Printed on 30% post-consumer recycled material.

TABLE OF CONTENTS

Section Page No.

I. EXECUTIVE SUMMARY I-1
I.A Establishment of the Reserve (CMA, MSHCP/NCCP, Mitigation Banking Agreement, Memorandum of Understanding, Settlement Agreement, Conservation Easement) I-2
I.A.1 Lake Mathews Cooperative Management Agreement I-2
I.A.2 Lake Mathews MSHCP/NCCP I-2
I.A.3 Mitigation Banking Agreement I-2
I.A.4 Memorandum of Understanding I-3
I.A.5 Audubon Settlement Agreement I-3
I.A.6 Conservation Easement I-3
I.B Overall Goal and Purpose of the Reserve I-3
I.B.1 Overall Goal I-3
I.B.2 Purpose of the Reserve I-4
I.C Purpose of the Management Plan I-4
I.D Structure of the Reserve Management Plan I-4

II. INTRODUCTION ..... II -1
II.A Background (Documents and agreements that set forth establishment of the Reserve) II-1
II.A.1 Lake Mathews Cooperative Management Agreement II-2
II.A.2 Lake Mathews MSHCP/NCCP II-2
II.A.3 Audubon Settlement Agreement II-3
II.A.4 Lake Mathews Reserve Conservation Easement Grant II-4
II.A.5 6WHSKHQV¶.DQJDURR5DW+DELWDW&RQVHUY
II.A.6 6WHSKHQV¶.DQJDURR5DW+DELWDW0DQDJHPH
& Fire Management Plan for RCHCA Lands in the Lake Mathews and Steele Peak Reserves II-7
II.A.7 Western Riverside County MSHCP II-8
II.B Overall Goal, Purpose, and Scope of the MSHCP/NCCP II-9
II.C Overall Goal and Purpose of the Reserve Management Plan II-10
II.C.1 Prior Management Activities II-10
II.C.2 Purpose and Need II-10
II.C.3 Overall Goal and Scope II-10
II.D Overall Vision II-11
II.D.1 Mission Statement II-12
II.D.2 Vision Statement II-12

TABLE OF CONTENTS (CONTINUED)

Section Page No.

II.E Plan Area and Map II-12
II.F Structure and Use of the Reserve Management Plan (How it would be used in decision-making and development of work plans) II-13
II.F.1 Structure of the Reserve Management Plan II-13
II.F.2 Use of the Reserve Management Plan II-31
II.G Management Decisions II-31
II.G.1 Identification of Long-Term Priorities II-31
II.G.2 Use of Adaptive Management Process II-32

III. RESERVE SETTING AND ENVIRONMENTAL CONSTR AINTS ..... III -1
III.A Reserve Setting III-1
III.A.1 Current and Proposed Surrounding Land Uses III-1
III.A.b Location, Size, and Configuration III-4
III.A.3 Easements III-9
III.A.4 Infrastructure (Roads and Water Management Facilities) III-10
III.A.5 MWD and Affiliated Activities (As authorized by the MSHCP/NCCP [e.g., facility operation, maintenance and construction, water quality protection, etc.]) III-12
III.B Environmental Conditions III-17
III.B.1 Climate and Hydrology III-17
III.B.2 Physical Conditions (Soils and Topography) III-18
III.B.3 Fire History III-42
III.C Biological Resources III-44
III.C.1 Botanical Resources (General, Covered Species, and Other Species of Interest) III-44
III.C.2 Animal Resources (Species Guilds, Habitat Connectivity) III-111
III.C.3 Covered Species III-115
III.D Management Units III-149
III.D.1 Zone 1 ..... III-150
III.D.2 Zone 2 ..... III-161
III.D.3 Zone 3 ..... III-162
III.D.4 Zone 4 ..... III-162
III.D.5 Zone 5 ..... III-165
III.E Cultural Resources (Regulatory Context and Surveys) III-167
III.E.1 Surveys III-168
III.E.2 Regulatory Context III-168

TABLE OF CONTENTS (CONTINUED)

Section			Page No.
IV.	RESERVE MANAGEMENT		IV-1
	IV.A	Structure, Purpose, Authority and Administration of the RMC	IV-1
		IV.A.1 Structure	IV-1
		IV.A.2 Purpose	IV-3
		IV.A.3 Authority	IV-4
		IV.A.4 Administration	IV-4
	IV.B	Management Staff	IV-6
		IV.B.1 Management Personnel	IV-6
	IV.C	Habitat Management Strategies	IV-9
		IV.C.1 Management Strategies	IV-10
		IV.C.2 Summary of Management Strategies	IV-21
	IV.D	Management Considerations	IV-26
		IV.D.1 Trespass, Vandalism, and Trash Dumping	IV-33
		IV.D.2 Pest Management	IV-34
		IV.D.3 Edge Effects	IV-37
	IV.E	Conservation Measures	IV-37
		IV.E.1 Protected Areas	IV-37
		IV.E.2 Seed Collection and Translocation	IV-38
		IV.E.3 Reserve Access	IV-38
		IV.E.4 Bat Management	IV-39
		IV.E.5 Sensitive Habitat Management	IV-39
	IV.F	Management Opportunities (What is and is not allowed or desired for management)	IV-39
		IV.F.1 Access (Public access, research, management, MWD operations, and existing easement holders)	IV-40
		IV.F.2 Biological Resources (Monitoring Covered Species, control of invasive species, habitat restoration, individual species management, research, and climate change)	IV-51
		IV.F.3 Cultural Resources	IV-77
		IV.F.4 Facility Maintenance (Facilities, roads, fencing, fire breaks, office, and equipment)	IV-79
		IV.F.5 Fire Management Plan	IV-83
		IV.F.6 Coordination with Other Conservation Efforts	IV-85
		IV.F.7 Management Summary	IV-86
	IV.G	Management Goals, Objectives, and Strategies	IV-88
V.	REFERENCES		V-1

TABLE OF CONTENTS (CONTINUED)

Page No.

APPENDICES

A Species Accounts: Covered Species Known to Occur in the Reserve
B Lake Mathews Reserve Fire Management Plan
C Plant Species Observed On Site
D Wildlife Species Observed on Site
E Vegetation Communities Within the Reserve
F Special-Status Plant and Wildlife Species with Potential to Occur within the Reserve
G Management for Covered Species
H Rodenticide Use
I Habitat S X L W D E L O L W \ , Q G Garland Rd 6 W H S K H Q V ¶
J Cactus Wren Habitat Restoration Guidelines
K Climate Change Effects and the Lake Mathews Reserve Management Plan

FIGURES

2-1 Regional Map II-15
2-2 Vicinity Map II-17
2-3 Plan Area Components II-19
2-4 General Plan Land Use - Riverside County II-21
2-5 General Plan Land Use - City of Riverside II-23
2-6 Hydrology Map II-25
2-7 Adjacent Conserved Lands II-27
2-8 Lake Mathews - Estelle Mountain Core Reserve Components II-29
3-1 Western Riverside County MSHCP Core/Linkage III-5
3-2 Cajalco Road Proposed Alignments III-7
3-3 Easement Map III-13
3-4 Reserve Security Map III-15
3-5 Regional Hydrology Map III-21
3-6 Soils Index Map III-23
3-6a Soils Map - Legend III-25
3-6b Soils Map III-27
3-6c Soils Map III-29
3-6d Soils Map III-31
3-6e Soils Map III-33
3-6f Soils Map III-35

TABLE OF CONTENTS (CONTINUED)

Page No.

FIGURES

3-6g Soils Map III-37
3-6h Soils Map III-39
3-7 Geology Index Map III-45
3-7a Geology Map - Legend III-47
3-7b Geology Map III-49
3-7c Geology Map III-51
3-7d Geology Map III-53
3-7e Geology Map III-55
3-7f Geology Map III-57
3-7g Geology Map III-59
3-7h Geology Map III-61
3-8 Fire Regime III-63
3-9 Vegetation Community Mapping - Index Map III-69
3-9a Vegetation Community Mapping - Legend III-71
3-9b Vegetation Community Mapping III-73
3-9c Vegetation Community Mapping III-75
3-9d Vegetation Community Mapping III-77
3-9e Vegetation Community Mapping III-79
3-9f Vegetation Community Mapping III-81
3-9g Vegetation Community Mapping III-83
3-9h Vegetation Community Mapping III-85
3-9i Vegetation Community Mapping III-87
3-9j Vegetation Community Mapping III-89
3-9k Vegetation Community Mapping III-91
3-9l Vegetation Community Mapping III-93
3-9m Vegetation Community Mapping III-95
3-9n Vegetation Community Mapping III-97
3-9o Vegetation Community Mapping III-99
3-9p Vegetation Community Mapping III-101
3-9q Vegetation Community Mapping III-103
3-9r Vegetation Community Mapping III-105
3-9s Vegetation Community Mapping III-107
3-9t Vegetation Community Mapping III-109
3-10 Covered Plant Species III-117

TABLE OF CONTENTS (CONTINUED)

Page No.

FIGURES

3-11 Critical Habitat III-125
3-12 Covered Amphibian and Reptile Species III-127
3-13 Covered Bird Species III-129
3-14 Covered Mammal Species III-131
3-15 California Gnatcatcher and Coastal Sage Scrub Species Suitable Habitat III-133
3-16 Burrowing Owl and Grassland Species Suitable Habitat III-143
3-17 Riparian Species Suitable Habitat III-145
3-18 Vernal Pools Suitable Habitat III-147
3-19 Management Zones III-151
3-19a 6 W H S K H Q V ¶ . D Q J D U R R- Slope III-153
3-19b 6 W H S K H Q V ¶ . D Q J D U R R- Soils III-155
3-19c 6 W H S K H Q V ¶ . D Q J D U R R- Vegetation Communities III-157
3-19d 6 W H S K H Q V ¶ . D Q J D U R R- Cumulative III-159
3-20 5 X W K ¶ V & X F N R R % H H III-163
4-1 Grazing Protection Zones IV-15
4-2 Herbicide Restriction Zones IV-27
4-3 Temporal Management Considerations for 5 Management Strategies IV-29
4-4 Non-Native Plant Species IV-31
4-5 Avoid Areas IV-57

TABLES

3-1 Acreages of Plan Area Components III-4
3-2 Soil Types and Acreages within the Reserve III-19
3-3 Fire History of the Lake Mathews Reserve III-42
3-4 Summary of Vegetation Communities and Acreages within Reserve III-66
3-5 Wildlife Guild Habitat Types and Associated Macrogroups within the Reserve III-112
3-6 Species Presence by Management Zone and Habitat Type III-165
4-1 Summary of Alternative Habitat Management Strategies IV-22
4-1 Summary of Alternative Habitat Management Strategies IV-22
4-2 Authorized Public Uses within the Reserve IV-43
4-3 Example Survey Methods for Covered Species and Guilds IV-52
4-4 Conceptual Management Schedule IV-56
4-5 Control Methods for Selected Non-Native Species IV-60

TABLE OF CONTENTS (CONTINUED)

Page No.

