

Table 5. Paleolake Cahuilla infillings during the Late Pre-Contact Period.

A.D. Date	Climatic Events	Waters (1983)	Laylander (1997)	Moratto et al. (2007)	Philibosian et al. (2011)
1800	Little Ice Age 1450-1800 (Stine 1990)				
1750					
1700					
1650				1620-1680	1620-1700
1600			early 1600s		
1550				1430-1580	1505-1605
1500					
1450		1340-1500	1400-1500		1390-1470
1400					
1350	The Great Drought 1200-1350 (Jones et al. 1999)	1230-1380		1210-1370	
1300					
1250			1000-1300		
1200					
1150		970-1130		940-1210	1100-1180
1100					
1050	Medieval Climatic Anomaly 800-1100 (Jones et al. 1999)				
1000					950-1050
950					
900				700-940	850-925
850		665-890			
800					
750					
700					
650					
600					
550					
500	Late Prehistoric Period begins in Colorado Desert				

Populations making use of the CMAGR and its environs during this period were from two distinct language families, the Uto-Aztecan and the Yuman (Golla 2007; Laylander 2010). Yuman language speakers settled along the Colorado River to the east and south of the Chocolate Mountains while Uto-Aztecan speakers lived to the north and west of the mountains. Linguistic evidence suggests that these territories were established during a time of sociocultural instability coinciding with the Archaic-Late Prehistoric transition (c. BC 1000-1000 AD) (Laylander 2010).

Eight cultural groups have been identified with potential cultural affiliation with the lands within and contiguous to the CMAGR. The most proximal groups are the Cahuilla, Chemehuevi, Kamia, and Quechan. Distant groups include the Cocopa, Halchidhoma, Mojave, and Serrano. The *Cultural Affiliation Study for the Chocolate Mountain Aerial Gunnery Range* provides an in-depth and detailed ethnographic review of these Native American groups (Cleland et al. 2010). Table 6 provides a summary of the complex and varied peoples of the region. Unless otherwise noted, the text of subsections 5.1.3.1 through 5.1.3.5 is taken directly from the CAS. Please see Cleland et al. (2010) if more detail is needed.

5.1.3.1 Cahuilla

Groups speaking the Cahuilla language occupied much of central-southern California from the inland valleys of western Riverside County, across the San Jacinto and Santa Rosa Mountains, throughout the Coachella Valley, and into the northern Colorado Desert. The Cahuilla language is classified within the Takic family of the Uto-Aztecan stock, closely related to several other southern California languages such as Luiseno, Serrano, and Gabrielino.

As noted by Earle (see Appendix B in Cleland et al. 2010), ethnographers have divided the Cahuilla into three geographic units—the Mountain, Pass, and Desert Cahuilla. The Desert Cahuilla resided closest to the CMAGR, occupying the Coachella Valley as far southeast as the east side of the Salton Sea lakebed. The eastern boundary of Cahuilla territory, though indistinct, included Chuckwalla Valley and the northern edge of the Chocolate Mountains (Bean 1978, as cited in Cleland et al. 2010). Earle (2009, as cited in Cleland et al. 2010) documents contact-era Desert Cahuilla use and knowledge of sites on or adjacent to the northern boundary of the CMAGR, including Dos Palmas, Tabaseca Tank, and the Indian trail that later became the route of the Bradshaw Trail (Cleland et al. 2010).

The Desert Cahuilla subsistence economy focused on the gathering of wild plant foods from lowland environments, including mesquite, screwbean, cactus, and hard seeds ([Bean 1978; Bean and Saubel 1963, 1972] as cited in Cleland et al. 2010). But, the groups inhabiting settlements in the Coachella Valley in the 19th century often retained gathering areas in the Santa Rosa Mountains or in other upland environments, such as the northern Chocolate Mountains. Foothill zones on the west side of the valley produced cacti, agave, and hard seeds for the desert-dwellers, and pinyon was found further upslope. Nolina and hard seeds were also an important resource in the mountains on the east side of the valley. Hunting also played an important role in Cahuilla subsistence. As described by Bean (1978,

as cited in Cleland et al. 2010), hunting techniques often included substantial preparation in the production of equipment, such as hunting blinds, nets and pit traps, and cooperation among men to drive game into traps. Fishing was also practiced using fish traps along the shores of Lake Cahuilla (when extant; see Table 5).

At least by 1824, the Desert Cahuilla were practicing irrigation agriculture, producing foods similar to those grown by Yuman-speaking groups on the Colorado River, including maize, beans, squashes, pumpkins [sic], melons, and wheat (Bean and Lawton 1973, as cited in Cleland et al. 2010). However, the Cahuilla irrigation system was completely different from that of the Colorado River groups. There have been arguments made that this production predated the Spanish presence in Alta California, and prehistoric horticultural plant remains have been found in Cahuilla archaeological sites (Wilke and Fain 1974:110–113, as cited in Cleland et al. 2010).

Apart from agricultural practices, the Desert Cahuilla subsistence strategy can be characterized as a "desert margin" adaptation, featuring seasonal movements from the desert floor up into the mountain foothills to obtain resources such as agave, islay, and chia ([Earle 2009; Kelly 1977] as cited in Cleland et al. 2010). This pattern is widespread in eastern California and can be observed from the western edge of the Imperial Valley northwestward along the desert side of California's interior mountain ranges to Owens Valley and beyond. Hard seeds, pinyon, agave/yucca, and even acorns (from canyon live oak, for example) are typical resources available to inhabitants of this zone. Earle (2009, as cited in Cleland et al. 2010) notes that the northern end of the Chocolate Mountains represents a transition zone that offered some upland plant resources similar to those exploited by Cahuilla groups in the Mecca and Indio Hills further to the northwest. Hence, subsistence and other resources within the CMAGR would likely have been at least periodically exploited by Cahuilla groups.

Cahuilla religious beliefs and practices include sacred songs and oral texts that tell of the creation of the world and place of the Cahuilla within that creation. These traditional sources also provide moral and ethical guidance. The Cahuilla creation narrative includes several key elements that are common amongst the Takic and Yuman-speaking groups of southern California and eastern Arizona (Kroeber 1925, as cited in Cleland et al. 2010), including:

- Dueling Creator gods (one rightly guided, the other vengeful and spiteful),
- Creation occurring at a known location within the region,
- Death of the Creator and his withdrawal from the earthly world,
- The cremation of the Creator at a known location,
- The human Cremation/Mourning Ceremony as a key ritual event, and
- Close interconnection between these cultural narratives and a recognized cultural geography incorporating the tribe's territory and its environs.

Public ceremonies were important components of Cahuilla culture and were held for a variety of occasions, including the marriage, naming of children, male and female initiation, cremation of the dead, installation of *Nets*, and the annual mourning ceremony.

Earle (2009, as cited in Cleland et al. 2010) states that the mourning ceremony was the most important ritual and involved the stockpiling of both food and valued goods such as beads for distribution to visiting groups. The mourning ceremony and other public rituals involved sacred dancing as well as the singing of sacred songs. Relations of reciprocal cooperation between clans of opposite moiety affiliation, linked by marriage ties, were reaffirmed by the sharing of food and valued goods that took place during the mourning ceremony ([Bean 1978:135–138; Strong 1929:84–85] as cited in Cleland et al. 2010).

Natural and supernatural phenomena were closely interrelated in Cahuilla cosmology, and individuals could use supernaturally acquired power to control elements of the natural world (Bean 1978:581, as cited in Cleland et al. 2010). Shamans were individuals who had acquired, and could demonstrate, sufficient power to cure illness, divine the future, control rain and other natural phenomena, and guard against evil. Strong argued that, while shamans played an important role in Cahuilla culture, they were not officers or political or ritual leaders of the individual clans. Their enterprise was individual rather than corporate.

According to Bean (1978, as cited in Cleland et al. 2010), Cahuilla reside on the following federally recognized reservations: Agua Caliente, Augustine, Cabazon, Cahuilla, Los Coyotes, Morongo, Ramona, Santa Rosa, Soboba and Torres-Martinez.

5.1.3.2 Chemehuevi

Ethnographically, the Chemehuevi are considered the southernmost of the 16 subgroups of the Southern Paiute (Kelly and Fowler 1986, as cited in Cleland et al. 2010). Their traditional territory generally lies in southeastern California from the southern tip of Nevada to as far south as Blythe and westward into the southeastern Mojave Desert and northeastern Colorado Desert. Cultural boundaries in this area are indistinct, and anthropologists suggest that the Chemehuevi were actively expanding southeastward during the 19th century. Earle (see Appendix B in Cleland et al. 2010) and Kelly and Fowler (1986, as cited in Cleland et al. 2010) indicate that Chemehuevi hunting parties probably made regular use of the Chocolate Mountains, particularly in the north. Linguistically, Southern Paiute is classified within the Numic language family of the Uto-Aztecan stock, closely related to Ute and Shoshone as well as Northern Paiute.

Although historically the Chemehuevi practiced agriculture along the Colorado River and the closely related Southern Paiute of the Las Vegas Valley probably conducted agriculture prehistorically, the inland Chemehuevi acquired most of their subsistence from the gathering of wild plant foods and hunting. Much of their territory was made up of basin-and-range environments—from mountain uplands containing pinyon to desert floor lake playas with mesquite and screwbean groves. The mountain zones, including the New York, Kingston, and Providence mountains, were the most important areas for procuring subsistence resources. The hunting of desert bighorn was a core cultural concern for the Chemehuevi, and deer and antelope were also hunted. Agave, different yucca species, and cacti were found on mountain and hill slopes. Grass seeds such as *Oryzopsis* and the *Lyceum* berry were found at lower altitudes. Around springs was found carrizo grass

(*Phragmites*), with its aphid sugar. The desert tortoise and chuckwalla were hunted, as well as the jackrabbit and cottontail.

The Chemehuevi were residentially mobile, moving settlements seasonally from winter to summer-fall camps. Key resource patches included lowland mesquite woodland, limited areas of upland pinyon resources, and desert springs. Earle (Appendix B, as cited in Cleland et al. 2010) suggests that the Chemehuevi placed considerable cultural emphasis on hunting and possessed some of the most powerful bows to be found in the Southwest. As with other desert groups, the Chemehuevi were able to travel long distances rapidly by foot. They maintained an economically symbiotic relationship with the riverine Mojave, exchanging desert products for the garden crops of the Mojave.

Along the Colorado River, Chemehuevi crops included maize, squash, pumpkin [sic], watermelon, and wheat (Kelly and Fowler 1986, as cited in Cleland et al. 2010). However, the gathering of wild plant foods, most importantly mesquite, probably remained more important than agriculture in supplying the overall dietary needs (Castetter and Bell 1951, as cited in Cleland et al. 2010).

Chemehuevi local residential groups or "bands" typically numbered 25 to 40 people. These groups often recognized a spokesman to represent the group at larger gatherings. For larger residential groups, such a spokesman performed some of the functions of a headman. They helped to organize residential group movements and group sponsorship of or attendance at regional events, such as the mourning ceremony and the fall gathering festival.

Amongst the Chemehuevi, there was a belief in spiritual connection between the Song Group and the territory and animals that lived there. Singing the sacred songs was necessary to maintain this connection and for hunters to be successful. For a hunter, the bond between himself, his song animal, his song, and the territory demarcated by the song was one of the key constructs guiding his experience of life (Earle 2004:47, as cited in Cleland et al. 2010).

The Chemehuevi held funerals for individual deceased and a collective Mourning Ceremony or Cry at intervals for a community's dead. Funerals involved the singing of the deceased's song, the burning of property, and traditionally the burial of the deceased. Laird presented considerable evidence on the traditional nature of interment among the Chemehuevi as opposed to cremation, a point on which there had been some debate (Laird 1976:41, as cited in Cleland et al. 2010). A river-dwelling Chemehuevi consultant of Kelly's mentioned that some practice of cremation occurred in the 19th century, although interment was preferred (Kelly 1953:22–39b, as cited in Cleland et al. 2010).

The two largest modern Chemehuevi communities today are found in two federally recognized tribes: Chemehuevi Reservation and the Colorado River Indian Tribes Reservation. Additionally, information provided by the Colorado River Indian Tribes in 2009 indicates that people identifying themselves as culturally Chemehuevi reside also on the Te-moak, Bishop (Lone Pine), Pahrump, Las Vegas Band of Paiute, Moapa, St. George, Twenty-Nine Palms, Agua Caliente, and Morongo reservations (Envirometrix 2009, as cited in Cleland et al. 2010).

5.1.3.3 Kamia (Desert Kumeyaay)

The Kamia or Desert Kumeyaay occupied the Imperial Valley from the Algodones Dunes westward to the eastern portion of the Peninsular Range ([Gifford 1931; Kroeber 1925; Spier 1923] as cited in Cleland et al. 2010). They were closely related to the mountain and coastal Kumeyaay of San Diego County and northwestern Baja California and spoke a Yuman language related to the Colorado River tribes. Luomala (1978, as cited in Cleland et al. 2010) indicates two distinct dialects of Kumeyaay—northern (Ipai) and southern (Tipai). Speakers of the northern dialect may have occupied Borrego Valley and the desert to the east as far as the Imperial County line, but the majority of the interior desert was within the territory of the southern dialect (Luomala 1978: Figure 1, as cited in Cleland et al. 2010). The origin traditions of the Kamia make reference to Lake Cahuilla and state that Kamia ancestors were settled on the eastern shore of that body of water, an area that could include portions of the CMAGR.

At least some Kamia groups practiced oasis and/or flood irrigation agriculture, but it seems likely as described by Earle (Appendix B, as cited in Cleland et al. 2010) that Kamia subsistence strategies were especially diverse in response to a highly variable effective environment that was controlled both by precipitation and the fluvial dynamics of the lower Colorado River. Hunting, fishing along the New and Alamo Rivers in periods of high flow, the gathering of wild plant foods, and the exchange of Kamia-manufactured pottery for storable foods from the Colorado River and Peninsular Range (Rogers 1939, as cited in Cleland et al. 2010) also contributed to this diverse subsistence economy.

The New and Alamo river and slough systems were important for the Kamia living in the Imperial Valley not only in relation to flood horticulture, but also in providing other food resources. Fishing was carried out on these watercourses. Reeds and rushes found on their margins provided edible roots and pollen. Mesquite woodland was also associated with the slough environments. The Peninsular Range to the west provided both prepared agave and acorns. From ethnohistoric accounts it seems likely that desert dwellers travelled west to obtain these resources *and* that the mountain tribes travelled to the desert to exchange them for desert products. It was also mentioned that desert Kamia groups sometimes camped at Jacumba, in the coast range foothills, where they carried out irrigation gardening (Gifford 1931:23, as cited in Cleland et al. 2010). Earle (Appendix B, as cited in Cleland et al. 2010) argues that Imperial Valley Kamia food production during good years yielded a surplus for exchange. This would have permitted a flow of crop foods westward to the mountain Kamia and mescal eastward from them as well.

Long-term seasonal settlements were maintained along the New and Alamo rivers, and the archaeological record suggests that shorter-term seasonal camps were occupied on shores of Lake Cahuilla when full or in recession (Apple et al. 1997, as cited in Cleland et al. 2010). Settlements also occurred at desert springs and at other resource patches.

Citing Gifford (1931) in particular, Earle (Appendix B, as cited in Cleland et al. 2010) notes that the religious traditions of the Kamia reflected a mixture of traits common both among the more western Kumeyaay groups and among the lower Colorado River tribes.

The origin stories given to Gifford parallel those of the Quechan and Mojave. Traits common with the lower Colorado humans include the "dying god" theme, the importance of the culture hero Mostamho as successor to the "dying god," the importance of the *keruuk* mourning ceremony, and the tracing of cultural heritage to the common creation of all Yuman groups at *Avikwame* (Spirit Mountain) in southern Nevada. But, it appears that dreaming took a less important religious role within Kamia culture. Certain features, such as the eagle sacrifice, reflected the ties of the Imperial Valley Kamia with the coastal and mountain Kumeyaay groups.

Gifford found that the Imperial Valley Kamia had sung sacred song cycles like the Colorado River groups. However, it was said that these songs were, at least in recent times, learned rather than dreamed. Gifford also noted that he was told that sacred stories were learned rather than dreamed, as they were among the Colorado River groups. Gifford was also frustrated over the limited information elicited about shamanism. It is not clear whether the data reflected differences between Kamia and Quechan religious culture, or simply reticence on the part of consultants to discuss religious beliefs.

As with many tribes in the region, the Kamia practiced cremation as the preferred method of treatment of the dead. Soon after death, the deceased were cremated, and their personal possessions were burned at that time. In addition, a periodic mourning ceremony (*keruuk*) was also held that was similar in many respects to that of the Quechan. Gifford was told that this ceremony was held from time to time to commemorate the deceased regardless of rank. In other words, it was not restricted to important leaders. As many as 10 to 12 people might be commemorated at a time. Relatives of the deceased would plant extra crops to produce abundant food to be distributed to attendees at the mourning ceremony. New clothing and other goods were also burned as offerings to the deceased. In addition, the Kamia had adopted the western Kumeyaay custom of preparing "images" that were burned as part of the ceremony.

Numerous federally recognized Kumeyaay tribes are located in San Diego County, some of which may include descendents of the desert clans. Kumeyaay tribes include the Campo, Ewiepaipe, Viejas, Barona, Sycuan, Jamul, Santa Ysabel, Mesa Grande, and San Pascual federally recognized tribes. Much of the ethnographic information on the Kamia was recorded by Gifford ([1918, 1931] as cited in Cleland et al. 2010) and Spier (1923, as cited in Cleland et al. 2010) on the Campo Reservation. There are also numerous Kumeyaay communities in northern Baja California ([Hohenthal 2001; Luomala 1978] as cited in Cleland et al. 2010).

5.1.3.4 Quechan

The Quechan occupied the lower Colorado River corridor up and downstream of the Gila River confluence. Their settlements ranged from just south of the international border to as far north as Palo Verde Valley; beyond this core territory, they travelled widely both up and down the river corridor from the delta to southern Nevada and east and west from the Phoenix basin to the Pacific Coast. This long-distance travel was facilitated by a regional trail system, portions of which have been recorded on the CMAGR (Rogers n.d., as cited

in Cleland et al. 2010). As cited in Cleland and others (2010), Earle provides ethnohistoric documentation of Quechan use of trails in the CMAGR vicinity. The Quechan language is a member of the Yuman linguistic family, closely related to Mojave and Cocopa.

Like other lower Colorado River groups, the Quechan practiced flood-based agriculture. Maize, tepary beans, squash, pumpkins [sic], and melons were staple crops**.** This farming system depended upon the annual flooding of the Colorado River to provide new soil nutrients and particularly moisture to make river bottom planting possible. Based on information provided by Castetter and Bell (1951, as cited in Cleland et al. 2010), anthropologists generally conclude that agricultural production provided less than 50 percent of the diet. Thus, fishing and the gathering of wild plant foods, especially mesquite and screwbean, were also very important in the subsistence economy. Hunting was not emphasized but would have been more important in years when the Colorado River floods failed (Earle, as cited in Cleland et al. 2010).

Forde (1931, as cited in Cleland et al. 2010) claimed that most wild plants harvested by the Quechan were products of the mesas adjacent to the Colorado River. However, other sources indicate that a number of plant food species were found and exploited in mountain areas away from the river (Halpern 1935, as cited in Cleland et al. 2010). This most probably would have included at least some portions of the Chocolate Mountains chain.

The Quechan lived in large, dispersed settlements close to the river corridor. Within these settlement areas individual dwellings were scattered across the upslope end of river bottom farm fields that extended toward the river. During episodes of especially high water, shelters built above the river bottom were used as temporary habitations if river bottom dwellings had been flooded out. The settlement population ranged up to 800 people, with several hundred being the norm.

For the Quechan, like other lower Colorado River groups, individual dreaming to seek guidance in life and spiritually based power was a principal aspect of religious belief and practice. This included the learning of sacred songs, through dreaming, about the events that occurred at the time of the creation of the world. The singing of these songs by individuals was a principal avenue of religious expression. The dreaming experience meant that sacred places could be visited, and the sacred landscape traversed, through dreaming rather than through conventional travel.

While individual singing of dreamed songs played a major role in religious life, community rituals such as those for female initiation and the mourning ceremony were also practiced. The mourning ceremony, or Kaṙúk, was held for prominent individuals who had recently died. The deceased were cremated soon after death, and the mourning ceremony took place at a later date. The Kaṙúk was a multi-day ceremony that involved the invitation of members of allied groups, and it required the accumulation of considerable food and other resources beforehand. It also featured the singing of dreamed songs ([Forde 1931:214–251; Halpern 1987] as cited in Cleland et al. 2010).

The geography of sacred places related to the sacred song cycles of Yuman groups is a major cultural feature of the lower Colorado River region. Kroeber (1925, as cited in

Cleland et al. 2010) collected large quantities of information on places mentioned in Mojave song cycles, from as far afield as the Pacific Ocean and the Tehachapi Mountains, the Gulf of California, Tucson, and southern Nevada. Modern Quechan have stated that a similar geography of scared places is important in their culture, but place names have not been compiled to the same extent.

The Fort Yuma Quechan Reservation contains the largest community of Quechan people.

5.1.3.5 Cocopa

The Cocopa occupied the banks of the Hardy River in northern Baja California and the Colorado River south of the Quechan and other portions of the Colorado River delta. They shared the linguistic and cultural traditions with the other lower Colorado River groups. This included flood horticulture generally similar to that practiced by their Quechan neighbors to the north. Earle (as cited in Cleland et al. 2010) suggests that the Cocopa were perhaps less dependent on horticulture than other Yuman groups farther up the river, given that the delta environment provided large quantities of mesquite and screw bean, as well as other wild plant resources. The Cocopa sometimes went on gathering expeditions to the Sierra de Juarez, in Baja California Kamia country to the west, to gather mescal and pinyon. The Cocopa also exchanged horticultural products with the Kamia in return for mescal and other wild foods.

During the late 18th and early 19th centuries, the Cocopa were traditional allies of the Maricopa of the middle Gila River and often in conflict with the Quechan. Earle (Appendix B) argues that because of this conflict, and the frequent fighting that it involved, the Cocopa were not frequent visitors to the more northerly reaches of Quechan territory. He was not able to identify any ethnohistoric connections between the Cocopa and the Chocolate Mountains. Nevertheless, there was at times peaceful contact between the two groups, as well as intermarriage, and Cocopa may have visited the CMAGR area at one time or another.

5.1.3.6 Halchidhoma/Maricopa

During the early historical period, the Yuman-speaking Halchidhoma occupied the banks of the Colorado River north of the Quechan. They were closely linked culturally and politically with the Maricopa of the middle Gila River (Harwell and Kelly 1983:71–75, as cited in Cleland et al. 2010). Spanish- and Mexican-era accounts, including statements by Halchidhoma and Maricopa themselves, tend to use the designations somewhat interchangeably. The Halchidhoma were thought of by other native groups as simply a division of the Maricopa located on the Colorado River. The subsistence and settlement practices, social organization, and general cultural characteristics of the Halchidhoma appear to have been very similar to those of other lower Colorado River groups of Yuman speech.

The Halchidhoma were allies of the Maricopa to the east and of the Cahuilla to the west. During the late 18th and early 19th century, there was severe conflict between the Halchidhoma and Mojave to the north of them and of the Quechan downriver. Around

1828, the Halchidhoma were defeated and survivors took refuge with their Maricopa allies and relatives primarily in central Arizona. As a result, very little ethnographic or ethnohistoric information is available on Halchidhoma utilization of interior southern California.

However, several important trails linking southern and central portions of Halchidhoma territory on the river with the Coachella Valley and ultimately the Pacific Coast passed along the perimeter of the CMAGR. The Cahuilla maintained exchange, marriage, and alliance ties with the Halchidhoma. Garcés's observations of the Halchidhoma in 1774 and 1776 suggest that they were receiving woven cloth mantas and other cloth goods from the Moqui [Hopi], which they traded for cotton that they produced (Coues 1900:II:93, as cited in Cleland et al. 2010). These cloth goods may have been exchanged westward to the Cahuilla along these trails. It seems likely, therefore, that occasional visits to the Chocolate Mountains occurred.

5.1.3.7 Mojave

The Mojave were the northernmost of the lowland Yuman-speaking groups of the Colorado River. However, they also ranged inland, both east and west, and occasionally established relatively longlived settlements at some distance from the river. In the 18th and 19th centuries, the Mojave were settled in the valley of the Colorado River, from about 10 miles north of modern Laughlin southward to along the river to the vicinity of Tyson Wash. They occupied territory in Nevada, California, and Arizona. Their culture and subsistence economy were similar to the Quechan.