TABLES

4-6 List of Pesticides Approved for Application by MWD (as of January 11, 2011) IV-66
4-7 Restoration Strategies Identified for Habitat Guilds IV-69
4-8 Possible Reserve Research Suggestions IV-76
4-9 Road Maintenance Activities within the Reserve IV-80

INTENTIONALLY LEFT BLANK

LIST OF ACRONYMS/ABBREVIATIONS

Acronym/Abbreviation	Meaning
AIR	Aerial Information Systems
BLM	U.S. Bureau of Land Management
CAL FIRE	California Department of Forestry and Fire Protection
CDF	California Department of Forestry
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CIR	color Infrared
CMA	Cooperative Management Agreement
CNPS, GIS, MCV	California Native Plant Society
DWR	Department of Water Resources
EA	environmental assessment
EIR	environmental impact report
FMP	fire management plan
FMU	fire management unit
GIS	geographic information system
HCP	habitat conservation plan
HMMP	habitat management and monitoring plan
MCV	Manual of California Vegetation
MND	mitigated negative declaration
MSHCP	multiple species habitat conservation plan
MWD	Metropolitan Water District
NCCP	natural community conservation plan
RCA	Regional Conservation Authority
RCHCA	Riverside County Habitat Conservation Authority
Reserve	Lake Mathews Reserve
RMC	Reserve Management Committee
RMP	Reserve Management Plan
SSC	Species of Special Concern
USFWS	U.S. Fish and Wildlife Service

INTENTIONALLY LEFT BLANK

I. EXECUTIVE SUMMARY

This Reserve Management Plan (RMP) is intended to guide management goals, objectives, and strategies for the 5,110.4-acre Lake Mathews Multiple Species Reserve (Reserve) in western Riverside County. The Reserve, centered on the Lake Mathews reservoir owned and operated by the Metropolitan Water District of Southern California (MWD), was established in 1995 through a Cooperative Management Agreement (CMA) among MWD, the Riverside County Habitat Conservation Agency (RCHCA), California Department of Fish and Game (CDFG) and the U.S. Fish and Wildlife Service (USFWS). The implementation agreement resulting from the CMA is a Multiple Species Habitat Conservation Plan and Natural Community Conservation Plan (MSHCP/NCCP) between MWD and the RCHCA to address and mitigate impacts to sensitive species and resources resulting from MWD activities and operations in the Plan Area, future MWD projects in the region, and conservation goals of the 6 W H S K Kangaroo Rat Habitat Conservation Plans (KR HCP). The Reserve comprises a previously established Ecological Reserve and the Mitigation Bank created by the CMA, and covered by a Conservation Easement. The Reserve conserves a total of 65 species (Covered Species), of which 50 are currently found within the Reserve and 15 have potential to occur within the Reserve.

Natural communities and species found within the Reserve are unique to Southern California, and are increasingly threatened by habitat loss and fragmentation due primarily to increasing urbanization and development pressures. The Reserve includes sage scrub and grassland communities, and wetland or riparian habitats line much of the edge of Lake Mathews and its tributaries. Conservation priorities focus on maintaining high-quality habitat for the 65 Covered Species through adaptive management and the guidance of both a Reserve Manager and a Reserve Management Committee (RMC). These entities should work cooperatively to guide management, according to the best interests of biological resources and MWD to maintain Lake Mathews as a water storage facility.

The Lake Mathews Reserve is part of the Lake Mathews/Estelle Mountain Core Reserve. The Core Reserve encompasses approximately 11,243 acres in total. This RMP is the managing document for the Lake Mathews Reserve, and the remainder of the Core Reserve that is owned by the RCHCA L V J R Y H U Q H G E \ W K H 6 W H S K H Q V ¶ . D Q J D U R R 5 D W + Plan and Fire Management Plan for RCHCA Lands in the Lake Mathews and Steele Peak Reserves, discussed in Section II.A.f.

This RMP details the biological resources located within the Reserve and identifies key management strategies that can be used to guide the Reserve according to an ecosystem-based approach to adaptive management. It is understood that ecosystems are dynamic and constantly in flux, and this RMP seeks to maintain those processes while managing for threats that may compromise the goals of biodiversity.

I.A Establishment of the Reserve (CMA, MSHCP/NCCP, Mitigation Banking Agreement, Memorandum of Understanding, Settlement Agreement, Conservation Easement)

I.A.1 Lake Mathews Cooperative Management Agreement

The CMA (December 1995) provides the framework for creating the Lake Mathews Reserve and MSHCP/NCCP, and establishes the RMC consisting of one representative from each of the four agencies with jurisdiction in the Reserve: MWD, RCHCA, CDFG, and USFWS. The CMA authorizes management for the Combined Reserve, which is also referred to as the Lake Mathews-Estelle Mountain Core Reserve. This Core Reserve consists of the Lake Mathews Reserve, RCHCA-owned land within the southern portion of the Core Reserve, and CDFG-owned land within the Estelle Mountain Ecological Reserve.

I.A.2 Lake Mathews MSHCP/NCCP

The Lake Mathews Reserve was established in July 1995 as mitigation for impacts to sensitive species resulting from operation of the Lake Mathews reservoir located within the sphere of influence of the City of Riverside in Riverside County, California. MWD and RCHCA developed an MSHCP/NCCP, which included the establishment of the Reserve and provisions for research and management, funding, and maintenance. The Plan Area defined in the MSHCP/NCCP includes MWD Operations Areas, Plan Area Projects, the Mitigation Bank, and an Existing State Ecological Reserve. The entirety of the Lake Mathews Reserve includes only property located within the Mitigation Bank and the Existing State Ecological Reserve.

I.A.3 Mitigation Banking Agreement

The Mitigation Banking Agreement (December 1995) was established among MWD, RCHCA, &'')* DQG 86):6 WR PLWLJDWH IRU 0:'¶V ZDWHU GHOLYHU\ western Riverside County. In creating the Mitigation Bank, MWD mitigated for projects located within the Plan Area (as defined in the MSHCP/NCCP) as well as projects located outside of the Plan Area. A total of 2,544.9 acres owned by MWD in the vicinity of Lake Mathews were dedicated as a Mitigation Bank per the aforementioned agreement. Further, the Mitigation Banking Agreement provided for the Existing Reserve, adjoining the Mitigation Bank, to be incorporated into the Lake Mathews Reserve that is to be managed conjunctively with the remainder of the Lake Mathews-Estelle Mountain Core Reserve designated by RCHCA under the SKR HCP.

I.A.4 Memorandum of Understanding

Two separate Memorandum of Understanding (MOU) were authorized as part of the approval of the MSHCP/NCCP, CMA, and Mitigation Banking Agreement. A Fish and Game Code Sections 2081 and 2835 MOU was entered into agreement in December 1995 among MWD, RCHCA, and CDFG. A second MOU was entered into by MWD, RCHCA, and USFWS. The MSHCP/NCCP was prepared to ensure issuance of appropriate incidental take permits for listed species and species that may become listed in the future through Section 10(a) of the Federal Endangered Species Act and Section 2081 of the California Endangered Species Act.

I.A.5 Audubon Settlement Agreement

A lawsuit following the establishment of the Reserve resulted in a Settlement and General Release Agreement (Audubon Settlement Agreement, Audubon 2002) between the San Bernardino Valley Audubon Society (Audubon), MWD, CDFG, and RCHCA which resulted in the settlement and release of claims Audubon had against MWD. This agreement also provided for conditional public access to the Reserve.

I.A.6 Conservation Easement

On June 21, 2005, MWD granted a conservation easement to the RCHCA in a document titled the Lake Mathews Reserve Conservation Easement Grant. The Conservation Easement ensures that the area covered by the easement will be retained as open space in perpetuity. It restricts uses of the property that would significantly impair or interfere with W K H S U R S H U W \ ¶ V F R Q values and authorizes the credit for 1,269.3 acres of occupied Stephens' kangaroo rat habitat W R Z D U G W K H 5 & + & $ ¶ V R E O L J.D W L R Q V X Q G H U W K H 6 . 5 + & 3

I.B Overall Goal and Purpose of the Reserve

I.B.1 Overall Goal

The three goals for the Reserve, as defined in Volume 2 ±Biological Resources± of the Lake Mathews MSHCP/NCCP (MWD and RCHCA 1995b, p. 7-9)

1. Protect existing natural habitat types on the Combined Reserve
2. Improve degraded habitat conditions by enhancing or restoring suitable habitat for Covered Species within the Reserve
3. Ensure that operation and maintenance of Lake Mathews as a water supply facility are not impaired

I.B.2 Purpose of the Reserve

The purpose of the Reserve is to achieve the aforementioned goals through an ecosystem-based approach to management. The Lake Mathews Reserve should be managed as an integrated ecological unit using adaptive management strategies to address management for multiple species that are of conservation concern. Populations of Covered Species should remain at stable, self-sustaining levels, although it is acknowledged that populations are in flux due to natural environmental factors (e.g., drought, wildfire).

Surrounding development in the region is adding additional conservation pressures in an area where development and habitat loss are increasing at an alarming pace. Conservation efforts underway in western Riverside County seek to mitigate for the impacts of urbanization by connecting large, contiguous blocks of habitat such that conservation values are preserved and the threats of extirpation are ameliorated. The Reserve is considered as part of this regional effort.

I.C Purpose of the Management Plan

This RMP is designed to guide management of the Reserve for the next 15 years (2012-2027), although it should be interpreted as a living document that is changed and updated as needed. This plan outlines the biological resources and sensitive species to be considered during management activities, the general and species-specific goals for the Reserve, and the plans and schedules needed to achieve these goals.

Management of the Reserve is set to maintain and support viable populations of sensitive species and other wildlife, as well as the ecosystem processes and biological resources these species depend on. Adaptive management strategies using an ecosystem-based approach are needed to manage large, contiguous areas of habitat for these conservation values. Effectiveness of management strategies should be evaluated based on continuing viable populations, which are expected to naturally fluctuate due to environmental factors such as natural disturbances (e.g. drought, wildfire), human-related impacts, and the results of enhancing or altering biological resources within the Reserve.

I.D Structure of the Reserve Management Plan

This RMP is designed such that it should serve as a constant tool and resource for management decisions made by both the Reserve Manager and the RMC. Principally, it seeks to offer a clear and thorough framework of the governing documents, management decision process, biological resources, management goals, and objectives and strategies that are to be used to further this end.

II. INTRODUCTION

The Lake Mathews Reserve Management Plan (RMP) provides a management plan for sensitive habitat and species native to western Riverside County found within the 5,110.4-acre Lake Mathews Multiple Species Reserve (Reserve). The Reserve was created according to guidelines and principles outlined by the Metropolitan Water District of Southern California (MWD) and Riverside County Habitat Conservation Agency (RCHCA) in the Lake Mathews Multiple Species Habitat Conservation Plan and Natural Community Conservation Plan (MSHCP/NCCP, July 1995). Sixty five plant and animal species are conserved within the Reserve, although 50 of these species have been recorded within the Reserve; two species of particular management concern are the federally endangered and state WKUHDWHQHG 6WHSKHQV¶ NDQJDURR UDW federally threatened coastal California gnatcatcher (Polioptila californica californica).

This RMP is based on management goals outlined in the 1995 Lake Mathews MSHCP/NCCP, Cooperative Management Agreement (CMA, December 1995), conservation easements, and other related agreements. The Plan Area defined in the Lake Mathews MSHCP/NCCP totals 5,993.5 acres, of which 5,110.4 acres are conserved as the Lake Mathews Reserve, and 883.1 acres are reserved for MWD for current and future uses located within the Operations Areas and Plan Area Projects. The Lake Mathews Reserve consists of the Existing State Ecological Reserve, established in 1979 by an agreement between the California Department of Water Resources and the California Department of Fish and Game (CDFG) for impacts relating to operation of the Lake Mathews reservoir, and the Mitigation Bank, which constitutes mitigation for impacts to listed species due to planned and future MWD projects. Additionally, the Mitigation Bank partially fulfills requirements of a multi-agency regional 6WHSKHQV¶ .DQJDURR 5DW Habitat Conservation Plan (SKR HCP). This RMP elaborates on the principles and objectives of the Lake Mathews MSHCP/NCCP and details specific management goals and strategies for the Reserve.

The Reserve is to be conserved in perpetuity, and as appropriate, expansions to the Reserve may be utilized to increase habitat for Covered Species. This RMP is valid for a total of 15 years (2013-2028), and updates to the RMP should be administered at that time and subsequently every 15 years. However, the RMP should be considered a living document that is updated and revised as needed, with regular reviews, as well as comprehensive updates to the entire RMP, as determined by the RMC.

II.A Background (Documents and agreements that set forth establishment of the Reserve)

Several plans either directly or indirectly relate to the establishment of the Reserve. The Lake Mathews MSHCP/NCCP directed the creation of the Reserve and outlines management responsibilities and objectives for conservation of sensitive species and biological resources. The

Lake Mathews MSHCP/NCCP, along with associated agreements relating to management of the Reserve, is the principal governing document for the Reserve and supersedes all other management plans for these lands. Authority for the MSHCP/NCCP was granted by a Cooperative Management Agreement (CMA). The Lake Mathews Conservation Easement and Audubon Settlement Agreement further clarify measures outlined in the Lake Mathews MSHCP/NCCP. The last three plans addressed in this section directly or indirectly address conservation goals within the Reserve and outline management priorities for conservation throughout western Riverside County ZLWK SDUWLFXODU IRFXV RQ 6WHSKH

II.A.1 Lake Mathews Cooperative Management Agreement

The CMA was jointly signed by CDFG, USFWS, MWD, and RCHCA on December 5, 1995 and is a governing document. The CMA also establishes the governing body for the Lake Mathews Reserve ± a Reserve Management Committee (RMC) ± consisting of one representative from each of the four agencies: MWD, RCHCA, CDFG, and USFWS.

II.A.2 Lake Mathews MSHCP/NCCP

The Lake Mathews MSHCP/NCCP was established in July 1995 by a CMA among MWD, RCHCA, CDFG, and USFWS to mitigate for impacts to sensitive species resulting from MWD operations and projects at Lake Mathews, including a reservoir operated by MWD to provide water supplies to customers in Southern California. The Lake Mathews MSHCP/NCCP is the governing document that implements the CMA.

A Mitigation Bank within the Reserve was established to provide mitigation for MWD Operations Areas and Plan Area Projects, and for future projects within the region but not located within the Plan Area. Additionally, the Mitigation Bank provides mitigation credit for 6WHSKHQV¶ NDQJDUR UDW Future Plan Area Projects are listed in the MSHCP/NCCP, and include MWD projects and :HVWHUQ 0XQLFLSDO :DWHU (Western) operations area improvements.

The Lake Mathews MSHCP/NCCP is the basis for a State of California Fish and Game Code Section 2081/2835 Agreement regarding take of sensitive species found within the impact area of Lake Mathews, and associated with related water supply facilities and continuing operations. The Reserve created by the Lake Mathews MSHCP/NCCP is also the basis for a federal Endangered Species Act 6HFWLRQ FRQIHUHQFH RSLQLRQ IRU /D 6WHSKHQV¶ NDQJDUR UDW and coastal California gnatcatcher.

The Lake Mathews MSHCP/NCCP identifies and conserves 50 sensitive species that occur within the Plan Area, as well as 15 additional sensitive species with a high potential to occur. Additionally, the Lake Mathews MSHCP/NCCP conserves sensitive habitat types found within the Plan Area, including Riversidean sage scrub and southern willow scrub. Management of the Reserve is designed to conserve the 65 sensitive species (Covered Species) and their associated habitats.

Three primary goals were determined to guide Reserve management in the Lake Mathews MSHCP/NCCP Volume 2 Biological Resources (MWD and RCHCA 1995b)

1. Protect existing natural habitat types on the Combined Reserve
2. Improve degraded habitat by enhancing or restoring suitable habitat for Covered Species within the Reserve
3. Ensure that operation and maintenance of Lake Mathews as a water supply facility is not impaired.

Also outlined in the Lake Mathews MSHCP/NCCP are the responsibilities of the management committee, responsibilities of the Reserve Manager, requirements for annual work plans, fire management, provisions to increase public access, and funding. The conditions of the Mitigation Bank are expressed, allowable activities within the Plan Area are enumerated, and authorizations of compliance with state and federal Endangered Species Acts are provided (Lake Mathews MSHCP/NCCP Volume 1 Conservation Plan (MWD and RCHCA 1995a).

II.A.3 Audubon Settlement Agreement

A lawsuit following the establishment of the Reserve resulted in the Settlement and General Release Agreement (Audubon Settlement Agreement, Audubon 2002) between the San Bernardino Valley Audubon Society (Audubon), MWD, CDFG, and RCHCA which resulted in the settlement and release of claims Audubon had against MWD. Audubon contested 0 : ' ¶ V approval of a mitigated negative declaration/environmental assessment (MND/EA) for the Lake Mathews MSHCP/NCCP. Audubon alleged that 0 : ' ¶ V environmental review of the Lake Mathews MSHCP/NCCP was inadequate pursuant to the California Environmental Quality Act (CEQA) and that an environmental impact report should have been prepared for the Lake Mathews MSHCP/NCCP. Audubon also claimed that CDFG did not have authority to issue an incidental take permit pursuant to the California Endangered Species Act.

The Settlement Agreement specifies conditions regarding the RMC. The agreement also specifies conditions regarding public access to the Reserve. New development or construction within the Reserve (e.g., MWD construction of a new water facility) would require, at a minimum, a negative declaration pursuant to CEQA for the agreement. The agreement substitutes the Habitat Value Unit calculation methodology for mitigation for impacts to protected species in the Lake Mathews MSHCP/NCCP with alternative mitigation methodology. The agreement dictates that the MND/EA shall not constitute project-level CEQA clearance for any subsequent project that would rely upon take authorization or mitigation credits through the plan. The agreement also requires that CDFG review the Lake Mathews Fire Management Plan.

II.A.4 Lake Mathews Reserve Conservation Easement Grant

The Lake Mathews Reserve Conservation Easement Grant by MWD to RCHCA was recorded in July of 2005. The Conservation Easement ensures that the area covered by the conservation easement will be retained as open space in perpetuity. It restricts uses of the property that would significantly impair or interfere with WKH SURSHUW\¶V FRQVHUYDWLRQ YDOX It states that the Reserve is to be managed to conserve, protect, restore, and enhance the land consistent with the CMA and MSHCP/NCCP, and that the uses of the Easement will be consistent with the CMA, MSHCP/NCCP, and Audubon Settlement Agreement. The Conservation Easement prohibits any and all incompatible uses that may adversely affect the conservation values of the property, including unseasonal watering, use of herbicides or biocides not authorized pursuant to the Lake Mathews MSHCP/NCCP, surface mining and oil exploration, incompatible fire protection activities, and introduction of exotic plant species. The easement was granted pursuant to the Lake Mathews MSHCP/NCCP

II.A.5 SWHSKHQV¶ .DQJDURR 5DW +DELWDW Conservation Plan (SKR HCP)

6WHSKHQ¶V .DQJDURR rat was listed as an endangered species by USFWS in 1988. This designation effectively halted new development on more than 22,000 acres in western Riverside County. The RCHCA was created in 1990 under the joint exercise of powers for the purpose of developing a SKR HCP, acquiring land, and managing habitat for the 6WHSKHQV¶ .DQJDURR. This management group, formed by the County of Riverside and the Cities of Hemet, Lake Elsinore, Moreno Valley, Perris, Riverside, and later, Corona, Murrieta, and Temecula, was created to protect the species and its habitat from disturbances that could result in take of the species (RCHCA 1996).

A short-term SKR HCP was approved by USFWS and CDFG in August 1990 as an interim conservation program designed to provide protection for 6WHSKHQV¶ .DQJDURR UDW while a plan to establish permanent reserves was being developed.

The long-term SKR HCP, the +DELWDW &RQVHUYDWLRQ 3ODQ IRU WKH Western Riverside County, was prepared by RCHCA, and approved by USFWS in agreement with CDFG on May 6, 1996. The agreement creates a network of reserves within western Riverside County occupied by and to be PDQDJHG IRU 6WHSKHQV¶ .DQJDURR A total of 30,000 DFUHV LQFOXGHG DV UHVHUYHV DUH RFFXSLHG E\ 6WHSKH

The SKR HCP authorizes incidental take of 6WHSKHQV¶ .DQJDURR UDW and describes the conservation, mitigation, and monitoring measures that are applied under the Section 10(a) permit issued by USFWS and Management Authorization issued by CDFG.