The Mojave, in historical times and presumably long before, traveled and traded in southern California closer to the coast. The Mojave River helped to form one major east-west travel corridor, but the Mojave also travelled extensively up and down the Colorado River corridor. In addition, Mojave songs mention places, including sacred sites, located far from their home villages. The whole desert, and beyond, was part of their world.

Earle (as cited in Cleland et al. 2010) notes that the association or connection of the Mojave with the CMAGR would have to do, first of all, with the extensive traveling for which this group was so famous. Not only did the Mojave regularly travel down the west bank of the Colorado River to visit the Quechan, but they traveled farther westward into the California deserts. The Mojave were intimately familiar with trail routes running down the Colorado River Valley itself, and with the river trail cut-off that ran from the southwest bank of the Colorado southward to Yuma, passing to the east of Picacho or Chimney Peak. The names of places and sacred song locales to the north of the Quechan settlements at the Yuma Crossing are found in Kroeber's notes of interviews with Mojave. Groups of traveling Mojave used desert trails located a day's travel or more west of the Palo Verde Valley in the era before 1830 when their enemies, the Halchidhoma, were still living in the Parker and Palo Verde valleys.

During the decades after the movement of the Halchidhoma away from the Colorado River, some Mojave also settled in the Palo Verde Valley bringing their settlements close to the more southerly east-west routes that likely passed very close, or through the CMAGR.

Before the Halchidhoma relocation, Mojave travelers had skirted the Palo Verde Valley to the west, as previously discussed, while journeying to visit the Quechan. It is likely that they traveled and camped in the vicinity of the CMAGR.

An important aspect of Mojave culture was the recitation of sacred songs memorializing the landscape of desert California and the Colorado River. Information collected by Kroeber suggests that there were two routes of supernatural travel touching on Cahuilla and Kamia territory that showed up in Mojave and other versions of the sacred songs. One was a route that, coming from the direction of the San Bernardino Mountains, stopped at Mount San Jacinto, then continued down the west side of the Coachella Valley past the Santa Rosa Mountains, perhaps to Warner's Hot Springs, then swung eastward across the desert to Yuma. A second sacred route mentioned by a Mojave consultant departed from the San Bernardino Mountains, passed to the Indio-Coachella area, then headed southeastward on the east side of the Coachella Valley to the territory of the Kamia. In this account, the Chocolate Mountains are not specifically mentioned, but this more easterly song-circuit route may have involved events associated with the Chocolate Mountains area.

5.1.3.8 Serrano

The Serrano are a group whose language belongs to the Takic branch of the Uto-Aztecan stock, like the Cahuilla, and they shared many cultural traits with the Cahuilla. A mountain division of the Serrano occupied the slopes and upland areas of the San Bernardino mountain range. The Serrano also originally occupied parts of the San Bernardino Valley. Serrano territory also included the desert region to the east of the San Bernardino Mountains out to Twentynine Palms. From there, the Serrano carried on exchange relations with the Halchidhoma by way of Pinto Basin and Rice Valley.

A number of Serrano clan communities were located along the Mojave River from its headwaters to the sinks of the Mojave near Baker ([Earle 2004, 2005] as cited in Cleland et al. 2010). These formed a desert division of the Serrano, intermarried with clans on the northern edge of the mountain division. Unlike the Mountain Serrano, the Serrano groups of the Mojave River were friends and allies of the Mojave of the Colorado, enemies of the Halchidhoma.

While the desert division of the Serrano exploited mesquite, like the Desert Cahuilla, the desert agave was absent from the desert territories of the Serrano. Various species of yucca were exploited in a manner similar to agave. Desert Serrano villages on the Mojave River did not have direct local access to pinyon and acorns but were able to procure them either through exchange or through visits to mountain area clans that had direct access to these resources. The Mojave River Serrano clan communities formed part of a long-distance exchange route that moved Olivella shell and other beads to the east, and textiles and other goods to the west, between Oraibi in northeastern Arizona and the Santa Barbara Channel. The Mojave played a key role in this long-distance trade to the Pacific (Earle 2005:12–15, as cited in Cleland et al. 2010).

Earle (Appendix B, as cited in Cleland et al. 2010) notes that the Serrano were more completely missionized than the other groups discussed in this report and that they had

largely abandoned the desert by the 1820s. Most Serrano were recruited to Mission San Gabriel, although some desert populations ended up at Mission San Fernando. After the progressive unraveling of the administration of Mission San Gabriel during the mid and late 1830s, some Serrano did return to the mountain clan territories to resume their traditional way of life. However, this revival of Serrano clan life occurred in the context of smaller populations that were concentrated in the mountain Serrano core areas. Most of the Mojave River became occupied by the Chemehuevi during this period. However, ethnographic testimony indicates that during the era of Mexican rule, there were still members of the Serrano Mamaitum clan resident at Twentynine Palms. By the late 19th century, refugee Chemehuevi had replaced the Serrano at the oasis at Twentynine Palms (Trafzer et al. 1997:68–69, as cited in Cleland et al. 2010).

The boundary between the Serrano and the Cahuilla in the mountains to the east of the Coachella Valley has been placed somewhere at or to the north of the north side of the Chuckwalla Valley. This valley is located circa 30 miles south of Twentynine Palms. The original proximity of the southern limit of Serrano territory to the Dos Palmas-Salt Creek Canyon area, perhaps as close as 13 to 15 miles, suggests that Serrano hunters or travelers may have entered the CMAGR vicinity. However, we do not have direct ethnographic testimony on such intermittent Serrano presence in the area.

Table 6. Groups Culturally Affiliated with the CMAGR.

Group	Language Family	Pre-contact Population Estimates	Traditional Territory	Traditional Alliances	Modern Communities
Cahuilla	Uto-Aztecan	6,000-10,000	Coachella Valley as far southeast as the east side of the Salton Sea lakebed	Cocopa, Maricopa, Pima, Havasupai, Walapai, Serrano, Ipai, Paipai, and perhaps Luiseno	Agua Caliente, Augustine, Cabazon, Cahuilla, Los Coyotes, Morongo, Ramona, Santa Rosa, Soboba, and Torres-Martinez
Chemehuevi	Uto-Aztecan	13,000	Mountainous regions of northeastern Colorado Desert	Mohave, Quechan, Kamia (Kameyaay), Southern Paiute, Yavapai, Western Apache, and Papayo	Chemehuevi Reservation, Colorado River Indian Tribes, Te-moak, Bishop (Lone Pine), Pahrump, Las Vegas Band of Paiute, Moapa, St. George, Twenty-Nine Palms, Agua Caliente, and Morongo
Kamia (Kameyaay)	Yuman	6,000-9,000 (Luomala 1978)	Imperial Valley from the Algodones Dunes to the eastern portion of the Peninsular Range. Settlement along the shores of Lake Cahuilla when full or in recessions	Mohave, Quechan, Chemehuevi, Southern Paiute, Yavapai, Western Apache, and Papayo	Campo, Ewiepaipe, Viejas, Barona, Sycuan, Jamul, Santa Ysabel, Mesa Grande, and San Pascual
Quechan	Yuman	3,000	Lower Colorado River corridor up and downstream of the Gila River confluence	Mohave, Kamia (Kameyaay), Chemehuevi, Southern Paiute, Yavapai, Western Apache, and Papayo	Fort Yuma

5.2 REGIONAL NATIVE HISTORY 1770-1900

The following history is sourced directly from *CMAGR Ethnographic Overview and Native Cultural Affiliation Study* written by John Lowell Bean (2010) and was minimally edited for relevance and clarity.

In discussing native groups of southeastern Desert California and the lower Colorado River, it is important to understand how such groups have historically been labeled or identified. Many so-called tribal designations used in the region can be traced to the Spanish explorations of the 1770s, particularly the travel accounts of Fr. Francisco Garcés. A consideration of the different aspects and levels of native group identity is important because of the imposition of alien concepts of tribal organization and tribal political leadership by the U.S. government in the 19th and 20th centuries. It was convenient for agents of the government to treat all manner of surviving native communities, settlements, and other groups as if they were politically centralized and ethnically distinctive tribal groups.

The location of native groups on the lower Colorado River and in the Colorado River Delta has in some cases changed significantly since the 16th century, as indicated by explorer's accounts and native testimony ([Kelly 1977:4-8; Stewart 1983b:1-2] as cited in Bean 2010). The general trend has been for a movement or displacement of groups northward within or from the delta region. This included the movement of the Kohuana, Halyikwamai, and Halchidhoma from the Baja California portion of the river and delta northward to the Palo Verde Valley region between 1700 and 1800. The Cocopa also moved from the lower delta northward closer to the modern international boundary by the 19th century.

The ethnological reconstruction of traditional social organization among Southern California groups has been made difficult by the effects of both population loss and culture change during the course of the 19th century. Both for communities that had the bulk of their populations directly absorbed into the Franciscan missions and for those further inland that did not, population loss due to outmigration, smallpox and other epidemics, and other causes, frequently had the effect of consolidating a number of different remnant clan and community populations in a single locality or settlement. This was often necessary so that these remnant clan units could continue to hold mourning ceremonies and carry out other traditional ritual activities. Such a historical process of amalgamation can obscure the precontact territorial affiliations of individual groups.

In the 19th century, the CMAGR was located in a boundary or frontier zone between a number of ethnic groups- the Cahuilla, Kamia, Quechan, Chemehuevi, and, prior to 1830, the Halchidhoma. Use of the CMAGR and immediately adjacent areas involved several types of activities:

1) travel on long-distance desert trails connecting the Coachella Valley, western Imperial

Valley, and areas southwest of Calexico with the Colorado River.

2) short or longer-term occupation of spring sites

3) exploitation of wild plant, animal and (possibly) mineral resources

5.2.1 East-West Interaction during the Spanish Colonial Period

Major and minor trail systems passed through and in the vicinity of the CMAGR. One important long-distance trail passed along the north and northeast sides of the CMAGR. This was followed

by the later route of the Bradshaw Trail. It linked the Halchidhoma of the Colorado River with the Cahuilla of the Coachella Valley and points further west. A second major trail passed southeast across the southwest foothills of the Chocolate Mountains, connecting the Coachella Valley with Pilot Knob and the Quechan villages on the Colorado River.

These major trail systems formed part of the network of trails connecting coastal southern California and interior southern California Takic groups with Colorado River communities, and, through them, with the Southwest, as discussed in preceding sections. From at least as early as the 1770s until the late 1820s, the Palo Verde Valley on the Colorado had been occupied by the Halchidhoma. As was discussed in Section 6.8, two major routes led west from their territory toward allied Cahuilla settlements--one by way of modern Desert Center and Hayfield Lake. The second headed west out of the Palo Verde Valley and passed to the south of the little Chuckwalla Mountains and past Chuckwalla Spring before turning on a northwest heading between the Chuckwalla and Chocolate mountains. The trail then rounded the north end of the Chocolate Mountains and reached the East edge of the Coachella Valley at Dos Palmas. The Halchidhomas were reported in the 1770s to have traveled to visit other tribes toward the coast, making the journey in four days (Forbes 1965:62).

In the late 18th century, the Halchidhoma were allied, at least in respect to exchange toward the coast, with both the Cahuilla and the mountain division of the Serrano (Coues 1900:II:450-451, as cited in Bean 2010). The relationship of both the Halchidhoma and the related Maricopa of southwestern Arizona with the Cahuilla was especially close. The Cahuilla intermarried with the Halchidhoma, and these marriage ties complemented those of exchange, travel, and political alliance. When the Halchidhoma were finally expelled from the Palo Verde Valley, a Chemehuevi consultant noted that only the Cahuilla had supported the Halchidhoma (Kelly 1953:24:14b, as cited in Bean 2010). He said that because of their marriage ties, they were "related" groups.

The Mojave, who frequently fought the Halchidhoma, and were allies of the Quechan, were reported by Garcés to have considered the Cahuillas to be a traditional enemy, although 20th century Mojave consultants did not recall the Cahuilla as such. However, the Desert Cahuilla of the Coachella Valley area considered the Quechan their enemies, as we shall see. This was apparently not a recent development, for Garcés commented in the 1770s that the Quechan "…have waged open (viva) war with Jalchedunes [Halchidhoma], Cocomaricopas, the Pimas Gileños, with all the nations down the river, and with the Jequiches [Cahuilla or Hak-witc] of the sierra" (Coues 1900:II:450, as cited in Bean 2010).

The animosity between the Quechan and the Halchidhoma could not have been helped by the Quechan perception that the disastrous Spanish attempt to establish both a mission and a civilian settlement at the Yuma crossing, in the heart of Quechan territory, at the beginning of the 1780s, was done with Halchidhoma connivance (Forbes 1965:79, as cited in Bean 2010). The Quechan rose up to destroy the mission and settlement on account of abuses by civilian settlers, abuses that were a direct result of the predictably faulty settlement plan developed by the military commander, the headstrong Rivera y Moncada. The subsequent interest of Gov. Pedro Fages in reopening a land link to Sonora was vetoed by Viceroy Bernardo de Gálvez in 1786, on the grounds that defeating the Apaches had to have top priority (Forbes 1965:225, as cited in Bean 2010). For the next sixty years, the Quechan continued to view with extreme suspicion anything that appeared connected with a renewed effort by Spain or Mexico to interfere in their area. Any effort to reopen the land route from Sonora to Alta California pioneered by the Anza expedition in 1774-1776 was, understandably, viewed as a mortal threat.

At least as early as the 1770s, the Cocopa, Quechan, and Halchidhoma were also involved in attempting to lay hands on horses. One means of doing this was through the exchange of war captive slaves, women and particularly children, to Spaniards in Sonora. Even in the 1770s, this was an established activity at Altar. The capture of women and children during raids was a prominent and culturally elaborated aspect of warfare among Yuman groups. The Quechan and the Cocopa, to the south of them, were traditional enemies who carried out this kind of raiding against one another. In addition to the trade in slaves, large numbers of horses had been introduced into the Colorado River delta. In that area, forage was apparently abundantly available (Forbes 1965:231, as cited in Bean 2010).

The communication between the Cahuillas and Halchidhoma during the decades after 1780 included continued exchange with coastal groups. However, the Halchidhoma, like other lower Colorado River groups, stayed away from the Franciscan missions. The missionaries, for their part, had only been able to complete their consolidation of the missionizing of coastal groups by the first decade of the 19th century. As of 1806, the mission recruitment of the Serrano was only getting underway at Missions San Gabriel and San Fernando. Even during the next decade, as substantial numbers of individuals from most Serrano communities were being recruited to Mission San Gabriel, the recruitment of Cahuillas was relatively limited. The contracting of Mountain Cahuillas to work on ranchos nearer to the coast, became more common in the 1820s and 1830s.

Increasingly, after 1806, Mission San Gabriel and other missions faced a problem of neophyte runaways crossing the frontier of Spanish control and taking refuge in sometimes distant gentile villages. This included cases of Serranos fleeing all the way to the Mojave villages on the Colorado River. During the teens, the civil war in Mexico stalled plans for a new chain of Franciscan missions further inland. At the same time the problem of native unrest grew, while subsidies from Mexico remained cut off, and the collapse of sea transport made it difficult for the missions to export the products that had resulted from the recent great expansion in the size of the mission livestock herds. The consequent failure of the plan to expand the mission system toward the interior also meant that declining mission populations of coastal Indians could not be replaced, creating a further economic crisis for the missions. In addition to the economic burden of supporting the colonists and the military, assumed by the missions once the subsidies from Mexico for the military were also cut off, the missions faced real or imagined alliances between disaffected neophytes and native groups living beyond the frontier of Spanish control. Both the unconquered native peoples of the Central Valley, and native groups of the deserts of southeastern California and the lower Colorado River, were suspected during the teens of plotting attacks against the Spanish settlements. Both the Quechan, called "Yumas" by the Spanish, and the Mojaves, were repeatedly rumored to be planning to attack. The Mojaves were said to have been induced in the late fall of 1810 to participate in a revolt at Mission San Gabriel, where they came close to attacking the mission itself, or so it was said. In 1819, after a deadly fight between a Mojave trading party and military escort troops at Mission San Buenaventura, caused by military misconduct, an attempt was made by the Spanish to send the military expedition to the Colorado River to punish the Mojaves (Earle 2005b:21-23, as cited in Bean 2010). Plans were made to build forts on the frontier, at San Gorgonio Pass and elsewhere, to keep the Colorado River Indians away.

The great exception to the fear about the menace represented by the lower Colorado River tribes was the relationship between the Spanish and the Halchidhoma. During the period of great fear of native attack from the direction of the Colorado River--1819 through 1824-- several Maricopa and

Halchidhoma chiefs ended up making state visits to coastal California. In February of 1821, the chief of a mixed Maricopa- Halchidhoma settlement on the Gila River in southern Arizona came to San Gabriel, bearing letters from the Spanish commander at Tucson. He had apparently been told about San Diego by a Cahuilla, and had wanted to pick up cotton [goods?] and shell beads on the coast. While Bancroft states that this chief was sent packing, out of Spanish fear of the 'Colorado River Indians', in fact he was given the title of General by the Spanish, and he and his nephew were sent onward to Monterey. Fr. Mariano Payeras, father president of the Alta California missions, then stationed at Soledad Mission, wrote sourly about the Maricopas visit to his establishment en route to the north (Payeras 1821, as cited in Bean 2010). In the fall of 1822, a large group of Halchidhomas arrived at San Gabriel.

These visits coincided with the appearance of young Quechan slaves in the pueblo of Los Angeles, these having been distributed or sold by the party of Maricopas and Halchidhomas. The slaves show up in the baptismal registers at Mission San Gabriel, as, for example, two Quechan girls aged 10 and 11, brought by the Maricopa chief, and finally baptized in January of 1825. These delegations would have followed one or the other of the trail routes passing into Cahuilla territory, including through the project area. Beattie states that the trail by way of Chuckwalla Spring and Dos Palmas was in fact used by the Maricopa to reach San Gabriel (Beattie 1939:14-15, as cited in Bean 2010). It is probable that these routes were also being used during this time for the conveyance of other Quechan slaves to Los Angeles by Halchidhoma and Maricopa.

5.2.2 **The Romero- Estudillo Expedition**

One element of the developing relations between the Halchidhoma and the Spanish and, later, Mexican officials of the early 1820s was the revival of plans to reopen a land route between Sonora and Tucson and Alta California. After Mexican independence, and with fears of a Spanish attempt at reconquest, egged on by the Holy Alliance, including the Russians up the coast, it seemed imperative to establish a land route that would link Upper California with insular Mexico.

In December of 1823, Captain José Romero and Lieut. José María Estudillo, undertook an expedition on the Maricopa-Halchidhoma-Cahuilla trail to the Colorado, to open a new route to Sonora. Estudillo served as diarist. The expedition was attempting to follow the route used by the Maricopas and Halchidhomas in traveling from the Colorado River in the Palo Verde Valley to the Coachella Valley and San Gorgonio Pass. Despite the fact, however, that the route to be followed was being used by Maricopa and Halchidhoma travelers to the coast, the expedition failed to get an adequate guide from these groups or the Cahuilla. The expedition made its way from Mission San Gabriel eastward through San Gorgonio Pass and past the Pass Cahuilla settlement of Wanapiapa, of the Wanikik Cahuilla (Bean and Mason 1962:36, 101, as cited in Bean 2010). After camping at Agua Caliente (Palm Springs) the expedition entered what was noted as the commencement of Cahuilla territory a league (2.6 mi.) south of Agua Caliente. From here on, the Cahuilla villages that were encountered were located in groves of mesquite. After another camp to the north of or at Indian Wells, the expedition traveled a reported 14 leagues down the valley. A standard distance value for the Spanish league-- 2.6 miles-- would appear to have placed them at the end of the day on the west side of the modern Salton Sea around Agua Dulce. A Cahuilla consultant of Bean's had suggested that the three villages mentioned during the day's travel were located in the Oasis and the Cabazon Reservation area north of Mecca. However, the route appears to have been located further southwestward and reached somewhere in the Agua Caliente area, because when the march was resumed after several days of rest it commenced to the 'northward'

(northeastward?), cutting across a salt-encrusted portion of the pre-Salton Sea dry lake bed before turning to the southeast toward Dos Palmas. One of the villages that was passed on the day's march from the Indian Wells area was called 'Los Veranitos' by the soldiers, because garden patches of maize, pumpkins, melons, and watermelons were seen there. While the expedition was resting for several days, it was visited by the Cahuilla chiefs Chiachia and Tujama Abali, who brought agave to the camp, and with whom the Spanish proposed to leave some saddle stock until the expedition's return. The chiefs expressed their willingness to accompany the expedition with armed followers, "... to fight against the Yumas [Quechans], their enemies, and against the Mojaves" (Bean and Mason 1962:38, as cited in Bean 2010). This offer was declined, and Estudillo did not attempt to secure additional guides from among the Cahuilla.

After crossing 'a great saltbed', the expedition arrived at two cienagas or swamps, a half league (1-1.3 miles) apart, located at the mouth of a canyon crossing eastward through the mountains. The second and more northerly of the two cienagas was Dos Palmas Spring, later a famous stopping place on the Bradshaw Trail. The spring, described in greater detail in a later section, is located 3.5 miles to the west of the western end of the CMAGR.

While camped at Dos Palmas, Estudillo turned over additional saddle stock to the Cahuilla chief, Cumma, for temporary safekeeping. He was told by the chief that stock could not be kept at Dos Palmas itself, because they were not secure there, since the Quechan "came that far" (Bean and Mason 1962:39-40, as cited in Bean 2010).

The expedition then headed to the northeast up Salt Creek, following a route that intermittently passes in and out of the CMAGR. They collected water at a pool of water apparently located near the mouth of a canyon leading one mile north to Canyon Spring, on the north side of Salt Creek. In the Salt Creek canyon, the expeditionnaires noted trails and paths left by Indians on foot and on horseback, both following the canyon and crossing it. Other trails were seen heading up into the mountains, sometimes with tracks a few days old. The bones of horses that had been eaten were also seen. The next day the expedition traveled in an easterly and northerly direction, finally reaching a spring they called San Pascual, having traveled eight leagues. More horse bones had been seen during the day. The following day they traveled 12 leagues through more canyons as they approached a plain to the east. During this travel, native horse and foot trails are also mentioned. At that point, the native guide became confused, and the soldiers insisted to their officers that the expedition turn back, which it did.

Bean and Mason have placed the spring of San Pascual at Palen Pass, over 20 miles to the northeast of Desert Center (Bean and Mason 1962:41, as cited in Bean 2010). However, the description of the canyons and rough country through which the expedition continued to pass suggests that somehow the expedition had continued to wander in the mountain canyons to the west of Desert Center and Chuckwalla Valley. From Desert Center east to the Palo Verde Valley and the Colorado River, the Chuckwalla Valley provides a broad and flat avenue for travel, and it is hard to believe that the expedition ever got to the north or east of Desert Center.

Estudillo noted in his diary that at the San Pascual spring, evidence was seen of use of the place as a native camp site. Evidence of recent native basket making was evident, as well as pieces of ollas and horse bones. Because of the basket, Bean and Mason speculated on possible Cahuilla occupation of the area (Bean and Mason 1962:102-103, as cited in Bean 2010). Lower Colorado River Yuman groups such as the Halchidhoma or Quechan were not involved in basketry manufacture during this era. Both the broken ceramics and the horse bones could indicate a range

of different groups visiting the spring, although a Cahuilla camp, rather than Halchidhoma or Maricopa travelers, was most likely associated with the deposition of the ceramics. The spring was located to the west of a pass and open plain that was checked out with Estudillo's telescope (Bean and Mason 1962:43, as cited in Bean 2010).

On the return journey, the party appears to have visited the main spring at Canyon Spring, at the head of a mile-long canyon branching to the north of Salt Creek. There the bones of a horse killed a few days before were found. Estudillo's expedition diary then describes rejoining the main trail, and "crossing to the first swamp [cienaga], which we did at 9:30, arriving in its vicinity at 2:30 in the afternoon, which is a ranchería of the Cohahaguillas" (Bean and Mason 1962:45, as cited in Bean 2010). Estudillo had reached the southerly of the two cienagas in the Dos Palmas area, which he indicated was a Cahuilla settlement. (Bean and Mason 1962:102-103, as cited in Bean 2010). Nearby, the next day, a Cahuilla chief or captain and a portion of his group arrived to gather reeds for basketry or matting. The next day, the expedition departed the Dos Palmas region for "the rancherías of the Cohahaguillas" located beginning about 7 leagues further to the west, in the mesquite thickets located on the valley floor. After resting at "los veranitos" village, the expedition took 9 hours to travel to the rinconada south of Agua Caliente, and a further 7 to reach Agua Caliente the next day, though travel was slow because of the terrible condition of the horses and mules. Estudillo described the territory of the Cahuillas as extending over 22 leagues from Agua Caliente southward to "the Palms and the salt flats".