The SKR HCP describes the proposed conservation, mitigation, and monitoring measures to be implemented for the preservation of the federally endangered Stephens' kangaroo rat (SKR). The HCP establishes a regional system of Core Reserves throughout western Riverside County for the specific conservation of Stephens' kangaroo rat and the ecosystem upon which it depends.

The Lake Mathews Reserve is part of the Lake Mathews/Estelle Mountain Core Reserve, designated for the protection of SKR habitat. The Lake Mathews/Estelle Mountain Core Reserve is the second largest Core Reserve (11,243 acres) and has the highest level of Stephens' kangaroo rat occupancy (4,264 acres) of all eight Core Reserves. This Core Reserve consists of the Lake Mathews Reserve as well as RCHCA, Riverside County, BLM, and CDFG owned land located immediately south of the Lake Mathews Reserve.

The RCHCA Reserve Management Plan, Habitat Monitoring Plan and Fire Management Plan for RCHCA Lands in the Lake Mathews and Steele Peak Reserves (Dudek 2007), has been implemented for the Lake Mathews/Estelle Mountain Core Reserve.

Management goals and objectives identified in the SKR HCP that pertain to management for Stephens' kangaroo rat within the Reserve include (RCHCA 1996):

- Maintain viable populations of Stephens' kangaroo rat within the reserve system and each of the Core Reserves sufficient to ensure the long-term persistence of the species in the SKR HCP area
- Promote the maintenance and enhancement of the ecosystem upon which the Stephens' kangaroo rat depends
- Develop and continually refine management practices which identify and adapt to changing conditions both within the reserves and on lands adjacent to them
- Establish a core wildlife reserve system that is managed to enhance the preservation of biological diversity in western Riverside County
- Assist in determining future priorities to add lands that have definable conservation and/or management value to the reserve system
- Consistent with the primary goal of ensuring Stephens' kangaroo rat persistence, establish programs which permit human access for activities deemed compatible with Stephens' kangaroo rat habitat conservation

Policies and procedures identified in the SKR HCP that may help to guide management of the Reserve include (RCHCA 1996):

- Maintain existing habitat values for 6 W H S K H Q V ¶ N D Q J D U R R U D W
- Enhance habitat values for 6 W H S K H Q V ¶ Z K H U H D S S U R S U L D W H U D W
- Maintain or enhance habitat values for other species where not in conflict with 6 W H S K H Q V ¶ kangaroo rat management goals
- Minimize the need for active management by allowing natural processes to occur where not in conflict with other management goals
- Manage the reserve system adaptively by (a) integrating existing knowledge with the results of ongoing experimental management, and (b) refining management techniques in response to changing conditions.

The RMC established by the Lake Mathews CMA is responsible for managing conserved habitat for 6 W H S K H Q V ¶ L Q W K H / D N H 0 D W K H Z V (V W H O O H 0 R X Q W D L Q & R U H 5 H V H U Y H, which includes the Lake Mathews Reserve (RCHCA 1996). Management strategies that generally address 6 W H S K H Q V ¶ L Q F O X G H K D E L W D W S U R W H F W L R Q, enhancement and/or restoration of suitable habitat, and ensuring that operations by MWD do not affect the ability for the Core Reserve to function as a high-quality ecological area subject to rights retained by MWD.

According to the SKR HCP, MWD is obligated to enhance and restore habitat, coordinate management of its Operations Areas with the RMC, and maintain access roads, fencing, and fire breaks. The RCHCA paid MWD for the conservation easement, with the funds set aside in a non-wasting endowment to manage the Lake Mathews Reserve.

Recent management activities within the Lake Mathews Estelle Mountain Core Reserve include (Shomo, pers. comm. 2012; RCHCA 2010):

- Initiation of cooperative management efforts with CAL FIRE, BLM, and Waste Management
- Grazing of over 400 acres, combined with pre- and post-grazing vegetation surveys, to measure grass height, density, and thatch thickness
- Completion of a vegetation management plan and prescribed burn on 120 acres
- Installation of 50 artificial burrows for burrowing owl (*Athene cunicularia*) and planting of 50 cactus patches (*Opuntia* spp.) for cactus wren (*Campylorhynchus brunneicapillus*)
- General maintenance activities, including monitoring of illegal activities, repairing fences and signs, and cleanup on an old orchard site.

II.A.6 Stephens' Kangaroo Rat Habitat Management and Monitoring Plan for RCHCA Lands in the Lake Mathews and Steele Peak Reserves

The Stephens' Kangaroo Rat Habitat Management and Monitoring Plan and Fire Management Plan for RCHCA Lands in the Lake Mathews and Steele Peak Reserves (Dudek 2007) identifies management goals and objectives for Stephens' kangaroo rat in the RCHCA-owned parcels within the Lake Mathews/Estelle Mountain Core Reserve and Steele Peak Core Reserve.

The RCHCA-owned parcels addressed in the aforementioned management plan are generally south of the Lake Mathews Reserve. The Steele Peak Core Reserve is located southeast of the Lake Mathews Reserve, east of Interstate 15 and the City of Perris; it is not adjacent to the Lake Mathews/Estelle Mountain Core Reserve and is a separate Core Reserve under the SKR HCP reserve system.

II.A.6.a Habitat Management and Monitoring Plan

The Habitat Management and Monitoring Plan (HMMP) establishes management goals and objectives for Stephens' kangaroo rat in the RCHCA-owned parcels within the Lake Mathews/Estelle Mountain Core Reserve and the Steele Peak Core Reserve. Although the management plan does not directly address property held under the Lake Mathews Reserve, many of the same management goals are directly applicable to the scope of this RMP. Management goals within these areas focus primarily on protecting and increasing available habitat for Stephens' kangaroo rat. Other management goals address invasive species and air pollution, native predators, trespass/vandalism/trash dumping, off-highway vehicles, and illegal shooting.

Management strategies utilized within the Lake Mathews and Steele Peak areas to maintain and enhance habitat for Stephens' kangaroo rat and other listed species while promoting overall biological diversity are (1) sheep grazing, (2) mowing, (3) herbicides, and (4) controlled burns. The HMMP proposes a combination of sheep grazing, mowing, and fire as the primary management methods. These methods have been shown to be effective in managing Stephens' kangaroo rat habitat within the Southwestern Multi-Species Reserve (Kelt et. al. 2005). Sheep grazing and prescribed burns are used effectively over large habitat areas, although restrictions and local site conditions may make these methods less cost effective. All measures need proper controls to be effective and not result in adverse impacts, particularly to the Lake Mathews watershed.

Unlike the Lake Mathews Reserve, the RCHCA-owned land addressed in the HMMP is intended to be utilized to manage primarily for Stephens' kangaroo rat. RCHCA-owned parcels focus on Stephens' kangaroo rat as the species for conservation. Although the HMMP focuses management on the kangaroo rat, it is acknowledged that many other sensitive species benefit from management strategies employed within the area.

II.A.6.b Fire Management Plan

The Fire Management Plan (FMP) creates a program to manage wildland fires based on the goals of the HMMP and public safety needs. It gives highest priority to public safety while providing a framework for prevention, suppression, and post-suppression activities. The goals of the FMP include (Dudek 2007):

- Transfer of critical Reserve information to, and absorption by, CAL FIRE Riverside unit firefighting personnel responsible for incident response
- Avoidance of Reserve-wide, catastrophic wildfires that negate the Reserve's ultimate goal of protecting and increasing the populations of W H S K H Q V ¶ N D Q J D U R R U D W
- Restoration or enhancement of the quality of degraded vegetation communities and habitat types in a manner consistent with overall conservation goals for species and natural communities
- Minimization of loss of current mature coastal sage scrub
- Enhancement of currently degraded shrublands
- Maintenance of native grassland
- Removal of non-native annual grassland in favor of low-growing annual forbs and native grasses
- Development of fuel-loading reduction methods that are consistent with overall Reserve management goals
- Provision for public safety through response plans and prevention activities
- Provision for adaptive fire management.

The FMP discusses appropriate fire prevention techniques and fire response. Techniques to prevent fire are often compatible with management strategies to increase suitable habitat for 6 W H S K H Q V ¶ . Fire response within the RCHCA-owned parcels is assigned a response (assertive, standard, or reserved) based on habitat type, proximity to structures and human habitation, fuel load, sensitive species present, and other considerations.

II.A.7 Western Riverside County MSHCP

The Western Riverside County MSHCP is a comprehensive, multi-jurisdictional plan that conserves sensitive plant and animal species and associated habitats throughout western Riverside County (RCTLMA 2003a). The plan was approved on June 17, 2003 by the County of Riverside and approved and permitted on June 22, 2004 by USFWS. The Western Riverside County MSHCP Plan Area includes unincorporated western Riverside County west of the San

Jacinto Mountains, and the Cities of Temecula, Murrieta, Lake Elsinore, Canyon Lake, Norco, Corona, Riverside, Moreno Valley, Banning, Beaumont, Calimesa, Perris, Hemet, Wildomar, Menifee, Jurupa Valley, Eastvale, and San Jacinto. USFWS and CDFG each issued a single umbrella permit to the plan participants for take authorization under federal and state Endangered Species Acts (RCTLMA 2003a).

The Plan Area encompasses approximately 1.2 million acres, or about 2,000 square miles, in western Riverside County. Establishment of a 500,000-acre Reserve System to be managed for the 146 covered plant and animal species is accomplished through incorporation of existing conservation lands (Public/Quasi Public Lands) and new conservation lands (Additional Reserve Lands) into a network of independently but cooperatively managed reserves (RCTLMA 2003a).

The Western Riverside County MSHCP characterizes the Lake Mathews Reserve as Public/Quasi Public Lands that are anticipated to be managed for open space value that contributes to the conservation of Western Riverside County MSHCP covered species (RCTLMA 2003a). No management plan developed under the Western Riverside County MSHCP supersedes the Lake Mathews MSHCP/NCCP or this RMP, or automatically grants the governing agency, the Regional Conservation Authority (RCA), rights to manage or monitor species found within the Reserve. Any monitoring or management actions proposed by the RCA on the Reserve should be funded by the RCA and would require prior approval by the Reserve Manager and/or the RMC.

II.B Overall Goal, Purpose , and Scope of the MSHCP/NCCP

The Lake Mathews MSHCP/NCCP is intended to continue to support the recovery and survival of the sensitive species known to occur within the Plan Area as well as provide the basis of land management guidance for the Reserve. Specifically, the Lake Mathews MSHCP/NCCP exists to protect natural habitat types on the Reserve, restore degraded habitat conditions for Covered Species by improving suitable habitat, and ensure the continuation of operations and maintenance of MWD facilities. The purpose of the Lake Mathews MSHCP/NCCP is (MWD and RCHCA 1995a):

- To describe projects and activities that may result in the take of endangered species, and the measures to be taken to minimize and mitigate such take
- To provide a management program for multiple wildlife species
- To create a mechanism to coordinate the responsibilities of multiple public agencies
- To serve as the basis for the issuance of incidental take permits to allow the take of currently listed species and species that may be listed as endangered or threatened in the future
- To serve as the basis for a Section 2081 Memorandum of Understanding/Permit under the California Endangered Species Act and a Section 2835 Memorandum of Understanding/Permit under the NCCP Act for the Covered Species.

The RMP is designed to provide management strategies until an update is needed, and the RMP should be comprehensively evaluated for updates as determined by the RMC. General and species-specific goals to guide management decisions are outlined in this plan. The periodic updates to this RMP should primarily focus on updating goals based on the successes and continuing or evolving threats. Goals are intended to drive management of the Reserve through perpetuity, although adjustments may be necessary.

II.C Overall Goal and Purpose of the Reserve Management Plan

II.C.1 Prior Management Activities

From July 1995 to the present, management has relied on the Reserve Managers to make decisions guiding management goals, objectives, and strategies to best manage for sensitive species and habitat found within the Reserve.

Management since 1995 has consisted primarily of herbicide use for control of invasive species, security, and some controlled burns for habitat management. Research has been conducted on Stephens' kangaroo rat occupancy and use of the Reserve (e.g., McClenaghan and Taylor 1993, O'Farrell et al. ...) and gnatcatcher (e.g., Braden et al. 1997, Braden 1999).

II.C.2 Purpose and Need

This plan outlines both general and species-specific management goals. It is the intention that goals would need to be periodically updated based on ongoing management activities. This RMP details the plan by which these goals are to be attained.

The primary objective of this plan is to outline management of the Reserve to maintain viable populations of sensitive wildlife and plant species (Covered Species) through a habitat approach, by managing large habitat blocks for these species. Through active management strategies, as well as habitat restoration and enhancement, the Reserve is intended to serve as an ecologically viable and important area for western Riverside County in perpetuity.

This RMP is required by the Lake Mathews MSHCP/NCCP and the CMA. Creation of this plan fulfills that requirement.

II.C.3 Overall Goal and Scope

The overall goal of this RMP is to provide the Reserve Manager and the RMC with a straightforward and thorough plan by which effective management and conservation of Covered Species and habitats can be implemented and monitored consistent with the requirements of the Lake Mathews MSHCP/NCCP, CMA, Mitigation Banking Agreement, Conservation Easement Grant, various MOUs, and Audubon Settlement Agreement.

The scope of this RMP includes several elements to achieve this goal:

- Statement of the goals and objectives of the RMP
- Compilation of the relevant information for developing the plan, including baseline data for the Reserve (1992–1993) and updated vegetation community mapping in 2011 that describes the biological and ecological context of this plan
- Identification of Reserve habitats, wildlife, and management considerations
- Identification of appropriate strategies for implementing management and associated monitoring
- Integrating wildfire management into this RMP

Specifically, the goals identified in Volume 1 of the MSHCP/NCCP for the Reserve are (MWD and RCHCA 1995a)

1. Protect existing natural habitat types on the Combined Reserve
2. Improve degraded habitat conditions by enhancing or restoring suitable habitat for Covered Species within the Reserve
3. Ensure that operation and maintenance of Lake Mathews as a water supply facility are not impaired

As stated in the Lake Mathews MSHCP/NCCP, the standard of mitigation effectiveness is continued viable populations, which are expected to fluctuate naturally due to environmental factors, human disturbance and presence, and the results of improving habitat within the Reserve. Corrective management should be undertaken when deemed necessary by the RMC and effectiveness should be continually monitored; adaptive management should be used to make adjustments to the management strategies. Effectiveness of management strategies, in comparison to mitigation, should be defined by overall habitat quality, not in terms of species status (MWD and RCHCA 1995a).

II.D Overall Vision

The overall vision for the Reserve reflects the accumulation of general goals identified for the Reserve and should be used to ultimately guide further refinement of general, as well as species specific, goals. The vision should provide the Reserve Manager and RMC with guidance on the future composition of the Reserve, which is to be conserved in perpetuity.

II.D.1 Mission Statement

The mission statement for the Reserve is:

To manage for species and habitat conservation values such that preservation of biological resource values are maintained in perpetuity.

II.D.2 Vision Statement

Conservation values shall be preserved within the Reserve and within areas of future expansion such that biological resources and natural ecosystem processes are maintained and supported. Management of the Reserve should be guided such that the Reserve will eventually support a self-sustaining ecosystem that minimizes potential threats (e.g., trespass, invasion of non-native species) and supports stable populations of Covered Species.

II.E Plan Area and Map

The Plan Area, as defined in the Lake Mathews MSHCP/NCCP, includes the Reserve and holdings that are to be maintained by MWD (Figures 2-1 and 2-2). These holdings generally directly abut the Reserve and are included in the Plan Area, and therefore have the direct potential to affect Reserve management activities (Figure 2-3).

The Plan Area is located in western Riverside County, in an unincorporated region within the sphere of influence of the City of Riverside (Figures 2-4 and 2-5). The Plan Area is generally surrounded by low-density residential and rural development, limited agricultural operations, and other open space areas. The southern region of the Reserve is crossed by Cajalco Road, a major thoroughfare for commuters traveling from Riverside to Orange County.

The ecoregion of the Plan Area is roughly defined as being south of the Santa Ana River, east of the Coast Range (Santa Ana Mountains), west of the San Jacinto Mountains, and north of the Palomar Mountains. This region includes the Santa Margarita and Santa Ana watersheds, and the Plan Area occurs within the Santa Ana watershed (Figure 2-6).

The Plan Area is primarily located in a flat valley with some gently rolling hills, surrounded by steeper hills and mountains. Variable topography has resulted in diverse habitat types throughout the Plan Area. Hills are dominated by Riversidean sage scrub, a subassociation of coastal sage scrub, and chaparral. Flat areas are dominated by non-native grasslands. Along the edge of the lake and drainages are riparian and wetland vegetation communities, including southern willow scrub. Rainfall is highly seasonal, and generally precipitation occurs November to April.

Fire is a continual and ever-present feature of the sage scrub and grassland ecoregion. Many native species depend on fire to create habitat openings and promote seed growth. Typical fire disturbance regimes occur every 8 to 10 years, and therefore maintain the ecosystem in a frequent state of flux.

As a result of this diverse mosaic of habitat and climatic characteristics, flora and fauna of this ecoregion are often highly localized and adapted to these ecological regimes. Fifty special-status plant and wildlife species are found within the Reserve, including the federally listed Stephens kangaroo rat and coastal California gnatcatcher. There is high potential for an additional 15 special-status species to occur within the Reserve, and these species and their habitat are to be conserved within the Reserve.

MWD maintains Lake Mathews as an important component of its regional water supply system, and it is the western terminus for the Colorado River Aqueduct. Therefore, in addition to serving biological values, the Reserve must also be managed to ensure that water quality values are preserved in the process.

Conservation lands are located in the vicinity of the Plan Area, potentially furthering goals of conservation and preservation of biological resources and ecological processes that occur within the Reserve (Figure 2-7). They include, but are not limited to, the Lake Mathews-Estelle Mountain Core Reserve located south and southwest of the Reserve, Cleveland National Forest to the west of the Reserve, and lands proposed for conservation in fulfillment of the Western Riverside County MSHCP. The Lake Mathews Reserve is part of the Lake Mathews-Estelle Mountain Core Reserve (Figure 2-8).

II.F Structure and Use of the Reserve Management Plan (How it would be used in decision-making and development of work plans)

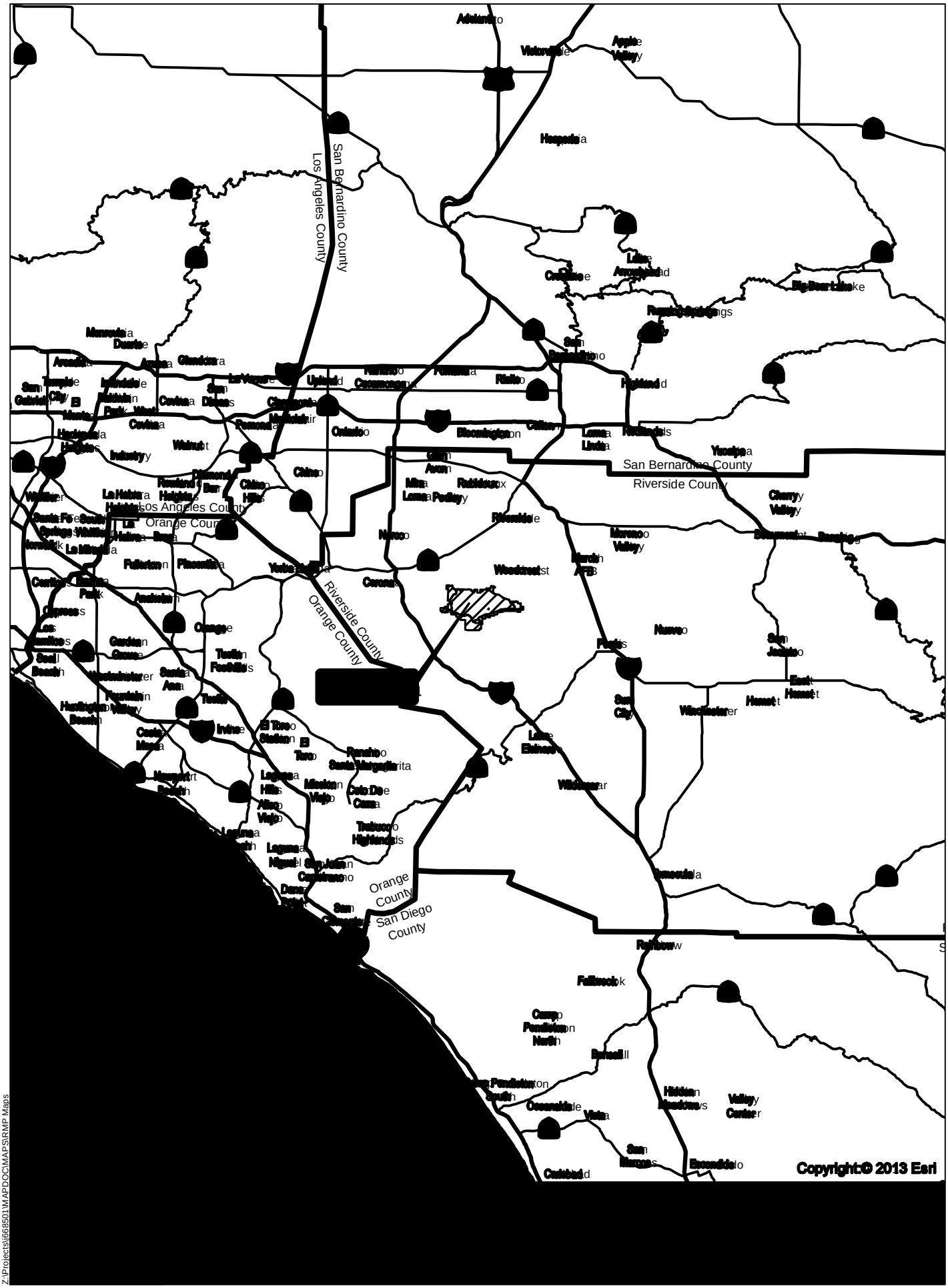
II.F.1 Structure of the Reserve Management Plan

The RMP is outlined with the intention that it should serve as a tool utilized by the Reserve Manager and personnel to guide management decisions within the Reserve. It seeks to provide a clear and thorough framework for the governing documents, the management decision process, biological resources, management goals, and objectives and strategies that are to be used.