It was subsequently decided that the Cahuilla-Maricopa route from San Gorgonio Pass to Arizona was not as feasible a route for communication with Sonora as a lower route from San Diego through the western Imperial Valley to a crossing around Yuma. Plans to build and garrison a fort at San Gorgonio Pass, to protect the Cahuilla-Halchidhoma-Maricopa route were abandoned. A fort was instead established among the Imperial Valley Kamia, at a lake on the New River that was dubbed 'Laguna Chapala', in December of 1825. This was meant to protect the route to the Colorado River across the Imperial Valley. Local Kamias were hired to help build the fort. However, at the beginning of April of 1826, the small detachment left to garrison the fort was attacked, apparently by Kamias, and 3 soldiers killed (Bean and Mason 1962:83-86, as cited in Bean 2010). Shortly thereafter, there were several battles between Kamia/Kumeyaay communities allied with the Mexicans, and others ranged against them. References in Heintzelman (1857:40, as cited in Bean 2010) and Bean and Mason (1962:83-87, as cited in Bean 2010) to Kamia groups fighting one another appear to refer to this era. In addition, several punitive expeditions were sent from San Diego to the Imperial Valley and the Colorado River to avenge the attack. The fort, nevertheless, was not re-established.

5.2.3 **Stock Raiding, Migration, and the Mission Frontier**

These events, and the struggle to establish the land route to Sonora, took place in the context of a generalized pattern, in the 1820s, of neophyte flight from the missions and the related stock raiding by native groups from beyond the frontier, with the connivance of Christianized Indians. This stock raiding would become even more of a problem in the 1830s and 1840s, as the rancheros and their operations moved further inland, and would continue long after the imposition of American rule in the late 1840s. In the regions inland from San Diego, and in adjoining areas in Baja California, native populations had had a long history of resistance to Spanish and Mexican rule, and stock raiding became an important element in this tradition.

In the late 1820s, a major showdown between the Quechan and Mojaves on the one hand, and the Halchidhoma and their Kohuana 'guests' on the other, led to the virtual expulsion of the Halchidhoma from the Palo Verde Valley, apparently in circa 1827-1828, as mentioned previously. The time frame for this famous event was not always recalled in identical fashion by native consultants whose groups were witnesses to it. Nevertheless, it was probably at around this time that the Mojaves and Quechan combined to drive the Halchidhomas away from the River, or at least most of them. Remnant Halchidhoma populations ended up living among the Maricopa on the Gila. Although Spier suggested that this Halchidhoma presence among the Maricopa was a late innovation, declarations by the Maricopa 'General' who visited San Gabriel in 1821 makes clear that some Halchidhoma were already living among the Maricopa at that date. Along with the Halchidhoma expulsion was the sequestering among the Mojave of a remnant Kohuana population for about five years before they moved down to the Yuma region and beyond, as I have previously noted. The expulsion of the Halchidhomas from the region from Parker south to the Palo Verde Valley was followed in the early 1830s by what the Mojaves claim was an invitation to the Chemehuevi to settle the river bottom portions of the Chemehuevi Valley, north of former Halchidhoma territory. In addition, the Chemehuevi occupied former Halchidhoma river bottom territory south of Parker in the Parker Valley and in the northern Palo Verde Valley. Quechan settlers, for their part, occupied much of the southern three-quarters of the Palo Verde Valley, where Major Heintzelman found them in 1852. This occupation is discussed at greater length below.

During the later 1820s through early 1840s, the Desert Cahuilla region, the Imperial Valley, and the Palo Verde Valley remained generally undisturbed by outside settler invasion or major military intervention. The perceived difficulties of desert travel that had been so hard on Estudillo's horses and mules had discouraged long-distance expeditions into the deserts to curb stock raiding. These occurred only very infrequently. However, the Pass and Mountain Cahuilla had been drawn increasingly into the orbit of the Mexican settlements by this time. While baptisms at Mission San Gabriel continued in the late 1820s and early 1830s, at least some of those baptized may have subsequently left the mission. Much larger numbers of Cahuillas were seasonally or permanently migrating to Mexican ranchos nearer the coast. These migrants were generally not required to abandon their native beliefs and customs. Father Zalvidea at Mission San Gabriel was incensed that at the Yorba Rancho on the lower Santa Ana River, Cahuilla workers at the ranch were allowed to cremate their dead with traditional ceremonies. Both Cahuillas and large numbers of Luiseños and coastal Kumeyaay/ Diegueño were participating in this migration, sometimes also having family members baptized at either Mission San Gabriel, or the Los Angeles Plaza Church, opened in 1826. During this era, the non-mission demand for native labor increased sharply as the sea trade of animal products (hides and tallow) to New England boomed, and the acreage devoted to non-mission grazing in southern California expanded. Both official and usufruct grazing holdings were taken up further and further inland by the late 1830s and early 1840s. This penetration of stock, particularly cattle, into the interior, caused increasing hardship for remnant native groups that had not been completely removed to the Franciscan missions. The Luiseño and Cahuilla, the groups with the largest populations still village-resident, were both affected by this expansion of herding inland. The effective loss of the western portion of the Mountain Cahuilla territory in areas like Winchester-Hemet-San Jacinto was to cause increasing hardship.

The expansion of stock raising was accompanied by a great increase in stock raiding by native groups with occasional help from foreign Mountain Men from the Great Basin. The longer-distance raiding of saddle stock was more notorious during this era ([Phillips 1993; Earle 2005a,

2005b] as cited in Bean 2010). Herds of such stock could be carried away to the near or distant Great Basin, or to the lower Colorado River. Cows were more difficult to move great distances in a hurry, and could not be sold on the New Mexico market. Yet cows also disappeared in ones and twos in frontier areas where both horses and cows were becoming an ever more important item in the native diet.

In the Pass Cahuilla region, a major incident occurred in late 1834, when the San Bernardino Rancho operated by Mission San Gabriel was attacked, apparently by Cahuillas. By the 1840s, the authority of Chief Cabezón, based in the Indio area, was being recognized by both Desert Cahuillas and Euro-Americans. He had more or less peacefully brought to a halt a punitive expedition led down into the Coachella Valley by Benjamin Wilson in 1845 in search of a native murderer (Woodward 1934:92, as cited in Bean 2010). San Gorgonio Pass was not, at this time, viewed as a major gateway for native stock raiders. At the same time, stock was being grazed at the north end of the Coachella Valley, salt was being packed out of deposits in the dry lakebed in the southern valley by Mexicans, and oasis irrigation agriculture was spreading among the Cahuilla on the valley floor.

Temporary or seasonal out-migration by desert Cahuilla can also be observed for this era. The Romero expedition account mentions, for example, encountering two non-Christianized desert Cahuillas who had worked on non-mission ranchos toward the coast (Bean and Mason 1962:32-33, as cited in Bean 2010). Several prominent chiefs, including Juan Antonio of the Mountain Cahuilla and Cabezón of the Desert Cahuilla, came to play the role of middlemen between the Whites and the Cahuillas. By the late 1840s, Juan Antonio became an ally of the Mexican rancheros of the interior, and provided resettled Mountain Cahuilla warriors to help contain stock raids by Chemehuevi, Utes, and others through Cajon Pass. Juan Antonio eventually established a large Cahuilla community at San Timoteo Canyon west of Banning. This settlement numbered in the hundreds in 1860, but was devastated by a smallpox epidemic in 1862-1863 that killed Chief Juan Antonio (Christian 2002:170-174, as cited in Bean 2010).

5.2.4 **American Rule**

The most important early developments of this period were the invasion of California and its later annexation by the United States in 1848 and the California Gold Rush, which followed closely thereafter. These events led to a huge influx of population into a province whose total non-native population had numbered around 10,000. A further expansion of stock grazing and other agricultural production took place at this time, as demand for products for the northern California mines caused a boom in the southern counties.

The new American regime led to attempts in San Diego County to tax the Luiseño and Kumeyaay/ Diegueño by seizing their livestock. This led to the organization of an attempted revolt by Antonio Garra, which involved the Kamia chief Gerónimo, as well as the Quechan. The Mountain Cahuilla were widely suspected of showing considerable interest in participating. However, the Mountain Cahuilla chief Juan Antonio, closely allied with the Lugo family and its rancho interests, was instrumental in helping crush the revolt. The hard feelings between the Cahuillas and Luiseños, exacerbated by the Temecula Massacre in 1847, when the Cahuilla had killed a number of Luiseño at the behest of their Californio Mexican allies, had made cooperation unlikely.

Hard on the heels of the revolt came the signing of treaties between representatives of the U.S. Government and the Luiseño and Cahuilla at Temecula, in January of 1852. The treaty was signed

by Juan Antonio and 12 other Cahuilla chiefs. The terms of the treaty promised the setting aside of a large domain within interior southern California, including the bulk of Mountain Cahuilla territory, as protected reservation lands, and the provision of agricultural implements, foodstuffs, and other materials to the native communities. Unfortunately, the treaty was never ratified by the U.S. senate on account of opposition by newly arrived California settlers, many of them Scotch-Irish Southerners who had little use for native people or for government authority. The Cahuilla and their leaders felt betrayed, and during the next several years there were rumors and reports of Cahuilla plans to revolt.

What particularly underlay the turmoil was a forced increasing subsistence dependence on horticulture and animal herding for the Mountain Cahuilla and for surviving Pass Cahuilla groups, discussed above. This dependence was a product of population movements, both voluntary and involuntary, and the impact of cattle and White hunters on wild plant and animal resources. Gardening and stock-raising were means of cushioning the impact of the decreasing availability of traditional resources. Yet this strategy was also under assault. White cattle and squatters were harassing the Cahuilla as they attempted to garden, and their cattle were stolen. In addition water sources were being seized, or water diverted further upstream, damaging Cahuilla crops. On account of the hunger that this was causing, White cattle were appropriated to eat, leading to more conflict. Chief Juan Antonio and other chiefs appealed to Indian Affairs Commissioner Manypenny, for federal help and protection ([Burton 1857, Phillips 1975:134-136, Williams 1856] as cited in Bean 2010).

In November and December of 1853, both the Coachella Valley and the southern Imperial Valley were explored by a mixed military-civilian Pacific railroad survey party (Blake 1856:91-123, as cited in Bean 2010). The team had been given the task of identifying possible routes for a railroad to be built from the Mississippi Valley to the Pacific. Geologist William Blake described the route followed by the survey party through the Cahuilla rancherías of the Coachella Valley. Blake's party traveled some 12 miles from Agua Caliente to "Deep Well" (Pozo Hondo), located in the vicinity of Palm Desert, passing an abandoned native barley field on the way. Blake's account makes clear that "Deep Well" was located some miles northwest of and up-slope from the point of the mountain ridge projecting northeastward into the valley where "Indian Wells" or Kavinish was located (Blake 1856:97-98, as cited in Bean 2010). This mountain ridge could be seen by the party looming on the right after it left "Deep Well". After camping at "Deep Well", the next day the expedition headed 13 miles east-southeast and passed several Indian trails and then several native rancherías on the valley floor, virtually hidden in the mesquite thickets. At a principal ranchería where grass for grazing was most abundant, the party stopped for the night. This would appear to have been Martinez. This settlement was located about 10 miles north of Travertine Point and 35 miles northwest of Salt Creek (modern Arroyo Salada [sic], near Salton City), on the west side of the valley.

The following day, the expedition traveled southeast along the west side of the valley, passing the ranchería of Agua Dulce and the ancient shoreline at Travertine Point. After a dry camp, the explorers then found water the next day at Arroyo Salada. After a day's rest, they headed south past San Felipe Creek to the Yuma- San Diego emigrant road at Carrizo Creek. They then traveled from Carrizo Creek 21 miles westward to Vallecito, then 18 miles further westward to San Felipe, finally reaching Warner's. At San Felipe a native rancheria was encountered, where gardens were seen along a creek, and mesquite collecting was also being carried out.

The expedition, meeting up with additional survey personnel, then retraced its steps toward the desert, eventually traveling from Carrizo Creek to Big Lagoon, a distance given as 25 miles. (Later in the decade, an intervening stop at Sackett's Well had been established, 15 miles west of Big Lagoon). Big Lagoon, later called Diamond Lake, may have been the site of the Laguna Chapala fort of 1825-1826. It was located on the New River channel, with the Little Lagoon (Blue Lake) and its mesquite thicket located "a mile or two" to the east of it, also on the river. The expedition then headed 26 miles east to Alamo Mocho, on the Alamo River channel, another Kamia settlement area. A new variant of the trail diverted from the old route to run along a portion of the New River, which had high water in 1849 and 1852, although Blake stated that his party stayed on the old route. A water stop was established on the new variant route that was later called New River Station, with a well and lagoon on the river channel, 15 miles east of Big Lagoon. The route followed by Blake also apparently passed Indian Wells, also on the New River, approximately five miles east of Big Lagoon. This was an important Kamia settlement site.

In the trek east from Big Lagoon, Blake's route veered south into Mexico to intersect the Alamo River, reaching Alamo Mocho at Beltran Slough. Alamo Mocho had a 20 ft. deep well. A lagoon on the Alamo River channel a half-mile to the southwest was reported in an 1861 account (Davis 1897:712-713, as cited in Bean 2010). Some 18 miles to the east of Alamo Mocho was a watering and camping place known to Blake as Mesquite Wells, and later called Salt Wells or Seven Wells, a series of shallow wells in an extensive Mesquite woodland that extended for many miles to beyond Cook's Well. Some 4 1/2 miles further southeast was the site of the later well-known watering place of Gardner's Well, not visited by Blake. The next water stop, Cook's (or Cooke's) Well, was located 7 miles east of Mesquite Wells. East of Cook's Well, the mesquite woodland along the trail continued until gradually replaced by cottonwood and willow within 6-7 miles of the Colorado River. The trail led to the principal Quechan settlement of xuksíly (Algodones), below Pilot Knob, which was supplied with an abundant spring (Blake 1856:107-112, as cited in Bean 2010). The expedition continued to the east to arrive at the military post established at the Yuma Crossing in 1850.

Blake's account and those of others using the route westward from Yuma in the 1840s and 1850s suggest rather great variability in water availability. This had to do with the fact that not only the overflow of the Colorado River but also local late summer or winter storm runoff contributed to water supplies in the New River and Alamo drainages. Thus it was that the New River was dry in June of 1849, but abundantly supplied with water in September of that year.

From the commencement of the Gold Rush through the Civil War and the early 1870s, the routes described by Blake from Yuma to San Diego and Yuma to Warner's Hot Springs and Los Angeles had been frequently traveled. The Butterfield Overland Stage had used the Yuma- Warner's route during its brief existence in the late 1850s ([Lawton 1974, Northrop 1956] as cited in Bean 2010). These routes became less important with the building of rail nets in the California deserts in the 1870s and 1880s.

5.2.5 **The Palo Verde Valley in the 1850s-1890s**

The Palo Verde Valley extends from the Blythe Intake in the north some 35 miles to Cibola in the south. The valley is approximately 10 miles wide at its widest point. The southern end of the valley around Cibola fronts on Milpitas Wash. This wash extends some fifteen miles to the west of the river and intersects the eastern boundary of the CMAGR. Further north, a trail that passed the east side of the CMAGR reached the river in the vicinity of the modern community of Palo Verde.

From Blythe, in the northern portion of the valley, another trail headed westward via Desert Center to pass by the northern end of the CMAGR.

The reshuffling of ethnic groups in the Palo Verde Valley after 1830, previously discussed, would have important implications for occupation and use of desert areas to the west of the valley, including the Chocolate Mountains. At its southeastern end the CMAGR approaches within a little over 10 miles from the Colorado River. Further north, Milpitas Wash and Wiley's Well Wash extend westward between the CMAGR to the west southwest and the Chuckwalla Mountains to the west northwest.

After the expulsion of the Halchidhoma and the Kohuana, dated to circa 1828, the Quechan came to dominate much of the valley. Nevertheless, along with the Chemehuevis at the north end of the Valley, there were groups of Mojaves that also established themselves in the valley at different times, as previously mentioned. Native testimony suggests that Quechan groups had moved into the Palo Verde Valley region relatively soon after the expulsion of the Halchidhoma. However, our first eyewitness accounts of Quechan settlements in the Palo Verde Valley date from the early 1850s. After the establishment of the U.S. military post at Yuma, military forays were made up the river, including one in September of 1852 that visited the Palo Verde Valley settlements. These were reported as located on the Colorado River between 45 and 60 miles north of Yuma, as noted previously.

As of the mid-1850s, the lower Colorado River and the Palo Verde Valley region, along with much of the California portion of the Sonora Desert, was plat surveyed by survey parties under contract to the General Land Office (Brown 1856, as cited in Bean 2010). The 1855-1857 surveys of the region below Palo Verde and the Riverside-Imperial County boundary appear to have encountered few native people resident in the valley on the California side of the river. This may have been partly due to the fact that at the south end of the valley the river ran close to the California side of the river bottom. North of modern Palo Verde, surveyor Brown described the California side of the valley as heavily settled by Yumas, Chemehuevis, and Mojaves, although ranchería locations were not described. The Yumas were noted as being the most numerous. In some areas adjacent to the river, the survey party was obliged to suspend work on the laying out of section lines due to native opposition. The use of compass and transit among the gardens of the natives caused the latter considerable anxiety (Brown 1856:425-426, as cited in Bean 2010).

The account of the Ives steamboat expedition up the Colorado River in January and February of 1857 indicates that 'Yumas' (Quechan) were encountered again once the Palo Verde Valley was entered from the south, north of Lighthouse Rock and Draper Lake.

In the 1860s, after the establishment of American military jurisdiction on the lower Colorado River, a mining boom on the east side of the Palo Verde Valley and elsewhere in western Arizona, disrupted native settlement of the valley. The general smallpox epidemic affecting native groups in Southern California in the 1870s also struck native populations along the Colorado River, including the Palo Verde Valley (Laird 1976:xxi,44,49, as cited in Bean 2010). In the 1880s, Quechan occupation of the valley waned, with Quechans returning downriver to their core settlements, as mentioned previously. A large number of Chemehuevis, around 300, were living in the vicinity of the later town of Blythe in the northern valley in the early 1880s. Some were involved in helping Thomas Blythe and O.P. Calloway to build the first irrigation system on the lower Colorado River at the Blythe Intake. After Calloway was killed by a Chemehuevi in 1880, this Chemehuevi population later dispersed from Blythe (Laird 1976:71, 248, as cited in Bean

2010). Both the nearby Colorado River reservation at Parker, Arizona, created in the late 1860s, and the Chemehuevi Valley were destinations for these Chemehuevis.

5.2.6 The Coachella Valley Cahuilla, the Bradshaw Trail, and the Chocolate Mountains

The mining boom on the east side of the Colorado River at La Paz and, later, Ehrenberg, had a major impact not only on the Palo Verde Valley but also on the Cahuilla of the Coachella Valley. At the very beginning of the Colorado River mining excitement in the early summer of 1862, William Bradshaw laid out a new route for wheeled vehicles to reach the Palo Verde area, as previously discussed. This route followed a native trail system along the northern and eastern perimeter of the CMAGR. The trail was described as it existed in June and July of 1862 by the detailed account of a would-be miner named J.H. Riley (Riley 1862, as cited in Bean 2010). The account provides another description of native use of the desert region, including the north and east sides of the Chocolate Mountains.

The party in which Riley traveled included William D. Bradshaw himself. After trekking from Los Angeles and San Bernardino, it passed from San Gorgonio Pass to Agua Caliente. In the account it was said that the residents of Agua Caliente were 'Serrano' Indians. It was noted that here an American named Rush Dickey had recently been killed by Indians, and a fight had taken place between Americans sent to arrest his killers and Indians, with two of the latter having been killed. Agua Caliente was described as comprised of a number of huts belonging to 200 Indians, who irrigated maize, wheat, barley, watermelon, and other crops. Water from the both the hot springs and a cold stream flowing from the San Jacinto Mountains was turned onto the crops there. All but three of the inhabitants, having seen the party approach the day before, had retired to a canyon some distance further back on the trail, 'for fear of another disturbance'. This apparently referred to the Dickey incident, which must have been recent. The travelers were asked to keep their stock out of the Indians' crops. A shade ramada was rented to several of the travelers at 12 1/2 cents per head, and other native residents arrived to trade corn fodder and wheat for flour and tobacco, and to assist with chores. The visitors were careful that their evening campfire did not ignite the rented but "uninsured" ramada.

Late the next night, the party reached the 'Ranchería de los Toros', as they called it. It was located south of the road, along which a grassy meadow was found, and in the midst of extensive stands of mesquite. Under its Captain, José Ignacio, the community was said to cultivate some 200 acres of wheat, barley, maize, watermelons, cantaloupes, and other crops. And it was noted that of the five oasis settlements in the desert region, Toros was the largest in areal extent, although probably not having as large a population as Martinez. While at the settlement, the travelers watched a stubble field being fired to drive out the rats and rabbits.

The party then set out for Dos Palmas, said to be 20 miles distant. It passed through the large settlement of Martinez, named for its Captain, Martinez, five miles to the east of Toros. Off to the left or north, about midway between Toros and Martinez, was said to have been the ranchería of Cabezón. Five miles beyond Martinez and two miles to the right or south was said to be located the last ranchería on their route, called "sweat house". This may have been the settlement of Alamo Bonito. The population of the Coahuilla Indians of the valley, not counting the "Serranos" at Agua Caliente, was placed at 800. This population was said to be peaceful and to recognize Cabezón "as their head chief and supreme authority". It was said that Cabezón was a chief of great dignity and rare abilities, who never spoke to the Mexicans or Americans except through an official interpreter.

The name Cabezón was allegedly given him by Mexicans because of the unnaturally large size of his head.

About 12 miles from the Sweat House, the party reached Lone Palm, with its sulphurous springs. To the south of Lone Palm lay the "dry lake" of the Salton Sink, encrusted with 3-4 feet of salt, in a bed estimated to be thirty miles long by 8-10 miles wide. This was referred to as located adjacent to the "Coyote Mountains"-- that is, the northern Chocolate Mountains. Eight miles from Lone Palm, the party reached Dos Palmas, where a very large spring watered some 60 acres of tule. Two or three miles to the south of Dos Palmas were reported two other large springs. One was said to be salty, but the other, called St. John's Well, 50 ft. in circumference, contained fresh water. Both springs were surrounded by dense growths of tule and canes. A mile to the left or northwest of Dos Palmas was another smaller spring said to have the best quality water in the area. By the next year, a station was established at the spring, and Indians, apparently Cahuillas, were hired to cut grass in the surrounding hills to provide fodder. The Dos Palmas springs area contained mesquite woodland, which supplied the travelers with firewood.

The party then departed Dos Palmas for 'Brown's Pass', or the canyon of Salt Creek. They reached the turnoff for Frink Springs and the direct road to Ft. Yuma. It was said that beyond Frink Spring, 15 miles to the southeast, there was no further water for another 70 miles until reaching Ft. Yuma. It was noted that appropriations had been made to establish a stage route to Ft. Yuma along this right-of-way, with the establishment of stations and digging of wells, but that nothing had come of it.

A mile beyond the turnoff for Frink Spring, the trail entered the canyon of Salt Creek, or "Brown's Pass". A place called "Water in the Cañon", 10 miles east of Dos Palmas, modern Canyon Spring, was the next objective. This consisted of a canyon leading north a mile into the sierra, providing access to three springs. The first, with the best water, was located on the east side of the canyon some 200 yards from its mouth. At the head of the right-hand branch of the canyon, at a mile distance from the mouth, was a large spring with tule growing around it. Near the head of the left branch of the canyon was a small spring impregnated with copper and believed to be poisonous. Heading eastward up Salt Creek canyon the next day, the party then followed Bradshaw's directions in turning southeast into a side canyon, en route to Taba-saca well, seven miles from "Water in the Cañon". The writer of the account noted that this was a deviation from Frink's map showing the route surveyed by Col. Washington in the mid-1850s. The latter route would have followed the Salt Creek canyon to the northeast over the pass, and 20 miles from the canyon, to a natural water tank between two rocky pinnacles. Then 8 miles to "Brown's Well", Dry Creek, and 35 miles further to the Colorado. It was noted that the only seemingly reasonable explanation for Bradshaw and Grant having laid out a route by way of Taba-Saca, was that they were following Indian guidance in doing so, and the Indians were guiding them by way of the only water sources that they knew of. This hints that the water tank and Brown's Well may have been intermittent in the former case and recently dug in the latter, such that the Bradshaw route followed the traditional native trail.