Specifically, this RMP includes the following information:

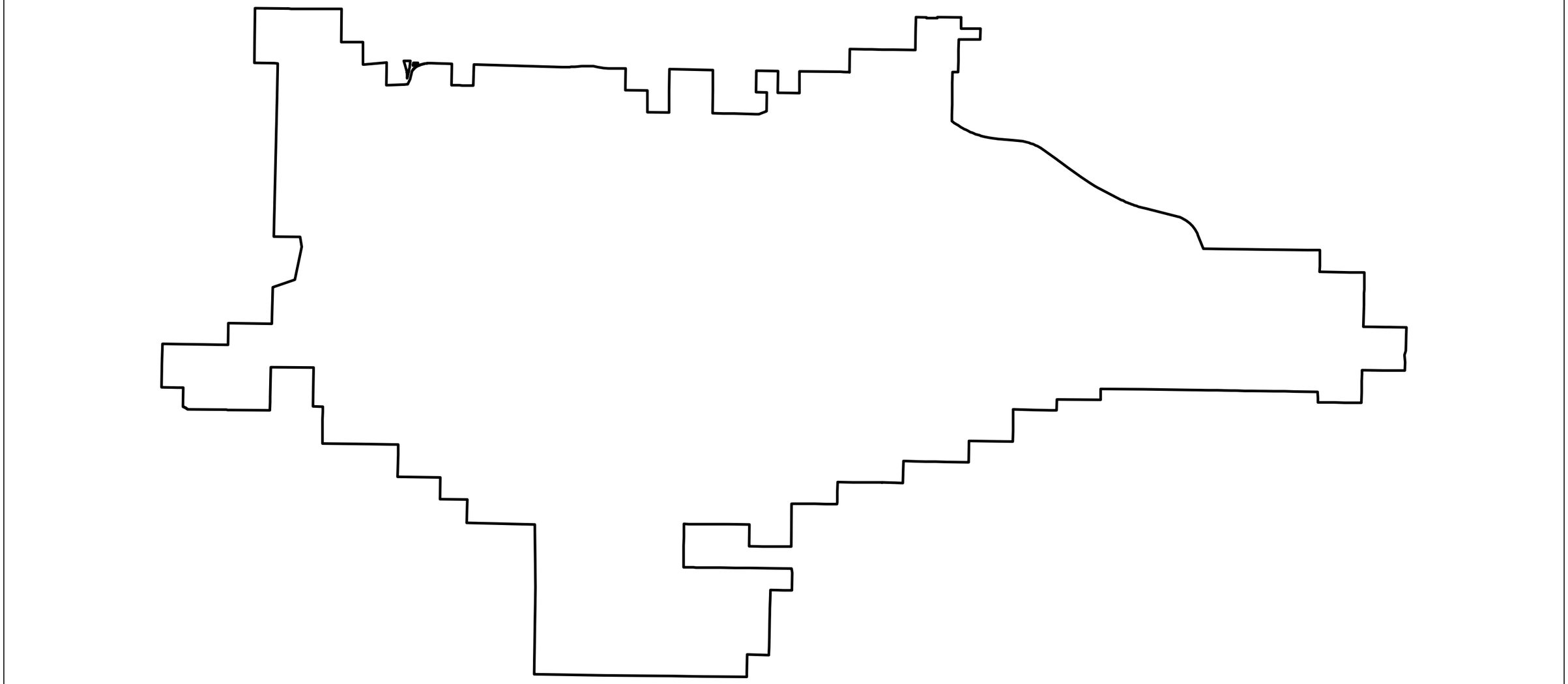
- Management strategies and a discussion of how this plan should be used by the Reserve Manager and the RMC

- A description of the Reserve setting, current infrastructure, and activities within the Reserve
- A discussion of climate, physical conditions, and fire history
- A description of biological resources, including vegetation communities and sensitive flora and fauna
- Management strategies for habitat types (e.g., non-native grasslands) and Covered Species
- Additional management considerations
- A discussion of known cultural resources within the Reserve and avoidance during Reserve activities or fire management
- A discussion of the RMC, Reserve Manager, and Reserve personnel, with specific attention to the roles of each
- Identification of management opportunities, including access to the Reserve, biological resources, habitat restoration, management for Covered Species, research opportunities, and climate change
- Ongoing maintenance activities for MWD and other easement holders
- The fire management plan
- A description of management goals and management objectives and strategies



Z:\Projects\l668501\MAPDOC\MAPS\RMP Maps

INTENTIONALLY LEFT BLANK



[redacted]

INTENTIONALLY LEFT BLANK

[redacted]

[redacted]

[redacted]

Z:\Projects\668501\MAPDOCMAPS\RMP Maps

INTENTIONALLY LEFT BLANK

[redacted]

on

ntial

l

[redacted]

Z:\Projects\668501\MAPDOC\MAPS\RMP Maps

INTENTIONALLY LEFT BLANK

[redacted]

uence

[redacted]

Z:\Projects\668501\MAPDOC\MAPS\RMP Maps

INTENTIONALLY LEFT BLANK

SANTA ANA RIVER -
Middle Santa Ana
River (Split)
- Arlington

SANTA ANA RIVER
- Lake Mathews
- Bedford

SANTA ANA RIVER
- Lake Mathews
- Cajalco

[redacted]

[redacted]

Z:\Projects\668501\MAPDOC\MAPSR\MP Maps

INTENTIONALLY LEFT BLANK

[redacted]

[redacted]

[redacted]

z:\Projects\668501\MAPDOC\MAPS\

INTENTIONALLY LEFT BLANK

[redacted]

[redacted]

[redacted]

z:\Projects\668501\MAPDOC\MAPS\

INTENTIONALLY LEFT BLANK

II.F.2 Use of the Reserve Management Plan

The RMP should be a tool and reference guide for both the Reserve Manager and the RMC. Important sections that are anticipated to be frequently used include the description of the adaptive management strategy, the discussion of biological resources and appropriate management tools, and finally the goals and objectives that are intended to guide Reserve management.

This plan does not intend to address every management challenge that could occur, but it seeks to address the anticipated challenges and provide a broad enough framework to be able to guide the Reserve Manager to potential actions and remedies without being prescriptive. It will ultimately be the decision of the Reserve Manager and RMC to utilize the alternatives provided in the RMP to guide actions related to biological resources, ecosystem processes, threats (both real and potential), and cohesively manage the Reserve as a unified ecological unit.

Additionally, this plan may need to be updated periodically, as conditions within the Reserve change, and goals and objectives are refined.

II.G Management Decisions

Overarching goals of the Reserve are to maintain natural ecosystems and ecosystem processes and conserve biodiversity, while focusing on Covered Species identified in the Lake Mathews MSHCP/NCCP. The primary management considerations for the Reserve relate to human-related impacts and maintaining suitable habitat for Covered Species. Management decisions are broadly based on strategies outlined in the Southwestern Riverside RMP (Moen 2008).

II.G.1 Identification of Long-Term Priorities

Identification and refinement of long-term priorities should help guide the use of the adaptive management strategy. The general and species-specific goals identified in Section IV.G address the three overall Reserve goals.

As determined by previous studies within the Reserve and general knowledge of the surrounding native communities, the principal management threats are (a) limiting the presence and spread of non-native species, (b) maintaining natural disturbance regimes (e.g., wildfire), (c) minimizing edge effects that are inevitable as development pressure expands around the Reserve, and (d) minimizing trespassing and associated impacts

Habitat management should reflect the dynamic nature of ecosystems and their species. The overall goal to support biodiversity, natural communities, and ecosystem processes should be accomplished through managing landscape-level habitat for the species covered under Lake Mathews MSHCP/NCCP, while considering other native wildlife and their habitat. Maintaining

high-quality habitat and enhancing or restoring natural communities is part of this overarching goal, as flora and fauna do not exist in a vacuum; diverse and dynamic biological processes are part of this goal. Dynamic habitats should be maintained, and land should be allowed to grow, contract, develop, mature, decline, and succeed to other habitats. Habitats or biological resources that are threatened or compromised should be managed, and natural changes should be allowed to occur. Above all, an emphasis on maintaining high levels of biodiversity and dynamic ecosystems should direct the implementation of management strategies. Particular management focus should be given to maintaining viable ecosystems, rather than for individual species. Some species such as Stephens' kangaroo rat, coastal California gnatcatcher, warrant additional management consideration, but it is not the intention that the only Reserve priority or direction is guided by those special-status species. Natural flux is expected and should be anticipated, and therefore guidance based on one or a few species is short-sighted and inconsistent with habitat-based management for the conservation of multiple species.

II.G.2 Use of Adaptive Management Process

II.G.2.a Introduction

The overall purpose and goal of the management program described here for Covered Species, including Stephens' kangaroo rat, coastal California gnatcatcher, burrowing owl, and cactus wren, as well as sensitive habitat, is maintenance and enhancement of suitable habitat and populations within the Reserve. Management goals and objectives must not compromise the activities of MWD to utilize Lake Mathews as a water service facility.

Adaptive management is a developmental approach to natural resource management that acknowledges our uncertainty of the function and structure of ecological processes, and the interactions between sensitive species that occur. Management needs to be scientific and include monitoring, targeted studies, and application of management activities as experimental treatments. The Reserve Manager should always utilize the best available information to make decisions, and at the same time, inquisitively question and attempt to understand the processes to determine how to best achieve the goals of the RMP.