The spring of Taba-saca was located south of the canyon trail and provided relatively small volumes of water. Bradshaw had said that the native name meant "Point of the Mountain", as he had apparently been informed by native people. Two prominent mountain peaks could be seen just to the southeast of the tank. A subsequent description of the tank mentions the presence of tortoise remains left by the Indians (Fairchild 1933:12, as cited in Bean 2010).

The party then departed the next morning for Chuckwalla Spring. Galleta grass and much cholla were observed during the journey. Chuckwalla Spring was reached approximately 40 miles from Dos Palmas. A mile up-canyon from this spring, several others were successfully dug by travelers. At this spring were Indians referred to as Chumas [Chemehuevis], as discussed previously. Quail, rabbits, hares, and tortoises congregated at the spring, and it was surmised that the hunting of these animals was one of the attractions of the spring. It was noted that tortoise carapaces were scattered about the spring in great numbers. A later account mentions that mesquite stands were found at the spring (Bancroft 1933:9, as cited in Bean 2010). Bancroft's guide to the trails leading to the Colorado River mines also mentions native people at this spring supplying galleta grass to travelers (Bancroft 1933:10, as cited in Bean 2010).

Riley's description of the trail ends at this point. His conversations at Chuckwalla Well with the other miners returning from the Colorado River convinced him that to continue on to La Paz, at least at that season, was not advisable.

Subsequent accounts of the Bradshaw route indicate that native laborers, most certainly Cahuillas, were being employed at Dos Palmas to gather animal fodder and perform other chores. As has been mentioned previously, it appears that Cahuillas were living at or near Dos Palmas in the late 1860s. During most years between 1863 and 1877, stagecoaches were run on the trail between San Bernardino and the Colorado River. This prompted the first permanent white settlement on the Coachella valley floor, as stagecoach swing stations were established to provide the coaches with fresh horses at various Cahuilla villages. From Agua Caliente (Palm Springs) southeastward, stage stations were established at Indian Wells, Toro Station, and Martinez Station. Additional stations further to the southeast in the Chocolate Mountains and Chuckwalla Mountains regions were Dos Palmas, Canyon Springs, Chuckwalla Well, and Mule Spring Station. In addition to the stage service, freight wagons and travelers on horseback added to the traffic across the valley. Added to this, a little over a decade later, was the construction of the Southern Pacific main railroad line from Los Angeles through San Gorgonio Pass and the Coachella valley to Yuma, and thence to Texas and the East. This line was completed in 1877. Thus in the space of about 15 years, the Desert Cahuilla habitat was transformed from one of relative isolation to one where transcontinental travelers and the infrastructure that moved them were part of the valley scene.

The flow of outsiders through the region beginning with the Colorado River gold rush in the summer of 1862 may have helped spread measles and smallpox among the Cahuilla. Fairchild observed a measles epidemic in the Coachella Valley Cahuilla villages he passed through at the end of August of 1862. He saw children sick with the disease, and other children who had died of it being cremated in their houses (Fairchild 1933:13, as cited in Bean 2010). A smallpox epidemic spread from Los Angeles to the San Bernardino area and to the settlement of Juan Antonio (Sahatapa) in San Timoteo Canyon in the fall of 1862. The flood of miners who crowded into southern California en route to Arizona may have contributed to this outbreak.

5.2.7 **The Desert Cahuillas under American Rule**

From the beginning of the 1850s, Juan Antonio and other Cahuilla leaders had bitterly complained about the failed ratification of the Temecula treaty, and about the nonfulfillment of promises for material assistance and the set-aside of Cahuilla lands from settlement. In the 1860s, the needs of the Los Angeles and San Diego region native communities received greater attention from the Bureau of Indian Affairs. Government distributions of agricultural implements and other goods were made to Cahuilla Chiefs, for example, in 1867. By this time, Indian agents in Southern

California were particularly concerned about unscrupulous individuals who were using liquor to buy native crops at a 50 percent discount. Money earned by some Coachella valley Cahuillas through providing fodder or other resources to the stage stations was also finding its way into the hands of the liquor purveyors. The Indian agent for Southern California looked at this as one of the most important problems that he had to deal with (Stanley 1867-1868:113,115; as cited in Bean 2010). This also extended to attempts to use liquor to get native people to 'sell' their lands. He noted that in many Southern California native communities, agricultural productivity was sufficient for local needs as long as the purveying of liquor or other problems did not interfere.

The increasing White intercourse with the Desert Cahuilla, did not, however, lead to a major invasion of settlers during the 1870s nor did the subsequent land boom of the mid and late 1880s. In the 1880s, Agua Caliente began to be transformed into Palm Springs, a health resort catering to victims of that late 19th century scourge, tuberculosis. However, the difficulties of arranging gravity flow irrigation in the area, the expense of steam well pumping, problems of alkali soil in the valley floor artesian zone, and the summer heat situation combined to discourage early emigrants. Beginning in the 1870s, several of the Coachella Valley oases were recognized as federally-protected reservations, including Toro (or Torres) and Cabazon, both in 1876. In 1891, the Torres-Martinez Reservation was greatly expanded in size, and 1893 the Augustine or Twentynine Palms Reservation near Indio was created.

These developments coincided with a second major smallpox epidemic occurring during the mid-1870s. This caused significant mortality among the Cahuilla, Serrano, Chemehuevi, and other groups ([Bean, Vane, and Young 1991:29, Ramon and Elliot 2000:601-602,607-609] as cited in Bean 2010). The 1870s epidemic mortality effectively ended generalized use of native labor in agriculture in the greater Los Angeles- San Bernardino area. It also caused widespread movement of kin groups among the mountain and desert divisions of the Cahuilla.

After the arrival of the railroad, many Desert Cahuilla worked for the Southern Pacific or were employed as woodcutters chopping down the mesquite woodlands of the valley for railroad use or shipment by rail out of the valley. Some Cahuillas also worked at a large salt works in the Salton Sink. By the time that fossil-fuel powered reciprocal well pumps became widely available in the area after the 1896-1904 drought, more settlers began to arrive in the valley, part of a larger pattern of settler penetration into the eastern California deserts from circa 1908 through the end of the 1920s. By this time, the Cahuilla had lost water access at a number of their oases, and traditional village sites had been abandoned. This had occurred from 1880 through the beginning of the 20th century. The final drop in valley water table was due to the double impact of the prolonged drought at the end of the century, and the pumping of water in the valley after the turn of the century.

Partly as a result of the breakup of these older oasis garden settlements, several of the reservation communities faced long and difficult legal and political struggles to retain title to their reservation lands. In the case of the Cahuilla of Agua Caliente, whose reservation sat in the middle of Palm Springs, repeated attempts were made to steal their increasingly valuable reservation lands. Only in the 1960s did the political climate begin to change so as to offer hope of respect for native proprietorship.

By the 1860s and 1870s, the Chocolate Mountains area, like other mountain ranges in the region, was combed over by prospectors looking for precious metal ores or other mineral values. This led to the opening of several mines in the southern Oracopia Mountains, close to Dos Palmas. The mining firm in charge had arranged to pipe water from the Dos Palmas Oasis (Henderson 1947:4,

as cited in Bean 2010). The stage stations on the road from the Coachella Valley to La Paz were abandoned after the cessation of regular stage service in 1877 while this route on the northeast side of the Chocolate Mountains continued to be used by wagon traffic, the stations with their permanent residents were gone.

By contrast, the ancient route along the southwest margin of the Chocolate Mountains, controversial and relatively little used in the 1850s and 1860s, was literally put on the map with the building of the railroad in 1877. As was the railroad practice in that era, sidings with water dispensing facilities, and perhaps with resident track repair crews, were located along the line every 7 to 10 miles. This arrangement was important in assuring a regular supply of fuel and particularly of water for the steam boilers. The siting of the stations took advantage of previously existing water sources, and wells were drilled. With the greater availability of water along the route, and the added margin of safety represented by the proximity of the wagon road to the railroad right-of-way, this became a popular wagon route to the Colorado as well.

In the Chocolate Mountains themselves, activity was limited to sporadic mining prospects and operations. The most important of these was the development of mines at the south end of the CMAGR at Tumco in the 1880s (Brown 1923:258, as cited in Bean 2010). Several wagon roads were developed at Salvation Pass and Surveyor's Pass, which provided access from the Imperial Valley towards the Palo Verde Valley.

The locations and movements of Kamia local populations in the era before the building of the Southern Pacific line along the east side of the Imperial Valley in the 1870s has been discussed previously. After this time, some Kamia were resident near the Colorado River, or on the Mexican side of the frontier, or had dispersed out of the Imperial Valley region. By the beginning of the Imperial Valley settlement boom after 1900, only scattered native Kamia survivors were found in the region. These depended on the local agricultural economy for employment as a means of survival.

5.2.8 **Twentieth Century**

After the turn-of-the-century, land irrigation development schemes succeeded in turning the Imperial Valley into an important area of agricultural settlement and production in California (Frisby 1992:29-52). The valley floor was crisscrossed with irrigation canals fed by the Colorado River. Imperial Valley also succeeded eventually in seceding from San Diego County and establishing itself as a separate county jurisdiction. One of the major events associated with the development of the Imperial Valley was the inadvertent flooding of the Salton Sea Basin in 1905, during construction of an irrigation diversion canal from the Colorado River. The flooding displaced the former salt works established at Salton and forced the Southern Pacific railroad to move its flooded right-of-way to higher ground further to the northeast.

The development of the Imperial Valley as an agricultural district had led to the development and growth of towns such as Calexico, El Centro, Brawley, Holtville, and Niland. This development, particularly after the turn of the century, had provided employment to Yumas and Kamias living in the Yuma-Somerton region, and Cocopas from further south in the Colorado Delta. Kroeber's Mojave consultant Jo Nelson recalled that when the overflow from the Colorado River filled the Salton Sea in 1905, both Kamia and Yumas were in the area of the Imperial Valley and were startled witnesses to the first inflow ([Kroeber n.d.; Reel 104:Fr. 166] as cited in Bean 2010) During the period when a portion of the flow of the Colorado was diverted to the Salton Sea, the

Cocopas had faced great hardship because of low floodwater levels in the Colorado Delta. They were forced to look for work on the American side of the international boundary. While the Quechan had been granted reservation lands on both sides of the Colorado River, the Kamia were not granted reservation lands in any of their former areas of occupation west of the Colorado River. In the early 20th century, Kamia were found resident both in Yuma and in Calexico, where a mixed Kamia-Cocopa population could be found.

5.3 POST-CONTACT AND NON-NATIVE SETTLEMENT

Current knowledge of the history of the California Colorado Desert is considered in detail elsewhere (Cleland and Wahoff 2006) and is summarized below.

5.3.1 European Exploration

The Spanish were the first non-Native people to venture into the region surrounding the Chocolate Mountains. As early as 1539, the Spanish began to explore parts of California. Spanish exploration for the next 200 years was intermittent in this area as it was considered remote and difficult to access. In the 1700s, expeditions led by Father Francisco Garcés (1771), Pedro Fages (1772), and Captain Juan Bautista de Anza (1774) established overland routes, opening up the region to travel (Beck and Haase 1974). However, the desert conditions were too harsh for large-scale, permanent settlement.

The overland route established by de Anza provided the principal route for Mexican soldiers and U.S. settlers traveling through Arizona to San Francisco after the turn of the nineteenth century. Small-scale placer mining was also undertaken from the late eighteenth into the nineteenth century. This localized prospection was only a fraction of what was to come for the region. The discovery of gold in California in 1848 brought an influx of emigrants from the east into California. A wagon road established along de Anza's southern route was used by gold rush emigrants from the east into California, followed by a mail route and a stage line along this same route. In 1857, Dr. Isaac Smith surveyed a route from Dos Palmas along the east side of the Salton Basin to Yuma, circumventing the Chocolate Mountains. In 1862, William Bradshaw scouted an overland stage route from San Bernardino to La Paz, Arizona. The trail skirted the northern and northeastern edges of the Chocolate Mountains. By 1868, the Castle Dome cutoff from Smith's route through the Chocolate Mountains was in use.

5.3.2 Development

Development in the Colorado Desert was largely dependent on transportation and water. Early transportation routes consisted of a c. 1852 wagon road from Fort Defiance in Arizona to the future home of Fort Mojave on the Colorado River, and the Bradshaw Trail, which was used extensively between 1862 and 1877 to haul miners and other passengers to the gold fields at La Paz. The introduction of railways in 1872, with the construction of the Southern Pacific Railroad from Los Angeles to present-day Indio, and eventually, Yuma, brought significant changes to the area.

Many of the railroad stops along the route developed into small communities, among them Dos Palmas and Frinks near the western boundary of the present-day CMAGR. The second transcontinental railroad, the Southern Pacific and the Atchison, Topeka, and Santa Fe railroads, were linked in 1881, providing quick and easy access to the region for settlers and for miners to the Chocolate Mountains, Cargo Muchacho Mountains, and Palo Verde Mountains. Mining was

at its peak in the southeastern Colorado Desert between 1890 and 1910, and again during the depression era of the 1930s (Morton 1977; Rice et al. 1996). Within the Chocolate Mountains, the heaviest mining activity was in the southeastern half of the mountain range.

The Imperial Valley is part of the trough stretching from the Coachella Valley to the Gulf of California and lies within Riverside and Imperial counties. During most of the nineteenth century, a lack of viable water sources kept the Imperial Valley from being settled. The California Development Company began agricultural development and initiated canal construction in the lower Imperial Valley—then known as the Salton Trough or Salton Sink—during the late 1890s. A canal, constructed in 1901 along the old Alamo River channel, carried water from the Colorado River to the area. Some 1,500 acres of crops were planted that year. Populations increased in the area and, in 1905, El Centro was established. Attempts to cut a new channel, to relieve silting of the Alamo Canal, led to the accidental flow of the Colorado River into the Imperial Valley between 1904 and 1907, creating the Salton Sea. The threat of floods was reduced by the completion of Hoover Dam on the Colorado River in 1935 (Henderson 1968:18). Construction of the Coachella Canal from 1936 to 1940 brought water to the east side of the Imperial Valley (Figure 5).

Figure 5. A Main Lateral Irrigation Ditch. Imperial County, California (Lee 1942).

As automobile transportation became increasingly important, the idea of an all-weather, transcontinental highway gained popularity. In the early twentieth century, civic and business leaders quickly perceived the benefits of bringing routes and roads to their communities. Around the country motor clubs, civic, state, and interstate associations organized to promote various, competing routes such as the Ocean-to-Ocean Highway, Pikes Peak Ocean to Ocean Highway, the Dixie Overland Highway, the National Old Trails Road Ocean-to-Ocean Highway, the Southern

National Highway, the Old Spanish Trail, the Lincoln Highway, and the Jefferson Davis Memorial Highway among others. Promoters of the Southern National Highway were thwarted in their efforts to create a direct route from San Diego to the east by the shifting sands of the Algodones Dunes, alternatively called the Imperial Sand Hills. A solution was found in 1915 when a single car lane surface of wooden planks, known as the Plank Road, was constructed across approximately seven miles of shifting dunes. The Plank Road was replaced with an embanked, paved road in 1926 (Weingroff 2017). Also constructed in 1915, the Ocean-to-Ocean Bridge over the lower Colorado River replaced the old ferry system. The new bridge, coupled with the Plank Road supplied an uninterrupted highway route connecting Yuma, AZ, Holtville, CA, and San Diego (Weingroff 2017). Today both the old Plank Road and the Ocean-to-Ocean Bridge are listed on the NRHP.

5.3.3 **History of the CMAGR**

Activity in the Colorado Desert changed focus during World War II (WWII). General George S. Patton, Jr., established the Desert Training Center (DTC)—later changed to California-Arizona Maneuver Area (CAMA)—for training in desert survival and warfare for conflicts in Northern Africa. Encompassing some 18,000 mi^2 (46,619 square kilometers) in southeastern California, western Arizona, and southern Nevada, the DTC included Camp Young and ten divisional camps (Henley 1989:8). Camp Young, the administrative headquarters of the DTC, was situated near what is now Chiriaco Summit. By 1944, focus began to shift away from training for desert combat, but the land around the Chocolate Mountains still holds physical traces of this period in the form of "tank tracks, tent pads, rock constructions, fox holes, and ration cans" (Cleland and Wahoff 2006: 96).

In addition to the desert training associated with Patton, the Chocolate Mountains became the site for a Marine Training Center called Camp Dunlap, which later became the CMAGR (Beck and Haase 1974:88). The CMAGR land and airspace have served as a bombing range since WWII. In 1966, the cantonment for the CBM was constructed in the western CMAGR. The CBM serves as a training camp for the Navy SEALs. The utility of the CMAGR for training has not diminished since the end of the Cold War and remains its primary purpose today.

6 NATIVE AMERICAN CONCERNS

Tribal consultation on the CMAGR began in 1990 with the cultural resources survey of the Special Warfare Desert Training Facility, now known as Camp Billy Machen. MCAS Yuma continues to consult with tribes on Section 106 undertakings and Section 110 surveys on the CMAGR (Table 7, see also Appendix E.7 in Volume II of this ICRMP). This includes tribal governments representing the following cultural affiliations: Cahuilla, Chemehuevi, Cocopah, Kumeyaay (Kamia), Maricopa (Halchidhoma), Mojave, Quechan, Tohono O'odham, and Yavapai (see also list in Section 1.3 of this document). Provided here is a summary of the concerns expressed by tribal representatives and some of the recent consultation efforts of the MCAS Yuma Cultural Resources Program for the treatment and preservation of prehistoric and Native American cultural resources present on the CMAGR. Information presented below was sourced from the *Cultural Affiliation Study for the Chocolate Mountain Aerial Gunnery Range* (Cleland et al. 2010), reports

from cultural resource management surveys completed on the CMAGR (Table 7), and documentation provided by MCAS Yuma.

Native American representatives support survey efforts to inventory the prehistoric and Native American cultural resources present at the CMAGR as these sites are understood to represent tribal history. While tribal groups understand that change is inevitable, they would like to continue working with MCAS Yuma to document and save Native American history as best as possible. The treatment of human burial remains and related materials is of paramount concern to all involved. The protection of site CA-RIV-2460 is a priority for tribal groups and the MCAS Yuma Cultural Resources Program, as well as being mandated by NAGPRA. MCAS Yuma recognizes that such sites strongly related to the connection between modern Native American communities and their ancestors should remain inviolate.

The MCAS Yuma Cultural Resources Program has been in active consultation with tribal entities on numerous projects, including some of the following recent successes. In 2017, the CRM worked with the United States Geological Survey (USGS) to find a location for a proposed Earthquake Early Warning Sensor on the CMAGR that would avoid cultural resources. Since the proposed location had been surveyed 40 years prior, there was a concern that there could be resources present that had not met the 50-year threshold for site documentation at the time of the original survey (von Werlhof and von Werlhof 1977). As a result, the CRM resurveyed the area and also hosted a requested tribal site visit where the project and local resources were discussed (James 2017).

In preparing for meaningful consultation with affiliated tribes in the CMAGR regional study area, the MCAS Yuma Cultural Resources Program understands that culturally affiliated groups often express heritage concerns for broad territories that span the entire region (Forbes 1965; Forde 1931; Kroeber 1925). The traditional cultural connection to the regional landscape is expressed in many ways. One key expression is the concept that all places within the landscape are interconnected in an essential way so that damaging one place damages the whole; for example, “the Quechan note that all the sites in their traditional range are connected spatially, culturally, and spiritually. They should not, therefore, be considered as isolated occurrences, but rather as part of a greater network of cultural heritage. As such, effects to one site create effects on all the others” (Woods et al. 2001:20). Thus, Native American concerns may extend to sites that otherwise might be assessed as nonsignificant, and the MCAS Yuma Cultural Resources Program keeps this in mind during consideration of potential projects within the CMAGR. As an example, a Section 106 survey in 2018 resulted in the recording of five historical-era sites and several isolated occurrences (IOs) (Knighton-Wisor et al. 2018). Although only one IO, a prehistoric ceramic sherd, was the type of resource of concern to the tribes, the CRM conducted formal consultation in case tribal groups had other significant knowledge of the area.

The MCAS Yuma Cultural Resources Program supports providing consulting tribes with opportunities to comment and provide input on projects within the CMAGR that might impact tribal resources. For example, MCAS Yuma conducted Section 106 tribal consultations and NEPA outreach on an EA regarding high explosive ordnance expenditure and supersonic flights. CA SHPO later concluded that Section 106 was not triggered by this undertaking and declined to comment.

Native American tribes of the lower Colorado River travelled widely over large, highly arid expanses, and travel was a central aspect of traditional culture and a key adaptation to the hyper-arid environment (Forbes 1965; Forde 1931; Kroeber 1925). Motivations for travel included social

visitation, shared utilization of productive subsistence resources patches, religious pilgrimages, trade, and warfare. Major trails are often cited as one of the elements that connect this regional landscape together. Not only did trails facilitate long-distance travel, but they are seen as marking the routes ancestral Native Americans took from the time of creation to arrive within their traditional territories, and are thus closely tied to tribal identity (Forbes 1965). The ability to know and traverse these landscapes was central to traditional culture. Thus, the continued effort to document and preserve these trail systems are key heritage concerns of the MCAS Yuma Cultural Resources Program. There have been several examples of successful tribal consultation recently completed regarding Native American trail systems. During tribal consultations in 2014, a tribe requested assistance from MCAS Yuma to locate the third (last) of three trails significant to the tribe, which they believe crosses BLM-managed land east of the CMAGR. To this end, that following year the CRM directed the necessary funding to contract a survey of a corridor near the eastern boundary of the CMAGR. The survey resulted in the recording of two Native American trails whose trajectories suggest they cross adjacent BLM-managed lands (Knighton-Wisor et al. 2016). Another survey in 2019 involved tribal consultation regarding potential Native American trail locations within the project area, as part of MCAS Yuma's efforts to document and preserve trail systems (Miljour et al 2019). Trail GIS data was acquired from a consulting tribe and provided to the survey crew for investigation, although no trails were visible on the ground during survey or in aerial data investigations.

MCAS Yuma is engaged in ongoing consultation with tribal entities regarding a project involving SWATs 4 and 5. During the review of the Draft Environmental Assessment (EA) for the Range Redesign of SWATs 4 and 5, the CRM discovered that the proposed project included more ground disturbing activities than previously communicated by the project coordinator. The CRM assessed that it would not be possible within the original EA timeline to accomplish the necessary tribal consultation on archaeological sites within the areas affected by the new requirements. It was determined that the best way to properly conduct meaningful government-to-government consultation without negatively impacting the EA timeline was to develop a Programmatic Agreement (PA) to guide the Section 106 process. The CRM worked with internal stakeholders from USMC Headquarters, NAVFAC, MCIWEST, and NSW to ensure the PA met the mission training needs. The CRM consulted with tribes and CA SHPO during the drafting of the PA. The CRM invited the ACHP to consult with MCAS Yuma on the development of the PA and to be a Signatory Party of the final document, but they declined to participate. MCAS Yuma successfully executed the PA for SWATs 4 and 5 in February 2016. Tribal consultations under the PA have included: six field trips with three tribes, visiting various sites within SWATs 4 and 5; meetings and phone calls with cultural representatives from tribal entities; and a meeting with a Tribal Council. Consultation, training, and annual reports will continue until construction of the training areas is complete

7 CULTURAL RESOURCES OVERVIEW

A review of MCAS Yuma's files, records, and databases was completed to compile an inventory of relevant prior cultural resources surveys, previously recorded sites, and constructed facilities, and their NRHP eligibility statuses.

7.1 OVERVIEW STUDIES AND ARCHAEOLOGICAL INVESTIGATIONS

Cultural resources surveys are one of the most valuable tools in MCAS Yuma's CRM program. Such surveys facilitate planning by delineating areas of the CMAGR that contain archaeological sites or historical buildings, informing the CRM's recommendations to leadership and project planners concerning proposed locations. Such inventories also help with identifying the risk, expense, and investment of time that must be incurred by a project to avoid or mitigate impacts to significant sites. Following is a discussion of select overview studies, archaeological survey reports, and historical building evaluations in the vicinity of the CMAGR.

7.1.1 Early Investigations

The earliest archaeological investigations in the region were recorded by Malcolm J. Rogers (1890-1960). Rogers was one of a handful of pioneers in the development of a scientific, chronologically-oriented archaeology in southern California. His data and ideas still influence contemporary understandings of the region's prehistory. It was during his affiliation with the San Diego Museum of Man between 1919 and 1945 that Rogers conducted archaeological investigations in and near the CMAGR in conjunction with his surveys of the 12 m (40 ft) shoreline of Paleolake Cahuilla and his interest in surveying Native American trails. Rogers recorded numerous village and habitation sites along the shoreline. Some of these sites are within or in proximity to the CMAGR, mainly in the area between the present-day community of Niland and the Imperial/Riverside county border.

After Rogers, the first known archaeological work at the CMAGR was conducted by E.W. Shepard, who in 1949 recorded Tabaseca Tanks (CA-RIV-384) in the northern part of the CMAGR. Single sites and small clusters of sites continued to be documented by individuals, college groups, and members of local museums into the 1990s. The first major post-Rogers survey effort that included the CMAGR was initiated in the 1950s by the Archaeological Survey Association (ASA), University of California, Redlands. In the early 1970s, Charles M. McKinney, a National Park Service archaeologist, assessed a large area in the southwestern portion of the CMAGR as part of a study by a special task force established by the Secretary of the Interior (Murtagh n.d.; Volume II: Appendix B). Based on this work, an archaeological district, encompassing much of the southern portion of the Chocolate Mountain Range (R-2507S), was determined to be eligible for the NRHP in September 1973 by the Secretary of the Interior. McKinney visited the area as part of a Geothermal Land Leasing Program. Unfortunately, the records of his work appear to have been lost. A map of the district and some associated correspondences were appended to the Environmental Assessment Withdrawal of the CMAGR, Naval Air Facility, El Centro, California, which was prepared by the Naval Facilities Engineering Command, Western Division (n.d.; refer to Volume II Appendix B of this ICRMP).

7.1.2 Cultural Resources Management Surveys and Reports

Most archaeological surveys and assessments conducted within the approximately 460,000 acres that comprise the CMAGR have been performed as a consequence of Sections 106 and 110 of the National Historic Preservation Act as amended (Table 7). Section 106 requires that MCAS Yuma consider the effects of its undertakings on historic properties by identifying those properties potentially affected, assessing those effects, and "seek[ing] ways to avoid, minimize, or mitigate any adverse effects on historic properties" (36 CFR 800.1). Consequently, MCAS Yuma conducts archaeological survey of areas that may be potentially affected by projects such as the construction of new targets, landing zones, support facilities, access roads, utility corridors, etc. Section 110 directs federal agencies to identify and evaluate historic properties on federal lands and to appropriately manage historic properties under their direct control or ownership. This requirement, along with the mandate to minimize harm to National Historic Landmarks, is often a key consideration in federal property master planning. The history of archaeological investigations on the CMAGR can be understood as a reaction to these compliance requirements and evolving approaches to satisfy them.

According to MCAS Yuma's cultural resources database, approximately 77,804 acres, or seventeen percent of the CMAGR, have been subjected to archaeological survey (Figure 6).

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Legend

- Chocolate Mountain Aerial Gunnery Range Boundary
- Chocolate Mountain Archaeological District (as mapped in NAVFAC Western Division n.d.)
- Intensive Pedestrian Survey Area
- Sample Survey Area (von Werlhof and von Werlhof 1977)

0 Meters 10,000

0 Feet 40,000

N

Created: March 4, 2020

1:324,006

NAD 1983 UTM
Zone 11 North

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

Figure 6. Surveyed Areas of the CMAGR.

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Table 7. Previous Cultural Resources Investigations on the CMAGR.

MCAS Yuma Report Number.	Title	Citation
CMAGR-1977-001	Archaeological Examinations of Certain Portions of Chocolate Mountains	(von Werlhof and von Werlhof 1977)
CMAGR-1990-001	Environmental Assessment for Archaeological Resources: Results of an Archaeological Records Search for the Chocolate Mountain Aerial Gunnery Range and a Cultural Resource Survey of the Special Warfare Desert Training Facility	(Smith 1990)
CMAGR-1991-001	Cultural Resource Survey of the Eagle Mountain Mine and the Kaiser Industrial Railroad	(Bull et al. 1991)
CMAGR-1992-001	Cultural Resource Survey Report, Chocolate Mountain Aerial Gunnery Range, Imperial County, California	(Diehl and Johannesmeyer 1992)
CMAGR-1992-002	Archaeological Inventory for a Small Parcel in the Chocolate Mountain Aerial Gunnery Range	(Mitchell 1992)
CMAGR-1993-001	Cultural Resource Survey of the Proposed Route of the Southern Cal Gas Line 6902	(Broeker and Padon 1993)
CMAGR-1993-002	Two Sides of the River: Cultural Resources Technical Studies Undertaken as Part of Environmental Documentation for Military Use of the Marine Corps Air Station, Yuma Training Range Complex in Arizona and California	(Woodall et al. 1993)
CMAGR-2000-001	Cultural Resources Survey Report for the Niland to Blythe Powerline Replacement Project, Imperial County and Riverside County, California	(Pigniolo et al. 2000)
CMAGR-2001-001	Archaeological Survey of Four Targets on the Chocolate Mountain Aerial Gunnery Range, Riverside and Imperial Counties, California	(Leach-Palm 2001)
CMAGR-2002-001	Cultural Resource Survey of Six Areas on the Chocolate Mountains Aerial Gunnery Range, Imperial County, California	(Wahoff et al. 2002)
CMAGR-2002-002	Evaluation of 24 FARP Archaeological Sites and Assessment of Training Effects, Chocolate Mountains Aerial Gunnery Range, Imperial County, California	(Apple and Deis 2002)
CMAGR-2003-001	Archaeological Survey of the Sniper Range at Camp Billy Machen Chocolate Mountains Aerial Gunnery Range Imperial County, California	(Underwood 2003)
CMAGR-2005-001	Chocolate Mountain Aerial Gunnery Range: Cultural Resources Survey of 12 Targets and Monitoring of 14 Archaeological Sites	(Apple and Shaver 2005)
CMAGR-2006-001	Cultural Resources Inventory, Site Monitoring, and Historic Resources Verification for Chocolate Mountain Aerial Gunnery Range, Imperial and Riverside Counties, California	(Apple et al. 2006)
CMAGR-2007-001	Archaeological Survey for the Chocolate Mountain Aerial Gunnery Range Central Training Area, Marine Corps Air Station Yuma	(Shalom 2007)
CMAGR-2007-004	Siphon 8 Bivouac Upgrade	(Lawson 2007)

MCAS Yuma Report Number.	Title	Citation
CMAGR-2007-005	United States Department of the Interior Bureau of Land Management Cultural Resource Report Naval Special Warfare SWAT-5 Ground Mobility Training	(Queen 2007)
CMAGR 2008-001	Installation of Eight Wildlife Drinkers in the CMAGR	(Lawson 2008)
CMAGR-2009-001	Archaeological Survey of Access Roads in the Chocolate Mountain Aerial Gunnery Range (CMAGR), Imperial County, California	(Schaefer et al. 2009)
CMAGR-2009-002	Archaeological Survey and National Register Evaluation for a Supplemental Magazine Project Camp Billy Machen, Imperial County, California	(Wahoff and Jow 2009)
CMAGR-2009-003	Archaeological Survey for Shallow Temperature Gradient Test Holes, Desert Warfare Training Facility, Chocolate Mountain Aerial Gunnery Range, Imperial County, California	(Wahoff 2009)
CMAGR-2010-001	Archaeological Survey of Nineteen Proposed MV-22 Osprey Landing Areas; Chocolate Mountains Aerial Gunnery Range, Imperial County, California	(Austerman et al. 2010)
CMAGR-2010-002	Archaeological Survey Report for the Salton Seismic Imaging Project, Imperial, Riverside, San Bernardino, and San Diego Counties, California	(Mirro et al. 2010)
CMAGR-2010-003	Spring Hill Archaeological Monitoring Report Riverside County, California	(Wahoff 2010)
CMAGR-2011-001	Results of a Class III Cultural Resources Survey for Three Geophysical Test Sites in SWAT-4, Chocolate Mountains Aerial Gunnery Range, Imperial County, California	(Schaefer and Dalope 2011a)
CMAGR-2011-002	Results of a Class III Cultural Resources Survey to Support the P-771 Facility Improvements and Material Storage Facility at Navy Seals Camp Billy Machen, Chocolate Mountains Aerial Gunnery Range, Imperial County, California	(Schaefer and Dalope 2011b)
CMAGR-2011-003	Results of a Class III Cultural Resources Survey of 6,933 Acres in SWAT-4, Chocolate Mountains Aerial Gunnery Range, Imperial County, California.	(Schaefer and Dalope 2011c)
CMAGR-2013-001	Cultural Resource Survey Special Warfare Training Area 4 and 5 Chocolate Mountain Aerial Gunnery Range, Imperial and Riverside Counties, California	(Rudolph et al. 2013)
CMAGR-2013-003	Archaeological Survey Report of Sixteen Proposed Military Aircraft Landing Zones on the Chocolate Mountain Aerial Gunnery Range Imperial County, California	(Bryne 2013)
CMAGR-2014-001	Archaeological Survey Report of Target Complex Invader Chocolate Mountain Aerial Gunnery Range Imperial County, California	(Bryne 2014)
CMAGR-2014-002	Addendum to the Special Warfare Training Areas 4 and 5 Survey Report: Cultural Resource Survey SWAT 4 Chocolate Mountain Aerial Gunnery Range, Imperial County, California	(Broockmann and Rudolph 2014)
CMAGR-2014-003	Letter Report for Imperial Buttes Mine Fence	(James 2014)
CMAGR-2015-001	Archaeological Survey of 16.5 Acres for the Proposed Utility Line Replacement Project near the CMAGR, Imperial County, California	(Dougherty and Broockmann 2015)

MCAS Yuma Report Number.	Title	Citation
CMAGR-2015-002	Archaeological Survey Report of Negative Findings - CMAGR Drinkers: Rut Tank, Mart Tank, and Rock Tank	(James 2015a)
CMAGR-2015-003	Archaeological Survey Report of Negative Findings - Killdeer/Finch Landing Zone Expansion	(James 2015b)
CMAGR-2016-001	Archaeological Survey of 1,210 Acres on the Chocolate Mountain Aerial Gunnery Range, California, for Marine Corps Air Station Yuma, Arizona	(Knighton-Wisor et al. 2016)
CMAGR-2017-001	Archaeological Survey Report of Negative Findings - Earthquake Early Warning Sensor	(James 2017)
CMAGR-2018-001	Archaeological Survey of 1,198 Acres for the Proposed Salvation Pass MV-22 Landing Zones on the Chocolate Mountain Aerial Gunnery Range, California	(Knighton-Wisor et al. 2018)
CMAGR-2018-002	Archaeological Survey of 5,821 Acres on the Chocolate Mountain Aerial Gunnery Range, California, for Marine Corps Air Station Yuma, Arizona	(Miljour et al. 2019)
CMAGR-2018-003	Letter Report for CMAGR Flights EA	(James 2018)

7.1.2.1 Von Werlhof and von Werlhof 1977

The first large-scale archaeological survey of lands within the CMAGR conducted in efforts to comply with federal regulations was led by Jay von Werlhof of the Imperial Valley Desert Museum (von Werlhof and von Werlhof 1977) (Figure 6). The survey was not in response to a proposed undertaking, but rather a nascent inventory effort. Approximately 360 sections (230,399 acres) of land in the southern portion of the CMAGR were surveyed, but only about five percent of this area was intensively covered. The von Werlhofs' deployed a sampling survey methodology designed to evaluate the archaeological potential of four topographic zones defined as upper levels of mountains, canyon bottoms, canyon mouths, and alluvial fans and terraces. A total of 183 sites were identified, mostly on alluvial plains and paved terraces. The entire subject area yielded 2.2 sites per square mile, yet the terraces contained a much greater concentration with 18.5 sites recorded per square mile (von Werlhof and von Werlhof 1977:40).

This investigation provided the most comprehensive treatment of resource types and their distribution to date. Unfortunately, 7.5-minute series USGS topographic quadrangle maps were not available at the time of the von Werlhof survey, and as a result, documentation of these efforts at the Southeastern Information Center have been plagued with site number and mapping problems. Subsequent surveys on the CMAGR have updated site information on some of these sites.

7.1.2.2 Investigations conducted during the 1990s

During the 1990s, five intensive pedestrian surveys were conducted within the CMAGR (Broeker and Padon 1993; Bull et al. 1991; Diehl and Johannesmeyer 1992; Mitchell 1992; Smith 1990) (Figure 6). These surveys were prompted by a land change with the BLM, gas pipeline installation, and various small construction projects. Combined, these efforts surveyed approximately 4,861 acres and 30 linear miles (48.3 km), and identified eight sites and six IOs (Broeker and Padon 1993; Bull et al. 1991; Diehl and Johannesmeyer 1992; Mitchell 1992; Smith 1990; Woodall et al. 1993) (Table 7).

The field studies conducted in the CMAGR portion of the 1993 Woodall et al. study were designed to address three cultural resource concerns. The first was to assess the applicability of the von Werlhofs' site distribution model to the northern portion of the CMAGR. The second focus of the study was to assess the extent of ground disturbance within operations areas. And lastly, several sites recorded during the von Werlhof and von Werlhof (1977) survey were reexamined to identify impacts since their initial recording.

Ten transects totaling 218 acres were intensively surveyed. Two previously unrecorded sites were encountered, CA-RIV-4884, a prehistoric lithic scatter containing a number of individual knapping stations, and CA-RIV-4835, a historical period debris scatter that also contains several tent locations as well as a hearth. (Woodall et al. 1993). Initial interpretation was that the northern portion of the CMAGR appeared to contain fewer prehistoric cultural resources than the southern region. Though substantial ground disturbance was observed in areas where close air support activities occurred, relocated sites displayed little to no disturbance from military land use activities (Woodall et al. 1993). Erosion appeared to be the major impacting element in some areas of the CMAGR, but several modern trash dumps and landfills were also observed.

7.1.2.3 Historic and Archaeological Resources Protection Plan for the CMAGR (Apple and Cleland 2001)

A HARP for the CMAGR was prepared in 2001.The management program prescribed under HARP called for four specific goals: the prioritization to survey those areas with greatest potential for impacts to cultural resources, a regional research design to guide inventory and evaluation efforts, a monitoring program to ensure that avoidance procedures are effective, and the reinitiation of consultation regarding the Chocolate Mountain Archaeological District (Apple and Cleland 2001). Heading the list of areas with the most potential for impacts were the areas adjacent to the targets and access roads. Implementation of the recommendations led to three surveys addressing these areas (Apple and Shaver 2005; Leach-Palm 2001; Wahoff et al. 2002). Each survey included a 200 m (656.2 ft) buffer around selected targets. In 2005, a site monitoring program outlined under the CMAGR HARP Plan was initiated in conjunction with the survey of twelve target buffers (Apple and Shaver 2005). In addition to identifying sixteen previously undocumented sites, fourteen known cultural resource sites were visited. Most of the monitored sites were found to be in the same general condition as when the resources were first recorded. Although ceramics have rarely been documented on the CMAGR, the 2005 survey recorded over 100 sherds of Lower Colorado Buff Ware in three pot drops (Apple and Shaver 2005).

7.1.2.4 Regional Archaeological Research Design for Chocolate Mountain Aerial Gunnery Range (Cleland and Wahoff 2006)

As recommended in the HARP, a Regional Archaeological Research Design (RARD) was prepared for the CMAGR (Cleland and Wahoff 2006). This RARD attempts to systematize the management of cultural resources on the CMAGR. The document outlines regional research issues that can be addressed via cultural resource management work and provides a context with which to assess significance under the NRHP (36 CFR 60). Regional research issues identified in this RARD include:

- Chronology and culture history,
- Prehistoric settlement patterns,
- Cultural mobility and interaction, and
- Land use patterns (both prehistorical and historical).

These research issues, and questions drawn from them, form the basis for evaluating the significance of cultural resources found on the CMAGR (Cleland and Wahoff 2006).

7.1.2.5 Cultural Affiliation Study for the CMAGR (Cleland et al. 2010)

The CAS for the CMAGR was conducted in accordance with Section 110 of the NHPA and in support of NAGPRA, AIRFA, Executive Order 13007 (*Indian Sacred Sites*), and Executive Order 13175 (*Consultation and Coordination with Indian Tribal Governments*). The study presents overviews of the history, culture, and indigenous peoples of southeastern California. The CAS identifies the cultural groups that may have inhabited or made regular use of lands and locations now encompassed within the CMAGR through consultation with contemporary Native American groups and a review of ethnographic literature. The CAS also seeks to characterize what types of cultural activities took place and specific areas and locations where these events occurred. By engaging with contemporary Native American groups, the CAS provides a forum for their concerns regarding the management of cultural resources on the CMAGR to be documented. It is

hoped that this document will aid MCAS Yuma in the ongoing process of government-to-government consultation with tribes that might be affected by operations on the CMAGR (Cleland et al. 2010).

7.1.2.6 MCAS Yuma Archaeological Survey and Report Standards and Guidelines (2016)

Beginning in 2016 cultural resources surveys conducted on the CMAGR were performed according to the *Marine Corps Air Station Yuma Archaeological Survey and Report Standards* (Volume II: Appendix C). These standards serve to supplement the California Office of Historic Preservation (OHP) *Instructions for Recording Historical Resources* and *Archaeological Resource Management Reports (ARMR): Recommended Contents and Format* for all cultural resources surveys performed on the CMAGR (Knighton-Wisor et al. 2016, 2018; Miljour et al. 2019). MCAS Yuma Standards and Guidelines dictate that Arizona State Museum (ASM) site-recordation standards be used in lieu of California Department of Parks and Recreation (DPR) guidelines. The implementation of these standards is meant to provide consistency between the CMAGR in California and the BMGRW in Arizona, as both ranges are managed by MCAS Yuma.

Four cultural resources surveys have been conducted to date that comply with *Marine Corps Air Station Yuma Archaeological Survey and Report Standards* (2016) including Knighton-Winsor et al. (2016), James (2017), Knighton-Winsor et al. (2018), and Miljour et al. (2019). Combined, these surveys encompassed approximately 8,220 acres, identified thirty-four sites, and recorded 886 IOs (James 2017; Knighton-Wisor et al. 2016, 2018; Miljour et al. 2019).

7.2 RECORDED CULTURAL RESOURCES

A review of files, records, documents, and other data from MCAS Yuma was conducted to compile an inventory of relevant previously recorded sites and constructed facilities, and their NRHP eligibility statuses.

7.2.1 Historical Buildings and Structures

There are currently seventeen military buildings and structures present on the CMAGR. The oldest were constructed in 1991 with more recent additions, such as canopies, installed as recently as the 2010s. As none of these buildings or structures exemplify an exception to the 50-year threshold prescribed in *Criteria Consideration (g)* of the NRHP (a property achieving significance within the past 50 years if it is of exceptional importance), nor have they reached 50 years of age, they are not of sufficient age to be evaluated for NRHP eligibility.

7.2.2 Traditional Cultural Properties

TCPs are defined in Parker and King (1990) as places of special heritage value to contemporary communities because of their association with the cultural beliefs or practices that provide a foundation for those communities and provide a basis in maintaining cultural identity. It should be noted that not all TCPs are related to Native American sacred sites; the term is applied to any traditionally used site, regardless of cultural affiliation. It should also be stated that a great deal of knowledge regarding specific TCPs is likely unavailable to non-Native American researchers, as the Native American community often maintains such information as confidential.

Much of the effort to identify the TCPs on the CMAGR lies in consultation with affiliated tribes. The Native American community may assign cultural significance to land and other kinds of

natural resources on a broad scale, or may focus on discreet locations. These TCPs may also cover a range of resource types, from geographic features to traditional resource gathering areas.

No TCPs have been identified within the CMAGR by Native American groups with ties to the area. However, as inventory efforts continue, resources may be found that qualify as TCPs. Site types consistent with the TCPs identified in the region include burials, caches, *tinajas*, pictographs, geoglyphs, and rock features such as alignments and petroglyphs. However, the determination of a resource as a TCP must be made by the federal agency after government-to-government consultation with concerned tribes. It is the USMC policy to not ask the tribes to identify TCPs. If any were to be identified during consultations for an undertaking that may have an adverse effect on a TCP, MCAS Yuma would not store any data on TCP location.

7.2.3 Chocolate Mountain Archaeological District

As mentioned above, an archaeological district encompassing a large area in the southern portion of the CMAGR was determined to be eligible for the NRHP in September 1973 by the Secretary of the Interior. The original nominating materials and evidence have since been lost, but a map of the district and some associated correspondences were appended to the "Environmental Assessment Withdrawal of CMAGR, Naval Air Facility, El Centro, California" which was prepared by the Naval Facilities Engineering Command, Western Division (see Volume II: Appendix B of this ICRMP). Using this map, the boundaries of the here-to-fore uncharted archaeological district have been mapped (Figure 6). The dimensions of the original district extend beyond the current boundaries of the CMAGR. The district encompasses 109,616 acres within the CMAGR. Approximately 8,219 of these acres have been surveyed resulting in the recordation of 119 archaeological resources.

7.2.4 Archaeological Sites and Isolated Occurrences

According to MCAS Yuma's current cultural resources database, there are 361 recorded archaeological sites located within the CMAGR (Table 8). Prehistoric sites outnumber historical-period sites on the CMAGR. The prehistoric resources found on the CMAGR include an array of precontact cultural remains, including lithic and ceramic artifact scatters, temporary habitation sites, rock features and rock art, prehistoric trails, probable cremated human remains, and other sites. These prehistoric resources document the continuous use of the CMAGR from its earliest known inhabitants of the Paleoindian period through the time of Euro-American exploration and settlement. Previously documented historical resources located within the CMAGR include WWII-era military bombing targets, military training camps, historical-period trash scatters, roadways, evidence of mining activities, ranching, campsites, and historical-period artifact scatters.

The inactive Eagle Mountain Railroad is within the CMAGR along its western and northern boundaries. In 1990, a 200-foot-wide corridor was surveyed for cultural resources along the entire length of the railroad, but no resources were recorded within the CMAGR boundary. At that time the railroad itself was not old enough to be NRHP eligible (Bull et al. 1991). In 2012, a portion of the railroad on the CMAGR was recorded as a historical-period railroad during a survey and was given the site number CA-RIV-11581 (Rudolph et al. 2013). The site was not evaluated for the NRHP at that time since it was determined that the proposed undertaking would not affect the site. Presently, it is slated to be destroyed with permission from the BLM and the site will be removed

from the MCAS Yuma inventory when the appropriate documentation is received from the BLM and CA SHPO.

In 2018, however, A&K Railroad Materials, Inc. (A&K) purchased the rails, railroad ties, and other materials within the Right of Way (ROW) from Eagle Mountain Mine and Railroad, LLC. (EMMR). A&K had been removing the railroad materials pursuant to a temporary license to access the ROW granted by EMMR. The company had a significant impact on the lands as it removed the tracks, potentially affecting natural and cultural resources. Upon this discovery, MCAS Yuma worked with the BLM to halt the removal of the railroad materials from the ROW within the CMAGR until A&K implemented a Biological Monitoring Workplan. This included updated Worker Environmental Awareness Program training for their employees on the project.

Appendix G in Volume II lists previously recorded cultural resources sites within the CMAGR based on MCAS Yuma's current cultural resources database. The list provides MCAS Yuma's site number and corresponding California site number, the NRHP eligibility determination, references for the original site recordation and any updates, and a brief description of the recorded resource. Copies of SHPO correspondence regarding eligibility determinations can be found in Volume II: Appendix D.

Table 8. Archaeological Sites Recorded on the CMAGR.

Temporal Designation	MCAS Yuma Database
Historical-Period	101
Prehistoric	239
Multicomponent	5
Unknown	16
Total	**361**

An overview of instances of feature and artifact types recorded at sites and IOs on the CMAGR is compiled in Tables 9 through 11. It should be noted that this tally does not constitute a complete count of each artifact or feature, but of the cultural resources that contain one or more of these types. For example, rock rings have been identified at 55 sites and a single IO on the CMAGR as recorded in MCAS Yuma's cultural resources database. However, the total number of prehistoric rock rings is greater than 55 as some sites include more than one instance of this type.