II.G.2.b Management Process

The adaptive management process seeks to enhance the value or function of habitat resources to support diverse native plant and animal communities, based on the best available science and feedback from daily management and monitoring activities. Adaptive management is defined in this context to mean that the Reserve Manager should use this plan, data, and other relevant information obtained from scientific studies, as well as information gleaned from management activities within the Reserve and the corresponding results, insight from other Reserve Managers, and any other relevant information as determined by the Reserve Manager that can be used to design and conduct successful management strategies.

Adaptive management is a process that feeds a continuing cycle through monitoring, analysis of results, a reevaluation of management strategies, and implementation of management strategies. Specifically, adaptive management begins with general objectives and strategies used to guide management decisions to govern the Reserve and goals. It is the intention that the general objectives are fixed, while year-to-year management activities are flexible to accomplish the objectives and comply with policies, reflecting on-the-ground conditions, changes in scientific thinking, and the suite of available management techniques.

Adaptive management should include the following steps: opportunistic learning through daily activities on the Reserve and through consultation with other Reserve Managers, scientists, and scientific literature; hypothesis formulation and testing; direct management activities; monitoring; direction of the results of analysis and assessment to the RMC; and evaluation of the efficacy of management strategies to guide future management and monitoring decisions (USGS 2004).

Specifically, the Reserve Manager should begin with scientific principles and the best existing information. This includes published literature, consultation with local scientists, conversations with other Reserve Managers, and knowledge from previous experience. This information should be understood in the context of conceptual models, which include known life history characteristics and attributes that dictate species responses to any management (see Appendix A- Species Accounts). This information should be understood in the context of the RMP goals (see Section IV.G, Reserve Management) to ensure that activities are in accordance with both life history traits and management goals.

The U.S. Geological Survey (2004) outlines three phases of adaptive management that can be used to guide the implementation of management strategies from initial identification of resources and relationships to the implementation of long-term strategies. During all three phases, an adaptive management strategy is utilized and it is recommended that baseline data be collected and pilot programs put in place that can resolve critical issues before the installation of long-term management programs.

Phase 1 involves identifying and inventorying resources and relationships, including an inventory of species, habitats, and other resources present, including locations and general conditions. A baseline should be established, from which future progress can be compared, trends analyzed, and data collected. Comprehensive data on species found within the Reserve and their locations was last done in 1992 and 1993 in preparation of the Lake Mathews MSHCP/NCCP. A thorough update of this data should be completed to obtain the necessary baseline data. Although vegetation communities were mapped in 2011 and therefore reflect current data, an assessment of habitat quality and suitability is needed to identify areas for restoration and management. Some management actions should be implemented during Phase 1, although this should primarily entail strategies with known and established impacts, such as hand removal of weeds and fence construction and repair.

Additionally, this phase may be used to develop or test hypothesized relationships between species, habitats, processes, and threats. For example, a study could be done to evaluate gnatcatcher occupation in areas of Riversidean sage scrub with high and low percent cover of non-native grasses to determine the threshold at which non-native grass cover prohibits occupation.

Phase 2 is the pilot testing of long-term monitoring programs and resolution of critical management uncertainties. This phase should focus on selecting long-term monitoring protocols and sampling designs that are cost-effective and can generate statistically powerful results to detect biological changes. Long-term monitoring programs are outlined for four special-status species (Stephens' kangaroo rat, coastal California gnatcatcher, cactus wren, and burrowing owl) (see Section IV.G.2). Most likely, some degree of refinement would need to be made to these management approaches based on the first few years of initial surveying and monitoring feedback. Evaluations of the efficacy and feasibility of the six primary habitat management techniques (grazing, mowing, herbicide use, controlled burns, habitat restoration, and no management) should be conducted, and the Reserve Manager should create a program delineating a long-term proposal for use of these management strategies. Additionally, the effectiveness of monitoring programs should be evaluated for additional Covered Species that do not have specific monitoring requirements, and these methods should be adjusted during this phase. This testing phase gives the Reserve Manager the opportunity to conduct targeted studies to resolve critical management uncertainties and refine models based on emerging information.

Phase 3 is the implementation of a long-term monitoring program and adaptive management. Although this phase strives to create a long-term management and monitoring program, that does not mean that this program is static. Rather, the program should be continually evaluated based on results of the monitoring program, local site conditions, and any new information related to the goals of the Reserve. It is anticipated that new and unexpected issues would arise within the Reserve that would need to be addressed and prioritized. However, it should be noted that although priorities and management strategies should change, data collection should seek to obtain information that is easily comparable across years and create trends that can be analyzed.

II.G.2.c Management Strategies

An adaptive management strategy gives the Reserve Manager and the RMC a clear set of goals and objectives that can guide action but are still flexible enough to allow for the Reserve Manager to control decisions depending on real site conditions and priorities. The Reserve Manager and the RMC should annually make decisions on priorities and management strategies for the upcoming year. Decisions should be guided based on:

- The most accurate and best available scientific information
- Monitoring data on field/ecological conditions

- The status of the plant and animal communities
- The status of potential and actual threats to the Reserve.

Adaptive management strategies can be further analyzed into categories of passive and active management. It is likely that both management strategies would be necessary for Reserve management, and it should be up to the discretion of the Reserve Manager and the RMC to determine the appropriate strategy given management goals and field conditions.

Passive management allows habitats and populations to fluctuate according to normal ecosystem processes and even stochastic variables, although continued monitoring is used to detect any adverse impacts that should be managed. This management strategy would most likely be used for managing species guilds, especially for monitoring, and it is generally assumed that management for the guild would also constitute a best management strategy for the Covered Species.

Monitoring should initially focus on collecting baseline data, from which annual and 5-year monitoring programs can be developed, as needed. Passive management should generally be guided by monitoring for the following (although more specific monitoring is needed for specific species, as outlined in Section IV.G.2):

- Ecosystem health (i.e., landscape-level changes in communities, changes in key habitats such as riparian forests, changes that indicate potential for type conversion from native to non-native habitats)
- The status, including distribution and abundance, of Covered Species, as outlined in the Lake Mathews MSHCP/NCCP, and any other threatened or endangered species that may potentially occur within the Reserve
- The potential threats to ecosystem health and biological species resilience (i.e., spread of non-native species, increased human presence within the Reserve).

Active management is the human alteration of the landscape for management purposes, and is utilized when ecosystem values need to be created or managed to support the goals and objectives outlined in this plan (USGS 2004). Active management may be implemented when monitoring indicates a decline in habitat quality or population levels such that the population is at risk of extirpation or when a management decision is made to increase the existing population. In general, passive management should be used for most species and guilds, and when monitoring indicates potential threats or a compromise to continued viability, active management should be used.

II.G.2.d Identification of Management Strategy

II.G.2.d.1 Management Approaches

To best determine which management strategies should be utilized to address a specific threat or resource within the Reserve, it is suggested that the Reserve Manager use the scientific method, if appropriate, to conduct management experiments. The scientific method consists of development of a hypothesis, design of an experiment to test the hypothesis, execution of the experiment, data collection and analysis, and finally synthesis of the results to evaluate the hypothesis.

Two types of experiments are available to test hypotheses relevant to Reserve management. A priori management experiments are controlled studies in which different management techniques are compared against a control to determine the best management strategy for the desired outcome (USGS 2004). For example, multiple study test areas may receive a treatment of different herbicides to determine which one is most effective when compared against a control. By conducting an experiment, the Reserve Manager is able to be cost effective and choose an application that would work most effectively over large areas of the Reserve.

Opportunistic management experiments are studies conducted in response to natural or human caused activities, such as wildfire or pesticide use for MWD operations (USGS 2004). The Reserve Manager should be able to monitor the effects of the activity and conduct monitoring with respect to different management treatments and their effects on habitat and sensitive species. In this case, the Reserve Manager does not anticipate conducting a study, but is able to effectively use the resources and site conditions to evaluate impacts and then apply the results to future management strategies.

Once a management strategy has been scientifically evaluated, the strategy employed to manage the threat or resource may be considered either routine or experimental. Routine management actions are for management that is of obvious conservation value such that experimental monitoring and planning is unnecessary. Routine management should include minimizing trespass and associated impacts through fence maintenance and increased patrols (USGS 2004). 7KLV LV DOVR FRQVLGHUHG D ³QR UHJUHWV´ PDQDJHPHQW associated adverse impacts that would result from the given management strategy, even though the anticipated outcome may not be predictable.

Experimental management actions are needed when there are multiple management actions that can be utilized given specific site characteristics and the management goals (USGS 2004). There LV RIWHQ QR ³ULJKW´ PDQDJHPH chosen management strategy could XWLOL]D depend on experimental studies, results from a priori test plots, or opportunistic studies of areas within the Reserve that have been artificially manipulated for some other purpose.

This overall approach should give the Reserve Manager the tools needed to identify the appropriate management strategy and any necessary continuing studies or consideration needed for the implementation of the management strategy.

II.G.2.d.2 Management Strategy

The first key issue would be to determine the threshold or trigger at which monitoring is insufficient and active management is needed. It is difficult to determine thresholds and the point at which management action is needed, and determine whether changes are due to natural population variation or stochastic processes (USGS 2004). Effective use of the long-term monitoring program, described in Section IV of this plan, should be used to detect changes in population size or structure, or habitat quality; and it is the goal that such changes are noticed and managed before precipitous changes occur. Long-term monitoring should provide information to distinguish natural habitat/population oscillations from negative trends resulting from environmental threats.

For example, during drought coQGLWLRQV FDSWXUHV RI 0HUULDP¶V N (Dipodomys merriami) plummeted from approximately 280 individuals trapped on a 1-hectare grid to just four individuals in Palm Desert (Behrends, pers. obs., as cited in Dudek 2007). The following year there was higher precipitation, and 80 individuals were captured. If environmental factors had not been considered in this analysis, it is possible that management strategies would have EHHQ XWLOL]HG WR LQFUHDVH SRSXODWLRQ these would have been 0HUULDP wasted efforts as this was a natural population variation resulting from climatic variables. As such, it is important for the Reserve Manager to thoroughly analyze monitoring trends in the context of potential environmental factors and threats.

Data do not currently explicitly state management thresholds for various sensitive species found within the Reserve. Therefore, the Reserve Manager must rely on monitoring data coupled with reviews of scientific literature and discussions with other Reserve Managers to determine thresholds for management action as they are warranted.