According to the *Marine Corps Air Station Yuma Archaeological Survey and Report Standards and Guidelines* (2016), IOs are defined as:

- Prehistoric trails less than 100 meters with no associated artifacts
- Any number or combination of flakes and/or cores from a single source if there are no other artifacts or features within 15 meters (50 ft)
- Any number of sherds in a single pot drop if there are no other artifacts or features within 15 meters
- Any single feature if there are no associated artifacts within 15 meters or temporally associated feature within 100 meters
- Less than twenty artifacts of any kind within a 15-meter (50 ft) diameter area; and

- Less than thirty artifacts of a single class (e.g., lithics, ceramics, cans), within a 15-meter (50 ft) diameter area.

The number of IOs recorded on the CMAGR greatly outnumbers those of sites. In total, approximately 1,260 IOs have been recorded on the CMAGR. Unlike sites, IOs on the CMAGR are predominantly historical, with discarded cans being the most common artifact recorded (Table 10).

Table 9. Prehistoric Feature and Artifact Types Recorded in MCAS Yuma Database.

Prehistoric Feature	Sites	IO
Trail segment	50	-
Ceramics	13	17
Geoglyphs	1	-
Rock art	1	-
Petroglyphs	2	-
Rock rings	55	1
Cremation/human remains	1	-
Cairns	6	3
Cleared circles/sleeping circles	65	-
Point or preform, hammerstone, formed tool	8	26
Lithic reduction site	30	-
Core	21	16
Obsidian	-	11
Thermal feature	3	-
Lithic debitage	-	14
Totals	**256**	**88**

Table 10. Historic-Period Feature and Artifact Types Recorded in MCAS Yuma Database.

Historical-Period Feature	Sites	IO
Cans	29	948
World War II bomb	1	24
Road	11	1
Ammunition	2	24
Railroad	1	1
Rock cairn	17	2
Military training site	2	-
Glass	18	48
Milled lumber	8	30
Ranch association	2	-

Historical-Period Feature	Sites	IO
Mining claim/association	28	-
Well/tank/catchment	5	1
Survey marker	9	36
Camp	5	-
Rock Ring	2	-
Coachella Canal	1	-
Petroglyph	1	-
Historical Trail	3	-
Foundation	2	-
Metal	-	20
Possible Grave	-	1
Ceramic	1	1
Totals	**148**	**1,137**

Table 11. Feature and Artifact Types with Unidentified Temporality

Unknown Features	Site	IO
Rock Cairns, alignments, piles	1	10
Totals	**1**	**10**

7.2.5 NRHP Eligibility Status

A historic property is defined in the NHPA [54 U.S.C. § 300308] as any "prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on, the NHRP, including artifacts, records, and material remains related to such a property or resource." Once a prehistoric or historic-period site is identified it must be treated as a historic property until and unless it is determined to be ineligible. According to the ACHP, federal agencies are legally responsible for decisions on the NHRP eligibility. Most eligibility determinations are "consensus determinations" meaning that no formal listing or nomination is necessary beyond the agreement of the federal agency and SHPO/THPO. The opinion of the Keeper of the NRHP must be sought if a consensus cannot be reached [36 CFR. § 800.4(c) (1-2)].

Decisions regarding eligibility are determined by an assessment of the resource's significance. The NHPA defines four criteria for significance. Significant properties are those:

A. That are associated with events that have made a significant contribution to the broad patterns of our history; or

B. That are associated with the lives of significant persons in our past; or

C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. That have yielded or may be likely to yield, information important in history or prehistory.

While a property or resource can be determined eligible if it displays significance in any or all these areas, archaeological resources are commonly assessed to be significant according to Criterion D: their potential to yield "information important in history or prehistory." Eligibility does not depend upon significance alone; a resource must have integrity of "location, design, setting, materials, workmanship, feeling, and association" to meaningfully convey its significance. Integrity for an archaeological resource is generally interpreted to be its degree and level of disturbance. Intact archaeological deposits are considered to possess integrity. Physical disturbance erodes the integrity of historic properties by reducing their ability to meaningfully convey their significance. Most archaeological sites recorded on the CMAGR have not been evaluated for their NRHP eligibility (Table 12). Those that have been determined eligible are presented in more detail in Table 13.

Table 12. NRHP Eligibility of Archaeological Sites Recorded on the CMAGR.

NRHP Eligibility	MCAS Yuma Database
Unevaluated	256
Eligible	8
Ineligible	97
Total	**361**

Table 13. NRHP Eligible Archaeological Sites.

MCAS Yuma Site Number	Primary Number	Trinomial	Description	Year Located	Data Source
CMAGR-1051	13-001864	CA-IMP-1864	**Cleared circles:** Originally recorded in 1977 as three cleared circles with the northernmost ringed by rocks. A quartz knife and chopper were originally recorded but were not relocated during subsequent surveys.	1977; 2002; 2005	Apple and Shaver 2005; Wahoff et al. 2002; Apple and Deis 2002; von Werlhof and von Werlhof 1977
CMAGR-1134	13-004395	CA-IMP-4395	**Petroglyphs:** First recorded in 1981 by Ed Collins as a petroglyph site containing three panels of mostly circular and triangular elements. There are 10+ circles and 2 triangles recorded; markings of "1906," a faint "1928," "2-6," and "HG" were found as well.	2013; 2011; 2005; 1981	Rudolph et al. 2013; Schaefer and Dalope 2011a (SWAT-4); Apple and Shaver 2005; Collins 1981
CMAGR-1165	13-008789	CA-IMP-8257	**Partially embedded rock ring with associated lithic flakes.**	2002; 2005	Apple and Deis 2002;Wahoff et al. 2002
CMAGR-1196	13-009235	CA-IMP-8444	**Rock rings:** Two, adjoining cleared circles with rock mounded around their perimeters.	2005; 2002	Apple and Shaver 2005; Apple and Deis 2002;Wahoff et al. 2002
CMAGR-1257	13-013568	CA-IMP-11640	**Cairn/rock feature:** stacked rock feature constructed of 10 volcanic stones.	2011	Bryne 2013;Bryne 2011
CMAGR-1300	13-014931	-	**Trail, cairn, ceramics, one trail feature, a collapsed cairn, and 15 associated ceramic artifacts:** Although only 352 m of the trail was recorded, aerial imagery shows that the trail continues for several kilometers in either direction.	2016	Knighton-Wisor et al. 2016
CMAGR-1301	13-014932	-	**Trail, cairns, clearing:** Consists of a trail segment, three rock cairns, and a rock clearing. No artifacts were located within the site. The site is situated on a well-formed desert pavement, and measures 282-by-93 m. While only 271 m of trail was recorded, aerial imagery shows that this trail continues for several kilometers in either direction.	2016	Knighton-Wisor et al. 2016
CMAGR-3002	33-002640	CA-RIV-2640	**Petroglyph, habitation area:** Recorded in 1983 as a ceremonial petroglyph site with trails, hearths, cleared circles, cairns, and cremations. No artifacts were observed.	2013; 2005; 1983	Rudolph et al. 2013; Apple and Shaver 2005;IVCM 1983

8 CULTURAL RESOURCES MANAGEMENT STRATEGY

MCAS Yuma is responsible for compliance with several laws, regulations, policies, and directives related to the management of cultural resources (Section 3, *Laws, Regulations, and Standards*). This management strategy supports MCAS Yuma's compliance with these requirements, while fulfilling its mission and supporting the missions of its tenants. This section identifies potential impacts to cultural resources and the management actions in place to prevent or mitigate these impacts.

8.1 CURRENT MANAGEMENT ACTIONS

Several management actions have been established on the CMAGR to address potential impacts posed to the cultural resources present on this range. The actions are prioritized to ensure the CMAGR's objectives, staffing, policies, and compliance actions to ensure legal and regulatory requirements for managing cultural resources are fulfilled. MCAS Yuma has developed a series of standard operating procedures (SOPs) that describe these actions. Additionally, regularly scheduled training for MCAS Yuma personnel involved with cultural resources issues are available on an annual basis, as needed, including overviews of regulatory requirements (e.g., the NHPA, ARPA, and NAGPRA).

8.1.1 Standard Operating Procedures for Cultural Resources Compliance Actions

To support continuity among the two military ranges managed by MCAS Yuma and per the direction of MCAS Yuma and NAVFAC Southwest, section 8.1.1 (including subsections) of this ICRMP is taken directly from the Barry M. Goldwater Range Integrated Cultural Resources Management Plan Part III: Cultural Resources Management on The Barry M. Goldwater Range West (2019). Changes were made where necessary to reflect facts and references specific to the CMAGR.

Full text of these SOPs is available in Volume II: Appendix E of this document.

8.1.1.1 National Historic Preservation Act Compliance (SOPs #1 and #2)

Requirements for Section 110 of the NHPA compliance are provided in SOP #1. Section 110 guides federal agencies in ensuring that historic preservation is integrated with agency programming and charges these agencies with the responsibility to identify, preserve, and maintain historic properties within their jurisdictions. Each federal agency is responsible for establishing a preservation program to identify, evaluate, protect, and preserve historic properties and prepare nominations for the NRHP. Out-year funding is programmed to take into consideration the costs of completing a Section 110 inventory of the ranges managed by MCAS Yuma. In particular, the program sets goals for the number of acres to be surveyed per year contingent upon funding to work towards completion of a comprehensive record of archaeological sites located on the ranges. The program also sets goals for evaluating sites on a regular basis, as access allows. Due to the limited time that the CMAGR is open for cultural resources investigations each year and the fact that the range is not open to the public, most of the Section 110 funding is devoted to the BMGRW, where impacts to sites are more of a possibility.

Procedures for Section 106 of the NHPA compliance are provided in SOP #2 and illustrated below in Figure 7. Section 106 directs federal agencies to consider the effect of their undertakings on

historic properties. Compliance procedures are outlined in the ACHP's regulations, *Protection of Historic Properties* (36 CFR 800). These include guidance on how to identify, evaluate, determine effects, and resolve adverse effects of all undertakings on historic properties. The NHPA recommends that federal agencies begin the Section 106 process early in the undertaking's planning so that a broad range of alternatives may be considered during the planning process for the undertaking. Consultation with SHPO and communication with Native Americans should begin in this critical early phase and continue through the phases that follow. In addition to SHPO and Native American representatives, the USMC will also plan to enter discussion with other parties that have a demonstrated interest in the project at hand, including interested members of the public.

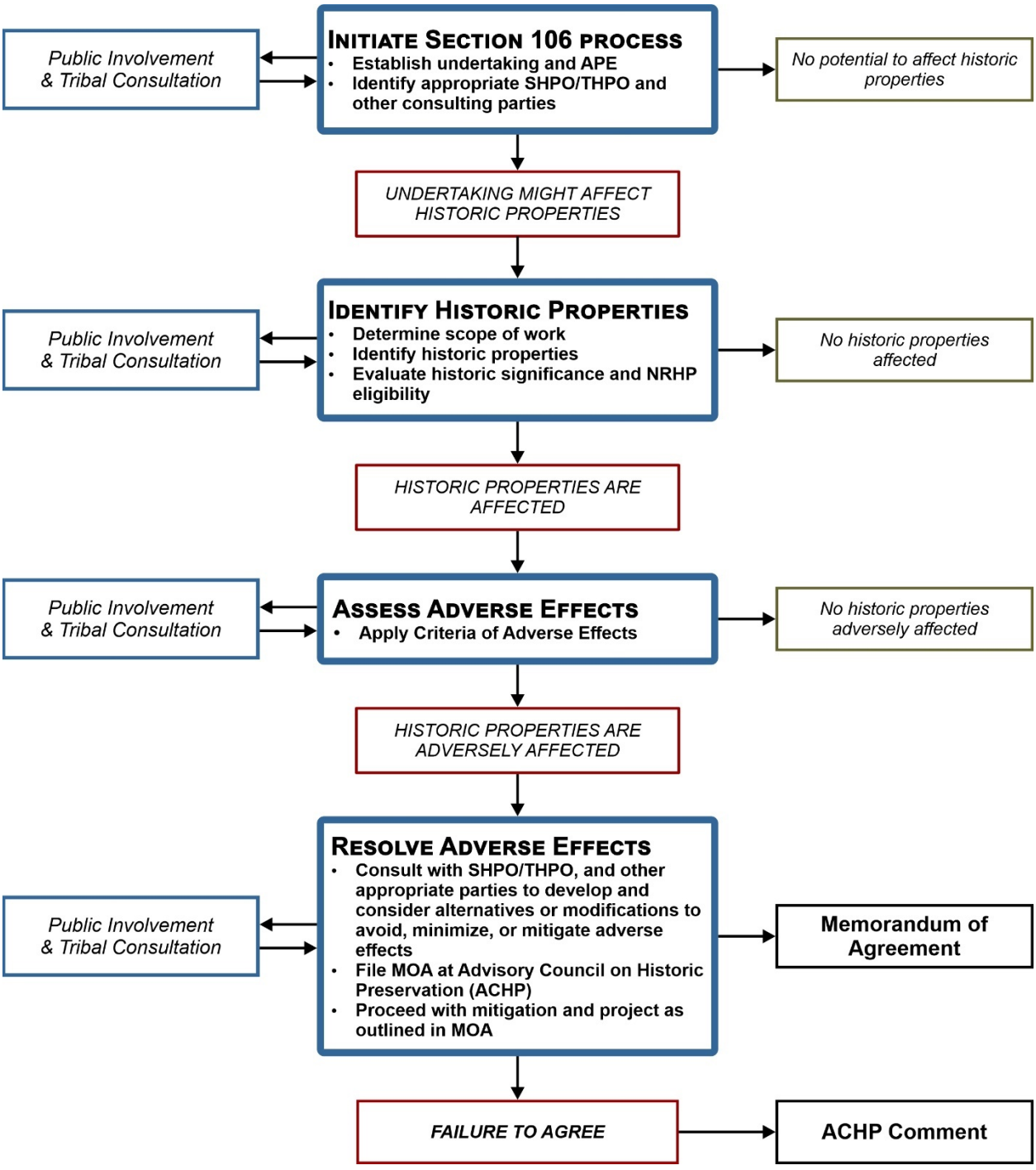

Figure 7. Section 106 Flow Chart

The Section 106 process is often conducted concurrently with the processes associated with NEPA. NEPA mandates that federal agencies consider all environmental consequences relevant to proposed actions and reasonable alternatives and include the public in the decision-making process. A cultural resources survey with the NHPA Section 106 review often supports the cultural resources component of an EA or an Environmental Impact Study (EIS), which are two types of documents that may be used to detail the analyses of impacts performed during the NEPA process.

Although the NEPA process can be used to satisfy Section 106 compliance review, MCAS Yuma typically adheres to the regulations separately yet runs the processes concurrently. Several factors contribute to this preference including funding, contracting, and timing of the processes. The most significant factor, however, is the release of cultural resource locations. Often an essential part of Section 106 review, these locations cannot be disclosed in public documents, including EAs and EISs. Thus, a summary of the thorough Section 106 review is written for inclusion in the public NEPA documents.

8.1.1.2 Archaeological Resources Protection Act Compliance (SOP #3)

ARPA strengthened protection of archaeological resources on federal and tribal lands by changing the criminal classification for unauthorized excavation, collection, or damage from misdemeanors (defined by the Antiquities Act of 1906) to felonies. Trafficking in archaeological resources from public and tribal lands is also prohibited by ARPA. ARPA requires notification of affected Native American tribes if archaeological investigations would result in harm to or destruction of any location considered by tribes to have religious or cultural importance. Policies and procedures for ARPA permits, ARPA violation documentation, and other actions are provided in SOP #3.

8.1.1.3 Native American Graves Protection and Repatriation Act Compliance and Inadvertent Discoveries (SOPs # 4 and 5)

NAGPRA protects human remains, funerary objects, sacred objects, and items of cultural patrimony of indigenous peoples on federal lands. NAGPRA also applies to collections management related to the treatment of Native American human remains, associated or unassociated funerary objects, sacred objects, and objects of cultural patrimony. This includes collections that were previously recovered and held in federal or federally funded archaeological repositories. Requirements for federal collections include the preparation of an inventory of NAGPRA-related artifacts, human remains, and funerary objects. NAGPRA also contains provisions for repatriation of such objects to lineal descendants or culturally related Indian tribes. Policies and procedures for NAGPRA inventories, consultations, and inadvertent discoveries of NAGPRA-related materials are provided in SOP #4.

SOP #5 provides procedures for inadvertent discoveries of non-NAGPRA-related cultural materials. These inadvertent discoveries, also referred to as post-review discoveries, are managed in accordance with the Secretary of the Interior's regulations, *Protection of Historic Properties* (36 CFR 800.13).

8.1.1.4 Treatment and Curation of Archaeological Collections (SOP #6)

The regulations titled *Curation of Federally-Owned and Administered Archaeological Collections* (36 CFR 79) establish definitions, standards, procedures, and guidelines to be followed by federal agencies to preserve collections of prehistoric and historic-period material remains and associated records recovered under the authority of the Antiquities Act (54 U.S.C. §§ 320301 et seq.), the Reservoir Salvage Act (54 U.S.C. §§ 312501 et seq.), the NHPA (54 U.S.C. §§ 300101 et seq.), or ARPA (16 U.S.C. §§ 470aa–mm).

As of 2015, all the CMAGR collections are housed at the Marine Air Ground Task Force Training Command, Marine Corps Air Ground Combat Center (MAGTFTC, MCAGCC) in Twentynine Palms, California for long-term storage and curation per an MOA for curatorial services of archaeological artifacts, specimens, and associated records. Copies of technical reports, site records, and other associated materials are also housed at MCAS Yuma and managed by the

MCAS Yuma CRM. Additional policies and procedures for the treatment and curation of archaeological collections are provided in SOP #6.

8.1.1.5 Tribal Consultation Program (SOP #7)

Consultation is the formal, mutual process by which an installation commander and/or designated representative and the CRM communicates and coordinates with tribal governments. It is intended to foster positive relationships with sovereign Native American nations and to ensure active participation by tribes in planning and implementing activities that may affect resources of interest to those groups. Consultation provides an essential means of obtaining the advice, ideas, and opinions of Native American parties regarding the management of federal resources, as well as ensuring the concerns of all involved parties are addressed. SOP #7 provides policies and procedures for tribal consultations regarding activities carried out on or issues concerning the CMAGR.

8.1.2 **Cultural Resources Data Management**

The MCAS Yuma CRM manages cultural resources databases and records, which are housed at MCAS Yuma and include:

- hard copies of all reports;
- digital copies of all reports;
- historical maps and documents;
- hard and digital copies of relevant literature concerning cultural resources;
- hard and digital copies of all site forms; and
- digital (Adobe Portable Document Format [PDF] and GIS) information for all sites and survey areas.

The CMAGR cultural resources GIS data are managed in two feature classes (*Cultural_Resources* and *Cultural_Resources_Restricted*) within the structure of the MCAS Yuma Spatial Data Engine (SDE). Within the *Cultural_Resources* feature class is the *CulturalSurveyArea* polygon feature, which contains the attributes for each of the cultural resources surveys that have been performed on the range. The *Cultural_Resources_Restricted* feature class contains one polygon feature and one point feature, *ArchaeologicalSiteArea* and *ArchaeologicalSitePoint*, respectively. As can be inferred from their titles, the data in the *Cultural_Resources* feature class can be accessed by personnel who have SDE permissions, while access to the *Cultural_Resources_Restricted* feature class is limited to those personnel who have a need to know and who have been approved by the CRM.

Contractors submitting cultural resources GIS data to MCAS Yuma will be provided with a database template and attribute population instructions to ensure they are submitting data that are compliant with the Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE) and are in accordance with MCAS Yuma's Specifications for Geospatial Data.

8.1.3 Access to Cultural Resources Data

The general public can access government information through Freedom of Information Act (FOIA) requests. However, there are exceptions, including the dissemination of archaeological site location, character, or ownership information (see NHPA Section 304 and ARPA Section 9).

MCAS Yuma follows best management practices for maintaining the confidentiality of archaeological site locations, which means that only professional archaeologists and qualified personnel with a valid need are allowed to access such data. Site location information will be available to project planners on a need-to-know basis, and such information cannot be included in subsequent analyses, reports, or studies that might be made available to the general public. Contractors and other agencies who have a need to use MCAS Yuma cultural resources GIS data must request access permission from the MCAS Yuma GIS Manager. These outside data users will be required to sign a Geospatial Data Use and Nondisclosure Agreement.

8.1.4 Integrated Cultural Resources Management Plan Updates

As required by *U.S. Marine Corps Guidance for Completion of an Integrated Cultural Resources Management Plan Update* (USMC 2009), this ICRMP will be reviewed annually and updated on an as-needed basis to take into account new information and address any problems encountered with using the document. During the annual review, the CRM will complete a self-assessment to determine the success of the cultural resources program over the previous year and to note specific accomplishments or challenges encountered. Annual reviews may also include participation by external stakeholders to note changes in points-of-contact, discuss initiatives completed over the previous year, and outline upcoming projects.

MCAS Yuma's ICRMP updates will integrate the latest available cultural resources information, including any new cultural resource studies on the CMAGR and any sites that have been newly identified, evaluated, or mitigated. Existing or new federal laws or regulations will be updated or added to relevant sections of this ICRMP, and any regulatory actions or violations that have occurred since the last update will be noted. The SOPs will be improved and updated as needed based on the result of their use. Updates to MCAS Yuma's ICRMP will also consider any changes in the military mission, substantial increases or decreases of range acreage, identification of new consulting parties and achievement of major program milestones. All updates to this ICRMP will be made in compliance with the DoD Instruction 4715.16.

Future ICRMP updates will be summarized in this section and recorded in the table at the front of the document.

8.2 ROLES AND RESPONSIBILITIES

Effective cultural resource management requires the coordination and integration of numerous organizations both military and non-military. An understanding of the roles and responsibilities of these various organizations is key to the successful implementation of this ICRMP. Additionally, regularly scheduled training for MCAS Yuma personnel involved with cultural resources issues are available on an annual basis, as needed, including overviews of regulatory requirements (e.g., the NHPA, ARPA, and NAGPRA).

8.2.1 Military Responsibilities

8.2.1.1 Installation Commanding Officer

The Commanding Officer's (CO) responsibilities include:

- Establishing a cultural resources program;
- Establishing a government-to-government relationship with federally recognized Native American tribes;
- Establishing a process that requires installation staff, tenants, and other interested parties to coordinate with the CRM early in the project planning process to determine if significant cultural resources may be affected by an installation undertaking;
- Establishing funding priorities and programming funds in an Environmental Program Requirements report;
- Serving as the "agency official" as defined in 36 CFR Part 800, with responsibility for the installations' compliance with the NHPA;
- Serving as the "federal agency official" as defined in 43 CFR Part 10, with responsibility for installation compliance with NAGPRA, and as defined by 36 CFR Part 79, with management authority over archaeological collections and associated records;
- Serving as the "federal land manager" as defined in 32 CFR Part 229, with responsibility for installation compliance with ARPA; and
- Signing all the NHPA PAs, Memorandums of Agreement (MOAs), and NAGPRA Cooperative Agreements (CAs) and Plans of Action after command comments have been addressed, and overseeing the preparation of the NRHP nominations for historic properties.

8.2.1.2 Marine Corps Air Station Yuma Director, Range Management Department (RMD)

The RMD at MCAS Yuma controls operations at the CMAGR. The RMD Director oversees all range management functional units, including the Conservation Division and their responsibilities include:

- scheduling the use of CMAGR lands for training field exercises and tests;
- advising the CO of proposed actions that may result in potential adverse effects to historic properties; and
- serving on the CO's behalf as the government's representative during government-to-government consultation with Native American tribes in accordance with DoD Instruction 4710.02.

8.2.1.3 Marine Corps Air Station Yuma Conservation Program Manager

The Conservation Manager's responsibilities include:

- supervising the CRM;
- ensuring cultural resources are considered during planning and implementation of all discretionary federal actions under the purview of MCAS Yuma;

- coordinating cultural resources management activities with organizational elements, installation tenants, and other parties as identified by the CO;
- developing funding priorities for cultural resources program and compliance activities on the CO's behalf;
- participating in consultation as described in this document or by other laws and regulations;
- serving on the CO's behalf as the federal agency official with management authority over archaeological collections and associated records; and
- reviewing and approving requests for access to cultural resources data and signing non-disclosure agreements.

8.2.1.4 Cultural Resources Manager

The CRM's responsibilities include:

- reviewing all projects to determine the type and level of impacts to cultural resources;
- determining the applicable laws and regulations and the applicable SOPs or other regulatory or consultation requirements;
- participating in consultation as described in this document or by other laws and regulations, and conducting and reviewing technical studies, as necessary;
- serving as the point-of-contact with the California SHPO and the ACHP, and for Native American consultation;
- assisting the CO and/or designated representative with funding priorities for cultural resources program and compliance activities;
- developing budget requirements for compliance with this ICRMP and any PAs or MOAs;
- coordinating and approving excavation permits on the CMAGR;
- coordinating record keeping and artifact curation, including:
    - developing and maintaining records, reports, and documentation sufficient for consultation and assessment of NRHP eligibility (including maps, plans, notes, data forms, site records, photographs, memoranda, draft and final reports); and
    - curating artifacts in accordance with Curation of Federally-Owned and Administered Archaeological Collections (36 CFR 79).
- updating the ICRMP as needed, based on periodic reviews;
- providing cultural resources expertise for short- and long-range planning, advising other range planners, and conducting preliminary site surveys;
- ensuring that all proposed operations-related functions that may affect cultural resources on the range are identified early in the planning process, and coordinating with appropriate regulatory agencies regarding such work;
- conducting Section 106 reviews of all operations-related undertakings and negotiating agreement documents to complete the review process;

- developing and implementing agreement documents and preparing reports per the terms of the corresponding agreement document; and
- conducting range tours for, and meetings with, tribal representatives and others in connection with range planning and operations and with specific projects.

8.2.1.5 Marine Corps Air Station Yuma Communication Strategy and Operations

To heighten public and military awareness of the cultural resources identified on the CMAGR, the MCAS Yuma Communication Strategy and Operations (CommStrat) may assist the CRM in initiating an educational program related to historic preservation and the cultural resources situated on the range. CommStrat can help in locating historical information regarding station resources or activities and may assist in developing interpretive programs. CommStrat can also assist in promoting the ICRMP to the public and installation personnel.

8.2.1.6 Marine Corps Air Station Yuma Counsel Office

The Marine Corps Yuma Counsel Office coordinates and reviews agreement documents (PAs, MOAs, NAGPRA CAs) to ensure that such documents are correct and complete, as these documents become legally binding. The Marine Corps Yuma Counsel Office serves as legal counsel for the CMAGR in administrative cases, hearings, and enforcement actions, and may interpret various cultural resources laws and regulations.

8.2.1.7 Range Management Department

The RMD schedules the use of the CMAGR lands for training field exercises and tests. Coordination for these activities is the responsibility of the RMD Director, whose responsibilities are outlined in more detail, above. The CRM is informed of any new activities that could require compliance procedures.

8.2.1.8 Range Tenants

The NSWG-1 is currently the major tenant operating at the CMAGR. Navy SEAL training activities conducted by the NSWG-1 are the only major training activity on the CMAGR not directly linked to tactical aviation. The SEALs training camp CBM is located on the southwestern boundary of the CMAGR. From this developed camp, SEALs are deployed to various areas of the CMAGR to conduct an assortment of ground training activities. These areas are primarily within SWATs 4 and 5 but include other portions of the CMAGR as well. Areas on the CMAGR are used to instruct SEAL infantry teams of four to six troops in special warfare tactics such as reconnaissance, surveillance, ambush, insertion and extraction in hostile territory, and desert survival. These activities may involve vehicle use off established roads. Live munitions training (firing, grenades, and demolition) for the NSWG-1 is conducted at designated areas.

Currently, a Programmatic Agreement is in place between MCAS Yuma and the California SHPO regarding the range redesign of SWATs 4 and 5 at the CMAGR to fulfill obligations of the undertaking under Section 106, while also supporting the mission of the CMAGR and MCAS Yuma (refer to Appendix A in Volume II of this ICRMP).

8.2.2 **Nonmilitary Participants**

8.2.2.1 California SHPO

SHPO coordinates state participation and implementation of the NHPA and is a key participant in the Section 106 process. SHPO consults with and helps MCAS Yuma to identify historic

properties, to assess project effects, and to consider alternatives to avoid or reduce such effects. SHPO reflects the interests of the people of California and the preservation of their cultural heritage. SHPO also helps MCAS Yuma in identifying potential consulting parties.

> Federal agencies are expected to provide reasonable time for other consulting parties to respond to requests for consultation. Likewise, each consulting party is expected to be responsive and to act in a timely fashion. If an Agency Official believes that a consulting party is being unresponsive, the Agency Official should make a reasonable effort to get the party to respond and then document that effort before moving ahead in the process. Failure of a consulting party to provide views does not mean that the Agency Official can assume that party's concurrence with a particular view or position, but does not prohibit the Agency Official from moving forward in the Section 106 review (§ 800.2(a)(4)).

All undertakings at the CMAGR that fall under Section 106 are coordinated with SHPO or have a signed PA or an MOA that allows for procedures agreed upon by all parties to be used instead of the standard Section 106 compliance process.

8.2.2.2 Advisory Council on Historic Preservation

The ACHP may be invited to participate in the Section 106 process or may participate because of comments received from any consulting party. If such a request is made, the ACHP has fifteen days to acknowledge the request and to state their interest in participating. If the ACHP does request to participate, they have up to forty-five days to provide comments. Copies of the agreement documents are provided to the ACHP for review, if so requested.

8.2.2.3 Native American Groups

Consultation with affected Native American groups may include sensitive historic preservation issues that extend beyond the boundaries of installation lands. When an affected Native American tribe has established procedures to deal with historic preservation issues, MCAS Yuma, SHPO, and the ACHP will, to the extent practicable, carry out responsibilities under regulatory requirements consistent with those procedures. When an undertaking may affect a property of historic value to a non-federally recognized tribe on nonnative American lands, the consulting parties will afford such a tribe the opportunity to participate as an interested party. A list of current tribal contacts is available in Volume II: Appendix F of this document.

8.2.2.4 U.S. Fish and Wildlife Service

The mission of the USFWS is working with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. Among other things, the agency advises and assists the USMC with their efforts to protect and recover all threatened and endangered species as mandated by the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.).

The USFWS manages the Chuckwalla Desert Wildlife Management Area (DWMA)/Critical Habitat Unit (CHU) for the threatened desert tortoise (*Gopherus agassizii*). This area is also designated as a desert tortoise Area of Critical Environmental Concern (ACEC) by the BLM. The desert tortoise critical habitats include geographic areas composed of elements essential to the species' needs, including food, water, space, nutrition, shelter, cover, and reproductive sites. Approximately 187,046 acres of the Chuckwalla DWMA/CHU are within the CMAGR. The

Chuckwalla DWMA/CHU includes approximately 2,095 acres of target areas, 161 acres of forward arming and refueling points, and 202.8 miles of roads used by the CMAGR.

8.2.2.5 United States Customs and Border Protection

The priority mission of the U.S. Customs and Border Protection (CBP), a component of the U.S. Department of Homeland Security (DHS), is managing, securing, and controlling the nation's borders. The CBP is responsible for preventing illegal entry into the United States and for apprehending undocumented aliens who have entered the United States illegally.

8.2.2.6 Public Participation

Public interest in historic preservation matters on the CMAGR and public participation during the Section 106 process is encouraged by MCAS Yuma. MCAS Yuma and SHPO seek and consider the views of the public when taking steps to identify and evaluate historic properties and when developing alternatives. Public participation in the Section 106 process is coordinated with and satisfied by such programs conducted by MCAS Yuma under the authority of NEPA and other regulatory requirements. Providing public notice includes providing historic preservation information to the public adequate to elicit feedback on such issues that can then be considered resolved in decision-making. Members of the public are given a reasonable opportunity to provide input and may have an active role in the overall process.

8.3 INTEGRATION

Under the DoD Instruction 4715.16 and OPNAVINST 5090.1D, Naval installations must integrate cultural resource requirements of applicable laws with their planning and management efforts. In accordance with the DoN (2012:25-26) ICRMP guidance, MCAS Yuma's Commanding Officer is responsible for integration of this ICRMP. At MCAS Yuma, the CRM will assist and provide guidance to the Commanding Officer for ensuring that current and planned installation programs, plans, and projects (e.g., training and test range management plans, master plans, endangered species recovery plans, grounds maintenance plans, facilities construction site approvals, and other land-use activities) are integrated and compatible with cultural resources programs, plans, and projects.

9 KNOWLEDGE GAPS, CHALLENGES, AND RECOMMENDATIONS

9.1 KNOWLEDGE GAPS

The current knowledge gaps in cultural resources data at MCAS Yuma can be attributed, in part, to available funding and very limited access to the CMAGR. The CMAGR is a year-round active bombing range. Together, these factors reduce opportunities to perform the tasks needed to fill these knowledge gaps.

9.1.1 Archaeological District

The Chocolate Mountain Archaeological District was determined to be eligible for the NRHP in September 1973 by the Secretary of the Interior. The district encompasses 109,616 acres of which 8,219 have been surveyed. Ten IOs and 109 archaeological sites have been identified within its boundaries. Further survey is warranted in the district to refine its boundaries and its relevance to the region's archaeology.

9.1.2 Acres Surveyed

Archaeological investigations have taken place on the CMAGR since the early twentieth century. Approximately 77,804 acres have undergone archaeological survey, which is seventeen percent of the total 460,000-acre area of the CMAGR (Figure 6). A major challenge for survey is the remote location and vast expanse of the CMAGR (~460,000 acres of desert and mountainous terrain most of which is miles from the nearest road). Furthermore, due to the military mission of MCAS Yuma, field work is only possible for a limited number of weeks each year, when training programs are paused to perform necessary target maintenance and ordnance removal. A predictive model of archaeologically sensitive areas could make the most effective use of limited field work opportunities. This model should incorporate knowledge of the geomorphology of the CMAGR in conjunction with aerial photography, LiDAR data, and historical maps and atlases to identify those areas with potential to contain significant archaeological deposits, locate probable sites and structures, and de-prioritize areas with low probability to contain cultural resources.

9.1.3 NRHP Eligibility Evaluation

Most archaeological sites recorded on the CMAGR have not been evaluated for NRHP eligibility (Table 12). The evaluation of cultural resources most vulnerable to potential impacts should be prioritized.

9.2 POTENTIAL IMPACTS FROM LAND USE

The HARP (Apple and Cleland 2001) created for the CMAGR identified potential threats to the integrity and preservation of cultural resources and historic properties as the following:

a. Impacts from current aerial training activities, including routine maintenance;

b. Impacts from ground-based training and maintenance;

c. Impacts from new projects;

d. Impacts from unauthorized activities, including vandalism, trespassers, and scrappers; and

e. Impacts from natural forces such as wind and water.

Considering the mission of MCAS Yuma, these potential impacts are, and will remain, perennial concerns. The SOPs currently in place were designed to address these concerns and appear to do so effectively. As most sites and IOs identified on the CMAGR can easily be avoided, there is no operational incentive to allocate limited funding or time to the evaluation of these resources. However, MCAS Yuma is planning to continue to update the GIS database with necessary corrections and additions to assess the potential impact of sites located in or near target buffers and other areas used for training and maintenance. Due to the military mission of MCAS Yuma, field work is only possible for a limited number of weeks each year when training programs are paused to perform necessary target maintenance and ordnance removal.

9.3 INTEGRATION OF GEOMORPHOLOGICAL CONTEXT WITH THIS ICRMP

Less obvious than the physical threats to effective conservation are the unintended consequences of outdated recording, survey, and sampling strategies. Traditionally accepted standards and practices do not always reflect advances in scientific knowledge. The assumptions underlying institutionally defined practices and recommendations may be proven scientifically invalid over time. Once established, these guidelines and standards are difficult to change.

ICRMPs, and the laws and regulations that shape them, not only allow agencies to update their management strategies in the face of new knowledge, but ICRMPs also require that they do so through a process of annual reviews and renewals on a five-year time scale. The effective use of this ICRMP gives MCAS Yuma the flexibility to develop best practices for the identification, evaluation, protection, and preservation of historic properties on the CMAGR as required by Sections 106 and 110 of the NHPA.

Current archaeological survey practices in the arid regions of the American southwest have been influenced by the legacy of Julian D. Hayden, an acknowledged "authority on the archaeology of the Sonoran Desert" (Thompson 1998). In the 1965 article, "Fragile-Pattern Areas," Hayden reasoned that archaeological sites in the desert southwest are extremely unlikely to contain sub surface deposits. This reasoning was founded upon assumptions regarding the formation process of the landforms upon which these sites are encountered, specifically desert pavements:

> Desert pavements are the most distinctive and important of the natural surfaces here considered. Alluvial surfaces in arid regions have been subjected to reduction by wind and rain through millennia; and where the alluvium has contained pebbles and larger stones, these have been lowered to a common level. The heavier aggregates have come to be tightly wedged together, side by side, upon a substratum of undisturbed softer and finer material which is no longer accessible to the action of the elements (Hayden 1965:273).

Hayden was not alone in espousing the "erosion" theory of desert pavement formation. Cooke (1970), Rogers (1966:39–43), and Symmons and Hemming (1968), among others shared this view that, once established, a desert pavement remained a relatively stable, unchanging surface for thousands of years.

In recent decades, the erosion theory has been displaced by other explanations. The current leading explanation states that "Most desert pavements are understood to form by an inflationary process

in which eolian sediment is trapped beneath surface clasts. The presence of a subsurface eolian layer promotes the surface motion of clasts by a variety of processes, leading to the interlocking and suturing of clasts to form a pavement (Pelletier et al. 2007:1914)." In other words, the mid-twentieth century idea that desert pavements were formed by a *taking away* of surface material has been replaced with the idea that desert pavements are formed by the *building up* of surface material (Ahlstrom and Roberts 2001). Furthermore, though it may have taken millennia for a pavement to form, the time required for a surface disturbance to "heal" (i.e. the gravel mantle to reform over the epipedon) can take place over a considerably shorter time span, that of human timescales if the underlying eolian epipedon is preserved (Haff 2005; Haff and Werner 1996; Pelletier et al. 2007). In areas like the CMAGR, which are subject to seismic shaking from tectonics (San Andreas Fault) and ordnance impacts, the gravel mantle may reform at an even faster rate (Haff 2005).

Geomorphological research has found that the formation and equilibrium processes of desert pavements are far more dynamic and complex than previously believed. Consequently, one can no longer assume that desert pavement sites lack sub surface deposits. This knowledge has been accepted and incorporated into the cultural resources management plans of federal facilities since at least 1996 as this excerpt from the U.S. Army Corps of Engineers Fort Worth District *Significance Standards for Prehistoric Archaeological Sites at Fort Bliss: A Design for Further Research and the Management of Cultural Resources* illustrates:

> The presence of a surficial gravel lag, or desert pavement, does not preclude the possibility that archaeological components may be buried at depth (Abbott et al. 1996:110).

It is not only possible that archaeological components could be buried beneath desert pavements; it has been demonstrated at multiple excavations in the Sonoran desert region (Ahlstrom and Roberts 2001; Apple and York 1993) including the Barry M. Goldwater Air Force Range in southwestern Arizona (Tucker 2001; Tucker et al. 2000). This has important implications for the practice and interpretation of archaeological investigations in the desert Southwest and on the CMAGR. The presence of intact sub-surface features is an indicator of an archaeological site's integrity and therefore crucial to assessing site significance.

The U.S. Military recognizes the importance of integrating knowledge of soil geomorphology with cultural resources management plans on military lands in arid and semiarid environments. The Army, the Navy, and NAVFAC SW participated in a geoarchaeology workshop funded by a grant from the U.S. Army Research Office (ARO), which highlighted "geoarchaeological research directions that will benefit archaeologists and the CRM in supporting the military mission and cultural stewardship on military lands" (Bullard et al. 2008:8–9).

MCAS Yuma is dedicated to fulfilling its stewardship duties. Time and funds allowing, MCAS Yuma will consider the use of investigative, non-invasive, non-destructive sub-surface testing methodologies and techniques such as systematic archaeological geophysical survey.

9.4 CLIMATE CHANGE PREPAREDNESS

Erosion has long been recognized as a threat to the integrity of archaeological sites on the CMAGR (Apple and Cleland 2001; Miljour et al. 2019; von Werlhof and von Werlhof 1977; Woodall et al. 1993). Changes in average temperature and weather patterns brought about by climate change are likely to increase the severity of erosive episodes on the CMAGR in the coming century (Hopkins

2018; Routschek et al. 2014). Identifying areas sensitive to erosion is a component of the environmental management policy of the CMAGR. The 2017 CMAGR INRMP 5-Year Action Plan seeks to establish a soils and erosion monitoring framework, assess erosion status within the watershed, and develop spatial data related to soil associations and characteristics (MCAS Yuma 2017: 96-98). Archaeological surveys of at-risk soil areas should be undertaken to establish an inventory of archaeological resources threatened by climate change. The spatial data developed to monitor erosion can also be used by the CRM to target survey efforts. Once the inventory is established, a monitoring program should be put in place to assess impacts to threatened sites.

10 ACTION PLAN

In meeting the standards mandated by Section 110 of the NHPA, the CRM will continue to address compliance challenges within the CMAGR to identify, evaluate, and preserve cultural resources under its control or jurisdiction. The MCAS Yuma Cultural Resources Program conforms to the following seven standards for historic preservation programs of federal agencies in this law (adapted from NPS site http://nps.gov/history/hps/fapa_110.htm):

1. Designate a qualified preservation officer to coordinate a historic preservation program that advances the purposes of the NHPA;
2. Complete the identification and evaluation of cultural resources under the CMAGR control or jurisdiction;
3. Nominate historic properties to the NRHP;
4. Consider cultural resources when planning projects or actions that may affect those resources;
5. Include knowledgeable and interested parties in consultations regarding historic preservation activities at the CMAGR;
6. Preserve the historic, architectural, archaeological, and cultural values of these properties;
7. Prioritize the use of historic properties when carrying out the mission of MCAS Yuma.

The following five action items constitute the MCAS Yuma Cultural Resources Program's current Action Plan for the CMAGR. Funding priorities, also known as Common Output Levels of Service (COLS), are assigned to projects based on the catalog number, or type of activity, under which a particular project falls. Projects assigned a COLS of 3 are the highest priority, followed by COLS 2, with COLS 1 projects having the lowest priority. For instance, the catalog number for ICRMP funding, CN-3066, is automatically set to a COLS 3, as ICRMPs are required under Marine Corps Order 5090.2 (Volume 8). Conversely, a project nominating properties to the NRHP, CN-3060, is automatically set to a COLS 1, because property nominations have a lower priority than NAGPRA issues. Table 14 summarizes these action items, provides their COLS assignments, and lists their short-term and long-term needed actions.

Chocolate Mountain Archaeological District

In the early 1970s, Charles M. McKinney, a National Park Service archaeologist, conducted an assessment of a large area in the southwestern portion of CMAGR as part of a study by a special task force established by the Secretary of the Interior (Murtagh n.d.). Based on this work, an

archaeological district, encompassing much of the southern portion of the CMAGR (R-2507S), was determined to be eligible for the NRHP in September 1973 by the Secretary of the Interior.

The original nominating materials and evidence have since been lost, but a map of the district and some associated correspondences were appended to the "Environmental Assessment Withdrawal of CMAGR, Naval Air Facility, El Centro, California" which was prepared by the Naval Facilities Engineering Command, Western Division (see Volume II: Appendix B). Using this map, the boundaries of the here-to-for uncharted archaeological district have been mapped (Figure 6). The dimensions of the original district extend beyond the current boundaries of the CMAGR. The district encompasses 109,616 acres within the CMAGR. Approximately 8,219 of these acres have been surveyed resulting in the recordation of 119 archaeological resources.

Funding and access represent the primary challenges to cultural resources management at the CMAGR. Funding for work at the CMAGR comes through MCAS Yuma, which also oversees the BMGRW. Current, external damage threats to the BMGRW make it a funding priority above the CMAGR. Once funds become available for the CMAGR, MCAS Yuma will prioritize additional survey of the Chocolate Mountain Archaeological District. This additional survey will allow for a more detailed eligibility determination, including defining which sites are contributing and non-contributing.

MCAS Yuma will continue to comply with all Section 106 undertakings within the district on a case-by-case basis.

Actions are needed to draft a Statement of Work (SOW), develop an independent government estimate (IGE), request and await funding, and work with NAVFAC to develop a Cooperative Agreement for the execution of an SOW.

National Register of Historic Places Evaluation of Undetermined Sites

Prior to 2013, MCAS Yuma neglected to make NRHP-eligibility determinations for sites that were recorded but were not within the APE of a proposed project. Since 2013, MCAS Yuma has been systematically going through previous survey project records, working backward from the most recent, to make and consult on NRHP-eligibility determinations for sites that have been given recommendations by the contractors who recorded them. Since a large portion of the BMGRW is open to the public for recreation and is continuously patrolled by the CBP, the resources on that range have been determined to be in more immediate danger of sustaining damage. Thus, evaluation of those resources will take priority over those on the CMAGR. As of January 2021, there are 256 recorded archaeological sites on the CMAGR with undetermined NRHP eligibilities.

Actions are needed to continue to reduce the backlog of unevaluated sites, in consultation with SHPO and interested tribal governments and organizations.

SWATs 4 and 5 PA

MCAS Yuma executed a PA in 2016 to guide the Section 106 compliance for the reconfiguration of the training ranges located in SWAT 4 and 5 training areas on the CMAGR (see Volume II: Appendix A). The PA undertaking consists of all activities associated with reconfiguration of, and training at, SWATs 4 and 5. The PA stipulates that "all proposed new construction and use of new locations for ground-disturbing activities will not be implemented until such time as it is determined that there are no historic properties within 100 meters of that part/phase of the Undertaking or a mitigation strategy has been approved by the Signatory Parties to this PA" (PA pp. 3, Implementation Strategy, reproduced in Volume II: Appendix A of this ICRMP).

Further actions are needed to continue following the PA stipulations and Section 106 compliance, including additional eligibility determinations and final findings of effect.

Inspect Collections

In 2017, MCAS Yuma signed a new MOA with MCAGCC for curatorial services, replacing the previous agreement executed in 2011 (see Volume II: Appendix A). According to the November 2020 letter from the MCAGCC Environmental Affairs Director, the inventory indicates the eight boxes of CMAGR artifacts and one box of associated records housed at their curation facility are accounted for.

Funding and actions are needed for regular inspections of the facility and collections to ensure all collections from the CMAGR continue to be properly curated.

Continue to Update Geographic Information System

The MCAS Yuma GIS database is managed through the USMC's Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE)-compliant Spatial Data Engine (SDE). Over the years, various contractors have written plans for adding the station's cultural resources spatial data to the SDE; however, none of the plans were ever completed. Starting in 2013, MCAS Yuma initiated a new strategy of creating polygon features for each of the surveyed areas and site boundaries known within the CMAGR. Data that were not already in a GIS format or GIS data that MCAS Yuma did not have, were either digitally created from original paper records, requested from the original source, or purchased from the South Coastal Information Center (SCIC). All of the MCAS Yuma cultural resources data have been input and are stored and managed within the Station's GIS database, but some of the data still need to be verified and refined.

Table 14. Short and Long-Term Cultural Resources Management Action Plan.

Action (COLS)	Current Status	Short-Term Plan	Long-Term Plan
Chocolate Mountain Archaeological District (COLS 1)	The district was determined eligible for listing on the NRHP in 1973. MCAS Yuma complies with Section 106 undertakings within the district on a case-by-case basis.	• Draft a SOW. • Develop an IGE. • Request and await funding. • Begin contracting effort.	• Work with NAVFAC to develop a Cooperative Agreement for execution. • Complete evaluations and determinations through consultation with SHPO and the tribes.
NRHP Evaluation of Undetermined Sites (COLS 3)	As of January 21, there are 256 recorded sites with undetermined NRHP eligibilities.	• Develop funding request, or • Develop field-going strategy.	• Execute short-term plan. • Make determinations. • Consult with SHPO and the tribes.
SWAT 4/5 PA (COLS 1)	Funding is required from the proponent to continue surveys within the APE. A majority of the sites have eligibility determinations and most portions of the undertaking result in a finding of No Historic Properties Affected.	• Enquire on status of funding from proponent for additional surveys. • Continue to survey APE and evaluate newly recorded sites as funded. • Finish eligibility determinations for previously recorded sites.	• Continue to educate the staff using SWAT 4/5 on PA stipulations. • Continue to manage the PA in accordance with its stipulations.

Action (COLS)	Current Status	Short-Term Plan	Long-Term Plan
Inspect Collections (COLS 3)	Artifacts and associated records are housed at the MCAGCC in accordance with the MOA.	• Request funding for periodic inspections. • Periodically inspect collections and curation facility.	• Ensure all CMAGR collections are properly catalogued and curated.
Continue to Update Geographic Information System (COLS 3)	All of the MCAS Yuma cultural resources data are stored and managed within the Station's GIS database, but some of the data need to be verified and refined.	• Continue to update the GIS database with necessary corrections and additions.	• Have all MCAS Yuma cultural resources spatial data up-to-date in the GIS database. • Have all sites and survey polygons linked to their site record and survey report.

APE = Area of Potential Effects; COLS = Common Output Levels of Service; GIS = geographic information system; MCAGCC = Marine Corps Air Ground Combat Center

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12 GLOSSARY

Advisory Council on Historic Preservation (ACHP): The independent federal agency charged by the NHPA (Section 201), as amended, to advise the President, Congress, and federal agencies on matters related to historic preservation. The ACHP also administers Section 106 of the NHPA through its regulation at 36 CFR Part 800, *Protection of Historic Properties*.

Aeolian: Accumulated through wind action; commonly refers to sandy material in dunes.

Alluvial: Pertaining to processes or materials associated with transportation or deposition by running water.

Alluvial fan: A major semi conical or fan-shaped constructional landform that is built of stratified alluvium, with or without debris flow deposits, that occurs on the upper margin of a piedmont slope and that has its apex at a point source of alluvium debouching from a mountain valley into an intermontane basin. Also, a generic term for similar forms in various other landscapes.

Alluvium: Deposits of organic and inorganic material made by streams on riverbeds, floodplains, and alluvial fans, particularly deposits of clay or silty clay laid down during a time of flood.

Archaeological resources: Any material remains of past human life or activities that can provide scientific or humanistic understandings of past human behavior and cultural adaptation through the application of scientific or scholarly techniques such as controlled observation, contextual measurement, controlled collection, analysis, interpretation, and explanation (see ARPA and 32 CFR §229.3).

Archaeological Resources Protection Act (ARPA) of 1979: This act (16 U.S. Code [U.S.C.] 470 aa-mm) strengthened protection of archaeological resources on federal and tribal lands by increasing the penalties first included in the Antiquities Act of 1906 for unauthorized excavation, collection, or damage of those resources from misdemeanors to felonies, including fines and imprisonment for first offenses. Trafficking in archaeological resources from public and tribal lands is also prohibited by ARPA. ARPA requires notification of affected Native American tribes if archaeological investigations would result in harm to or destruction of any location considered by tribes to have religious or cultural importance.

Avifauna: Birds of a particular region or environment.

***Bajada*:** When several alluvial fans laterally coalesce, the resulting feature is called a *bajada* (Spanish for ―that which is below‖). *Bajadas* may be hundreds to thousands of feet thick and may hold deposits of water deep beneath the surface.

Arroyo: A steep-sided gully formed by the action of fast-flowing water in an arid or semi-arid region.

Basin: A loose term for an intermontane basin, bolson, or semibolson. Also, a depressed area with no surface outlet or only limited surface outlet.

Basin floor: A generic term for the nearly level, lower most major part of intermontane basins, the floor includes all of the alluvial, aeolian, and erosional landforms below the piedmont slope. Component landforms include playas, broad alluvial flats with ephemeral drainage, and relict alluvial and lacustrine surfaces that rarely, if ever, are subject to flooding.

Building: One of the five NRHP property types. A structure created to shelter any form of human activity—includes houses, barns, churches, and other buildings, including administration buildings, dormitories, garages, and hangars.

Calcareous soil: A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to visibly effervesce when treated with cold, dilute hydrochloric acid.

Channel: The bed of a single or braided watercourse that commonly is devoid of vegetation and is formed of modern alluvium. Channels may be enclosed by banks or splayed across and slightly mounded above a fan surface and may include bars and dumps of cobbles and stones. Channels, excepting floodplain playas, are landform elements.

Clay: As a soil separates, the mineral soil particles that are less than 0.002 mm in diameter. As a soil textural class, soil material that is 40 percent or more clay, is less than 45 percent sand, and is less than 40 percent silt.

Coarse-textured soil: Sand or loamy sand.

Cobble: A rounded or partly rounded rock 3–10 in. (7.6–25 cm) in diameter.

Colluvium: Soil material and/or rock fragments moved by creep, slide, or local wash, and deposited at the base of steep slopes.

Conservation: Planned management, use, and protection of cultural and other resources to provide sustainable use and continued benefit for present and future generations and to prevent the exploitation, destruction, waste, and/or neglect.

Consultation: A reasonable and good-faith effort to involve affected parties in the findings, determinations, and decisions made during the Section 106 process and other processes required under other statutes and regulations. Consultations with Indian tribes must be on a government-to-government level to respect tribal sovereignty and to recognize the unique legal relationship between the federal government and Indian tribes set forth in the Constitution, treaties, statutes, and court decisions.

Creosote bush community: Found on fine-grained soils of lower alluvial fan and valleys; creosote bush, bursage.

Cultural landscape: A geographical area that historically has been used by people, or shaped or modified by human activity, occupancy, or intervention, and that possesses a significant concentration, linkage, or continuity of areas of land use, vegetation, buildings and structures, sites, and/or natural features.

Cultural patrimony: As defined in NAGPRA, objects that have ongoing historical, traditional, or cultural importance central to a Native American group or culture.

Cultural resources: Represent the nation's collective heritage, and broad public sentiment for protecting these heritage resources has been codified over the years in numerous federal, state, and local laws (King 1998; King et al. 1977). This term includes: (1) buildings, structures, sites, districts, and objects that may be eligible for or that are included in the NRHP (historic properties); cultural items as defined in 25 USC 3001; American Indian, Eskimo, Aleut, or Native Hawaiian sacred sites for which access is protected under 42 USC 1996; archaeological resources as defined by 16 USC 470bb; archaeological artifact collections and associated records defined under 36 CFR

79; and any definite location of past human activity, occupation, or use, identifiable through field inventory (survey), historical documentation, or oral evidence.

Culture: The traditions, beliefs, practices, lifeways, arts, crafts, and social institutions of any community, be it an Indian tribe, a local ethnic group, or the people of the nation. Man's use of and adaptation to the environment as seen through his behavior, activities, and the methods employed to transmit customs, knowledge, and ideas to succeeding generations.

Curation: The process of managing and preserving an archaeological collection of artifacts and records according to professional museum and archival practices, as defined in 36 CFR 79.

Desert pavement: Large, flat, conspicuous areas largely devoid of vegetation and covered by a layer of tightly packed small stones, which are frequently very dark-colored due to the development of desert varnish. Desert pavement is formed through a process of physical weathering and the accumulation of a porous mineral layer in the soil that separates and levels the desert-pavement surface from the underlying, uneven, rocky material.

Desert varnish (also rock varnish): A glossy microbially deposited coating found on rock, stone, or boulder surfaces that provides the dark complexion of the rock surface despite the internal color of the rock. Desert varnish is very thin, at most a few hundredths of a millimeter thick (about the thickness of a sheet of paper). The thickest, darkest coatings of varnish found on older deposits may be the result of accumulation over many tens of thousands of years to more than 100,000 years.

Dike: A built-up wall or embankment to prevent flooding.

Dissection: The partial destruction through erosion of a land surface or landform by gully, arroyo, canyon, or valley cutting that leaves flattish remnants, ridges, hills, or mountains separated by drainages.

District: One of the five NRHP property types. Districts are concentrations of significant sites, buildings, structures, or objects united historically or aesthetically by plan or physical development.

Dune: A mound, ridge, or hill of loose windblown, granular material (generally sand), either bare or covered with vegetation.

Effect: Any change in the characteristics that contribute to the uses determined appropriate for a cultural resource, or to the qualities that qualify a cultural property for the NRHP. Determination of effect is guided by criteria in 36 CFR Part 800.9.

Ephemeral: Something that lasts a short period of time.

Erosion: The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Ethnography: The branch of anthropology that describes and analyzes extant cultural systems.

Ethnohistory: Ethnographic information that can be obtained from historical documents; for example, diaries of early explorers and early newspaper accounts.

Ethnology: The branch of anthropology that deals with the comparative cultures of various peoples, including their distributions, characteristics, folkways, religions, and social organizations.

Evaluation: Assessing the historic significance and historic integrity of a site, building, structure, district, or object by applying the criteria of eligibility for inclusion in the NRHP.

Fan: A generic term for constructional landforms that are built of stratified alluvium and occur on the piedmont slope, downslope from their source of alluvium.

Fauna: Animal life.

Fine-textured soil: Sandy clay, silty clay, or clay.

Floodplain: A nearly level alluvial plain that borders a stream and is subject to flooding unless artificially protected.

Floor: A generic term for the nearly level, lower part of an intermontane basin (a bolson or semibolson) or a major desert stream valley.

Flora: Plant, bacterial, or fungal life.

Foothill: A steeply sloping upland that has relief of as much as 1,000 ft. (300 m) and fringes a mountain range or high-plateau escarpment.

Funerary objects: An object that, as part of a death rite or ceremony of a culture, is intentionally placed with individual human remains, either at the time of burial or later.

Geoglyph: is a large design (generally larger than 4 meters) produced on the ground and typically formed by durable elements of the landscape, such as stone, stone fragments, gravel, or earth. Geoglyphs can be formed by both additive processes such as the arrangement and alignment of materials on the ground in a manner akin to petroforms, and subtractive processes such as removing part of the natural ground surface to create differently colored or textured ground in a manner akin to petroglyphs. Subtractive geoglyphs are commonly called “intaglios” such as the Blythe Intaglios located in southern California.

Geomorphic surface: An episode in landscape development; a mappable part of the land surface that is defined in terms of morphology (relief, slope, and aspect), origin (erosional or constructional), age (absolute or relative), and stability of component landforms.

Geomorphology: The science that treats the general configuration of the earth’s surface; specifically, the study of the classification, description, nature, origin, and development of the landforms and their relationships to underlying structure and the history of geologic changes as recorded by these surface features.

Glacier/glacial: A large moving mass of accumulated ice and snow formed on mountains. Glacial refers to places and objects affected by such.

Gravel: Rounded or angular fragments of rock as much as 3 in. (0.2-7.6 cm) in diameter. An individual piece is a pebble.

Habitat: natural home or environment of an animal, plant or organism.

Habitation site: A type of archaeological site that is defined by static human behavior in a specific place. That place being a centralized temporary or permanent dwelling for human actives (i.e. village, camp).

Hammerstone: An archaeological term for a stone tool that is used for hammering or knapping.

Hearth: a fire pit or oven.

Historical context: An organizing structure for interpreting history that groups together information about historic properties sharing a common theme, geographical location, and period. The development of historical contexts is a foundation for decisions about the planning, identification, evaluation, registration, and treatment of historic properties based upon comparative significance.

Historic integrity: The ability of a property to convey its historic significance. To be eligible for the NRHP, a property must be historically significant. It also must possess historical integrity, which is a measure of authenticity and not necessarily condition. Elements of integrity to be considered include location, design, setting, materials, workmanship, feeling, and association. Not all seven aspects of integrity need to be retained, but a property must have sufficient physical remnants from its period of historical importance to illustrate significant aspects of its past. The integrity of archaeological sites typically is evaluated by the degree to which they can provide important contextual information. The integrity of traditional cultural places is interpreted with reference to the views of closely affiliated traditional groups, if traditional people will write or talk about such places so information can be filed with a public agency. If a place retains integrity in the perspective of affiliated traditional groups, it probably has sufficient integrity to justify further evaluation. The NRHP Bulletin 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties*, provides guidance for identifying and assessing traditional cultural places.

Historic preservation: The NHPA states that historic preservation ―includes identification, evaluation, recordation, documentation, curation, acquisition, protection, management, rehabilitation, restoration, stabilization, maintenance, research, interpretation, conservation, and education and training‖ regarding cultural resources.

Historic property: Any district, site, building, structure, or object listed in or eligible for inclusion in the NRHP because of its historic significance. The regulation at 36 CFR 60.4 explains criteria for determining eligibility for listing in the NRHP.

Historic significance: The importance of a property to the history, architecture, archaeology, engineering, or culture of a community, a state, or the nation. It is achieved by meeting one or 7 more of the following criteria: association with events, activities, or patterns (Criterion a); association with important persons (Criterion b); distinctive physical characteristics of design, construction, or form (Criterion c); potential to yield important information (Criterion d).

Holocene: The second epoch of the Quaternary period of geologic time, extending from the end of the Pleistocene (about 10,000–12,000 years ago) to the present.

Horticulture: Human cultivation of plants for food, medicine, material or textiles.

Hunter-gatherer: A means of society where all food is hunted and foraged.

Hydrology: the study of the movement, distribution and management of water on Earth and other planets.

Ichthyofauna: Fish life of a particular region.

Identification: The first step in the NHPA Section 106 process includes preliminary work (such as archival research or literature review), actual efforts to identify properties through field survey, and the evaluation of identified properties to determine if they qualify as historic properties. The standard is a reasonable and good faith effort for identification and evaluation.

Igneous rock: Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Indian tribe: Under AFI 32-7065, the term Indian tribe includes federally recognized American Indian tribes, Alaska Native villages, and Native Hawaiian organizations. A federally recognized tribe is one that the U.S. government formally recognizes as a sovereign entity requiring government-to-government relations. The federal government holds lands in trust for many, but not all, Indian tribes. Some tribes are not federally recognized and are not afforded special rights under federal law, with the following exception. According to the NRHP guidelines, traditional cultural places include places of cultural significance to both federally recognized tribes and other groups. Non-federally recognized tribes may be consulted as interested parties.

Inert: Nonreactive, nonexplosive (regarding inert ordnance).

Intaglio: An Italian word meaning a design incised or engraved into a material, geoglyphs formed by the removal of earth or desert pavement are often referred to as intaglios.

Integrated Cultural Resources Management Plan (ICRMP): A document that defines the procedures and outlines plans for managing cultural resources on the DoD installations (see DoDI 4715.16).

Integrated Natural Resources Management Plan (INRMP): An integrated plan based, to the maximum extent practicable, on ecosystem management that shows the interrelationships of individual components of natural resources management to mission requirements and other land use activities affecting an installation's natural resources (see DoDI 4715.03).

Intermontane basin: A generic term for wide structural depressions between mountain ranges that are partly filled with alluvium and are called valleys in the vernacular. Also a relatively small structural depression within a mountain range that is partly filled with alluvium and commonly drains externally through a narrower mountain valley.

Inventory: A process of descriptive listing and documentation of cultural resources within a defined geographic area based on a review of existing data, fieldwork, and other means.

Knapping station: A manufacturing station where stone tools are being formed and shaped (i.e. flint spear points and arrow heads).

Kinship system: It is the system of social relationships connecting people in their culture who are or are considered to be related. Such relations have reciprocity as their foundation.

Lacustrine: lake deposits.

Landform: A three-dimensional part of the land surface, formed of soil, sediment, or rock that is distinctive because of its shape, its significance for land use or to landscape genesis, its repetition in various landscapes, and its consistent position relative to surrounding landforms.

Lithic: Something consisting of stone.

Lithic debitage: Waste material produced during the production of chipped stone tools.

Medium-textured soil: Very fine sandy loam, loam, silty loam, or silt.

Mesa: A broad, nearly flat-topped, and commonly isolated upland mass characterized by summit widths that are larger than the heights of bounding erosional scarps.

Metamorphic rock: rocks that are changed physically or chemically by extreme heat and pressure.

Mesozoic: era of geologic time that is between 245-65 million years ago.

Midden: A pile or heap of refuse.

Mountain: A highland mass that rises more than 1,000 ft. (300 m) above its surrounding lowlands and has merely a crest or restricted summit area (as distinct from a plateau).

National Register of Historic Places (NRHP): The official federal list of sites, districts, buildings, structures, and objects worthy of preservation consideration because of significance in American history, architecture, archaeology, engineering, or culture. The NRHP is administered by the Department of the Interior, National Park Service. Criteria for eligibility, and the procedures for nomination, making changes to listed properties, and removing properties from the NRHP are detailed in 36 CFR 60, *National Register of Historic Places*. Significance may be local, state, or national in scope.

Native Americans: American Indians, Eskimos, Aleuts, and Native Hawaiians (DoDI 4715.16).

Object: One of the five NRHP property types. Objects typically are small in scale, sometimes movable, and often artistic in nature, and include sculpture, monuments, airplanes, boundary markers, and fountains.

Osseous: made of or consists of bone.

Outcrop: That part of a geologic formation or structure that appears at the surface of the earth.

Paleogenomic: Reconstruction and analysis of genomic information of once existing species.

Petroglyph: is an image or art form that is created by incising, picking, carving, or abrading rock.

Perennial: existing during all seasons of the year.

Geomorphic provinces: Very large, general landscape units that display dominant geologic formations and patterns such as basins, plateaus, and mountain ranges.

Piedmont: A general slope rising to mountains.

Plain: A flat, undulating, or even rolling area, larger or smaller, that includes few prominent hills or valleys, is usually at low elevation in reference to surrounding areas, and may have considerable overall slope and local relief.

Playa: The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Pleistocene: The first epoch of the Quaternary period of geologic time (about 2 million–10,000 years ago), following the Pliocene epoch and preceding the Holocene.

Pliocene: The last epoch of the Tertiary period of geologic time (about 7 million–2 million years ago), following the Miocene epoch and preceding the Pleistocene epoch.

Pluvial lake: A lake formed during a period of exceptionally heavy rainfall; a lake formed in the Pleistocene epoch during a time of glacial advance and now either extinct or existing as a remnant. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapo-transpiration.

Precambrian: In reference to the earliest era in earth's geologic history. Ending 570 million years ago, it is characterized by when the earth's crust first formed and the first life in the sea began.

Prehistory: Before written history. In North America, prehistoric usually refers to the period before European contact.

Protohistory: The study of historical-period groups who themselves did not maintain written records. The protohistoric period is usually defined as between A.D. 1492 and A.D. 1700.

Quaternary: The second period of the Cenozoic era of geologic time, extending from the end of the Tertiary period (about 2 million years ago) to the present and consists of two epochs, the Pleistocene (Ice Age) and the Holocene (recent).

Remnant: A remaining part of some larger landform or of a land surface that has been dissected or partially buried.

Restricted airspace: Airspace with defined vertical and lateral dimensions that has been established by the federal Aviation Administration (via the rule-making process) to denote areas where military activities can occur.

Ridge: A long, narrow elevation of the land surface, typically sharp crested with steep sides and forming an extended upland between valleys.

Riparian: A zone of transition from the aquatic to terrestrial ecosystems, whose presence is dependent upon surface and/or subsurface water, which reveals the influence of that water through its existing or potential soil/vegetation complex. Riparian habitat may be associated with features such as lakes, reservoirs, estuaries, potholes, springs, bogs, wet meadows, muskegs, and ephemeral, intermittent, or perennial streams. Riparian areas are often characterized by dense vegetation and an abundance and diversity of wildlife.

Riverine: Located along or in the banks of a river.

Rock cairn: Human made stacks or piles of rocks. Their function can be to mark trails or territorial boundaries. In some cases, they represent ceremonial practices.

Rockshelter: A shallow, cave like space in an outcrop, or overhang of rock that is utilized by humans for shelter.

Runoff: The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff.

Sacred objects: objects that are considered to have a quality of sanctity and important to the performance of a ritual.

Sand: As a soil separates, individual rock or mineral fragments from 0.05 to 2.0 mm in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sand dune: An aeolian landform element built of sand-sized mineral particles. Dunes commonly occur on the leeward side of a Pleistocene lakebed.

Sandstone: Sedimentary rock predominantly containing sand-sized particles.

Seismic: movement of the earth and its crust expressed in vibrations and earthquakes.

Sheet erosion: The removal of a uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Silt: As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 mm) to the lower limit of very fine sand (0.05 mm). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site: One of the five NRHP property types. The physical location of a significant activity or event; often refers to archaeological sites or traditional cultural places, although the term also may be used to describe military properties such as testing ranges, treaty signing locations, and aircraft wrecks. All sites are the location of past human activities or events.

State Historic Preservation Officer (SHPO): The official appointed by the governor of each state or territory to carry out the functions defined in the NHPA and to administer the state's historic preservation program. SHPOs provide advice and assistance to federal agencies regarding their historic preservation responsibilities.

Stewardship: The management of resources entrusted to one's care in a way that preserves and enhances the resources and their benefits for present and future generations.

Stratified: Arranged in strata or layers.

Stratigraphic layers: Geographic layers or strata arranged due to composition, distribution, and succession of the strata.

Stream terrace: One of a series of platforms in a stream valley, flanking and parallel to the stream channel, originally formed near the level of the stream and representing the dissected remnants of an abandoned floodplain, streambed, or valley floor produced by a former stage of erosion or deposition.

Structure: One of the five NRHP property types. A work constructed for purposes other than human shelter, including bridges, tunnels, dams, roadways, and military facilities such as missiles and their silos, launch pads, weaponry, runways, and water towers.

Surface drainage: Runoff or surface flow of water from an area.

Terminal: The end or finishing of something. Sometimes referring to a finishing transition.

Terrace: An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour; an old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Terrain: Area of land in reference to its physical features.

Terrestrial: On the surface of the earth. Plants and animals that live on the surface of the earth are terrestrial.

Tertiary: The first period of the Cenozoic era of geologic time, following the Mesozoic era and preceding the Quaternary (from approximately 65 million to 2 million years ago). Epoch or series subdivisions include, in order of increasing age, Pliocene, Miocene, Oligocene, Eocene, and Paleocene.

Thermal feature: A type of archaeological feature that is associated with burning or extreme heat (i.e. hearth, oven).

Tinaja: A cavity or natural depression eroded into bedrock by stream or wind action and filled with direct rainfall or runoff. Small, rock pocket *tinajas* (formed by aeolian erosion) are found in rock outcrops away from streambeds. Stream channel *tinajas* (formed by alluvial action) are bedrock pools that range in size from small potholes to large plunge pools. These are one of the most reliable water sources in the Sonoran Desert. They can hold several hundreds of gallons and in some cases are perennial. *Tinajas* can be buried in sand but still retain subsurface water.

Topography: The relative position and elevation of the natural or man-made features of an area that describe the configuration of its surface.

Traditional cultural property (or place): A property that is eligible for inclusion in the NRHP because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history and (b) are important in maintaining the continuing cultural identity of the community. The traditional cultural significance of a historic property is derived from the role the property plays in a community's historically rooted beliefs, customs, and practices. Examples of properties possessing such significance include: a location associated with the traditional beliefs of a Native American group about its origins, its cultural history, or the nature of the world; a rural community whose organization, buildings and structures, or patterns of land use reflect the cultural traditions valued by its long-term residents; a location where Native American religious practitioners have historically gone, and are known or thought to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice; a place where Native Americans still go to collect traditional tools or raw materials to make traditional items such as basketry or pottery.

Transect: a linear line through space. Usually referenced as an individual line on a grid within archaeology. For example, during a pedestrian survey an archaeologist will systematically scan the ground of an area by walking in transects on a grid.

Tribe: A federally recognized tribe or other federally recognized Native American group or organization.

Tributary: a stream or river feeding a larger river or lake.

Undertaking: Any project, activity, action, or program wholly or partly funded under the direct or indirect jurisdiction of a federal agency. Includes projects and activities that are executed by or on behalf of a federal agency; federally funded; require a federal permit, license, or approval; or are subject to state or local regulation administered through delegation or approval authority by a federal agency. Also, any action meeting this definition that may affect the NRHP eligible resources and thereby triggers procedural responsibilities under 54 USC §§ 300101-307108.

Upland: Land at a higher elevation than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley: An elongate, relatively large, externally drained depression of the earth's surface that is primarily developed by stream erosion.

Valley fill: In glaciated regions, material deposited in stream valleys by glacial movement. In non-glaciated regions, alluvium deposited by heavily loaded streams.

Volcanic: Pertaining to the deep-seated, igneous processes by which magma and associated gases rise through the crust and are extruded onto the earth's surface and into the atmosphere. Also, the structures, rocks, and landforms produced by these processes.

Wash (dry wash): The broad, flat-floored channel of ephemeral stream, commonly with very steep or vertical banks cut in alluvium.

Weathering: All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Younger Dryas: A climatic period between 13,000-11,000 BP that saw a return to the cold, glacier like climate of the Pleistocene.