The second key issue would be to thoroughly identify the management implications and long-term effects of action on the Covered Species and other associated species, habitat types, and conservation values. Factors to be considered are: (a) the long-term value of the enhanced or altered habitat for sensitive species in the Reserve; (b) the current value of the habitat for other species; (c) the long-term cost of maintaining the area in a restored state; and (d) the identification of other management areas that may be of higher priority than the area considered for management (USGS 2004).

When it is decided that management action is needed, the Reserve Manager would need to determine the degree of action required, based on adaptive management principles outlined in this plan. The degree of action should vary depending on the threat, the management implications, and the threshold that management action requires.

- Management actions may be immediate and forceful to completely remove the threat, only if by doing so there are no other associated adverse impacts.
- The Reserve Manager may also decide that more information is needed, and consult with colleagues, local scientists, published scientific data, and other Reserve Managers to prepare a proposed action plan. Consultation with agencies and the RMC may be necessary.
- Finally, it may be determined that the threat is not of substantial magnitude or would consist of a long-term management issue that is best managed on an ongoing basis, and possible management strategies are included in this management plan (e.g., management for non-native grasses).

Implementation of management actions would be the final step of the management strategy. Actions should be monitored, to determine the results of the management strategy, especially with respect to sensitive species and biological resources. Adjustments should be made, as necessary, to maximize effectiveness or minimize adverse impacts during implementation of the strategy. Data collection during management actions should be used to analyze the effectiveness of the chosen management strategy, especially to determine whether to utilize the strategy in other areas of the Reserve and select or modify additional strategies that may be effective.

The cycle of adaptive management should be a constant feature of Reserve management, as management should be seen as an evolving and dynamic process. It is anticipated that some strategies would be found more effective than others, and that the responses of species or ELRORJLFDO UHVRXUFHV ZRXOG -size-fits-\DOO DQDJHPHQW DSSURDFK LV DQG require input from both the RMC and Reserve Manager to guide management forward.

III. RESERVE SETTING AND ENVIRONMENTAL CONSTRAINTS

III.A Reserve Setting

The Lake Mathews Reserve (Reserve) is located in western Riverside County, which has been characterized in recent years by extremely rapid growth and urbanization. The Reserve is located within the jurisdiction of an unincorporated area of western Riverside County, between Interstates 15 and 215 and southeast of the City of Corona and north of the City of Lake Elsinore (Figures 2-1 and 2-2). The Reserve extends north of El Sobrante Road, east of the junction of El Sobrante and Cajalco Roads, south of Cajalco Road, and west of La Sierra Avenue. The center of the Reserve is at W 117°25'21.84" and N 33°50'16.64".

The Reserve centers on the man-made reservoir of Lake Mathews, which was constructed by the Metropolitan Water District of Southern California (MWD), with a holding capacity of 182,000 acre-feet. The reservoir is the western terminus for the Colorado River Aqueduct, which provides water for clients of MWD, including Riverside, Los Angeles, and Orange Counties.

III.A.1 Current and Proposed Surrounding Land Uses

:HVWHUQ 5LYHUVLGH &RXQW\ LV KRPH WR PRUH WKDQ associated jobs, urban development, and infrastructure, although the area incorporates less than a WKLUG RI WKH FRXQW\¶V SRSXODWLRQ (Lake Mathews MSHCP/NCCP Volume 1 Conservation Plan [MWD and RCHCA 1995a]). Populations have increased rapidly in Riverside County since the 1990s. Approximately 2.2 million people currently reside in Riverside County, which marks an increase of approximately 45% since 2000. Close to 6,000 people reside in the unincorporated area surrounding Lake Mathews (U.S. Census Bureau 2010).

This section describes both the current adjacent land uses and the planned land uses surrounding the Reserve (Figures 2-4 and 2-5). The Reserve is located in an unincorporated region of Riverside County, between the Cities of Corona and Riverside (Figure 2-4) and within the Sphere of Influence of the City of Riverside (Figure 2-5). Surrounding land uses include low-density housing, minimal agricultural operations, the El Sobrante Landfill, and areas for conservation. Specifically, low-density and rural housing is located southeast and northeast of the Reserve. Farmland and low-density housing is located immediately north of the Reserve, and land to the west and southwest is undeveloped, and is owned by the Riverside County Habitat Conservation Agency (RCHCA) to manage for 6WHSKHQV¶ NDQJDURR UDW (Dipodomys stephensi) as part of the Lake Mathews-Estelle Mountain Core Reserve (Core Reserve).

Planned adjacent land uses reflect the goals outlined in the 2003 General Plan for the Lake Mathews/Woodcrest area. Land use plans prioritize maintenance of rural residential areas throughout the Lake Mathews region (RCTLMA 2003b).

Current Adjacent Land Uses

The 511-acre Victoria Grove housing development (RCTLMA 2003) is situated north of El Sobrante Road between La Sierra Avenue and McAllister Street. The property includes 1,144 low- and medium-density homes, as well as an elementary school and 61 acres of open space. The community of Lake View is directly west of Victoria Grove, located west of La Sierra Avenue. The property consists of 1,650 acres, of which 555 acres are developed for residential and 977 acres have been preserved as open space. Immediately northwest of the Plan Area is the rural residential development of Eagle Valley, including 4,600 homes and 245,000 square feet of commercial use over approximately 800 acres. There is additional rural residential development to the south and east of the Reserve.

Citrus groves and other agricultural operations are scattered throughout the surrounding area. Several nurseries are located along El Sobrante Road between McAllister Street and Vista del Lago Drive. Dos Pinos Nursery (approximately 32 acres) is located south of El Sobrante Road and Y.C. Chen Nursery, Inc. (approximately 211 acres) is located on the north side.

The El Sobrante Landfill, owned and operated by Waste Management, is located approximately 2 miles southwest of the Reserve (Waste Management 2012). Waste Management has conserved approximately 640 acres of habitat to manage for W H S K H Q V ¶ and Coastal California D W gnatcatcher (*Polioptila californica californica*), as well as other listed species, as required by their Habitat Conservation Plan (HCP), approved by the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG).

Additional conservation lands are located west and south of the Reserve and are conserved through the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) (Figures 2-7 and 3-1) and the 6 W H S K Kangaroo Rat Habitat Conservation Plan (SKR HCP). Undeveloped hillsides located west of the Reserve are identified for conservation through the Western Riverside County MSHCP. The Lake Mathews Reserve is included as part of the Lake Mathews/Estelle Mountain Core Reserve, which includes the entirety of the Lake Mathews Reserve and incorporates approximately 6,000 acres managed by RCHCA located to the south and southwest (Figure 2-8). Additional parcels that are part of the Core Reserve and located south of the center of the Reserve are owned by Bureau of Land Management (BLM) and CDFG.

Planned Adjacent Land Uses

Current planned adjacent land uses consist primarily of housing developments and commercial centers. Cajalco Road, a thoroughfare crossing through the southern part of the Reserve, is under review to be widened and is discussed below.

An environmental impact report (EIR) has been prepared for the Lake Mathews Golf and Country Club (RCTLMA 2003), which would convert 331 acres of currently vacant land north of the Reserve to a residential and golf course development project. The proposed project would also create an expansive open space system and three parks. The EIR was prepared and submitted in 2003, and is currently pending construction.

Gavilan Hills Estates is situated southeast of the Reserve (Gavilan Hills Estates 2008). The proposed project, centered on Gavilan Road, consists of mixed residential, open space, and one school for grades kindergarten through eight. Gavilan Hills Estates received approval from the County Board of Supervisors in May 2010. A total of 587 acres will be developed on the 1,301-acre property. Gavilan Peak, as well as other sensitive biological resources including Harford Springs Reserve, an open space preserve of 325 acres, would be conserved in the project.

Proposed development for the Serrano Commerce Center (Rosetta Advisors 2009) is located southwest of the Reserve, east of Interstate 15 in the Temescal Canyon region. The commerce center would involve development of 372.06 acres of light industrial, and a 17-acre retail commerce center. A total of 48.77 acres located along the eastern and northeastern boundaries would be conserved as open space, in accordance with the Western Riverside County MSHCP. Approval for the Serrano Commerce Center was granted in July 2010 by the Riverside County Board of Supervisors.

Cajalco Road runs in an east-west direction through the southern extent of the Reserve. This road serves as an important connection for local residents and commuters between Interstates 15 and 215, as well as commuters from Riverside County to Orange County. To meet the demands of current and future uses, expansion of the road has been proposed, from a two-lane roadway to a four-lane roadway (Figure 3-2). Potential impacts to the Reserve could directly result from road expansion, including loss of habitat and increased mortality rates due to collision. Indirect impacts to the Reserve potentially could result from increased vehicular traffic and increased disturbance to sensitive species within the Reserve. However, there is potential for proposed alignment to improve wildlife movement through the Reserve, through the construction of wildlife undercrossings or culverts. Mitigation for impacts may be required consistent with the Lake Mathews MSHCP/NCCP and the SKR HCP.

Two alignments have been proposed that would both consist of a four-lane roadway with one bike path (Standerfer, pers. comm. 2011). The existing right-of-way is approximately 80 feet; the expansion would be at least 142 feet wide. Alignment 1 follows the existing route of Cajalco Road, and is preferred by USFWS. Alignment 2 takes a more southerly route, starting halfway between Temescal Canyon Road and La Sierra Avenue, rejoining the current alignment of Cajalco Road just west of Lake Mathews Drive. The review is currently going through the public comment period, and the draft EIR has yet to be completed.

III.A.b Location, Size , and Configuration

Lake Mathews is located within the center of the Reserve. The Reserve extends north of El Sobrante Road and south of Cajalco Road. Cajalco Creek and braided streams that flow from the dam and feed into the eastern tip of Lake Mathews are included in the Reserve.

The Reserve does not include the reservoir of Lake Mathews, but the Reserve boundary extends to the ordinary high water mark. MWD has jurisdiction over the lake and lands below the ordinary high water mark. There are several islands located within the Reserve which are included within the Reserve.

The entire Plan Area consists of 5,993.5 acres, which encompasses the Reserve and MWD property (Table 3-1, Acreages of Plan Area Components, Figure 2-3). The Reserve consists of the Existing State Ecological Reserve totaling 2,565.5 acres, and creates a 2,544.9-acre Mitigation Bank. Of the remaining 883.1 acres, 154.5 acres are allocated for future Plan Area Projects and 728.6 acres are Operations Areas currently utilized by MWD.

Table 3-1
Acreages of Plan Area Components

	Plan Area Component	General Location within Plan Area	Acreage within Plan Area
Reserve	Existing State Ecological Res	Northeast of Lake Mathews, and south to Cajalco R	2,565.5
	Mitigation Bank	South of Cajalco Road, and northwest and north of Existing State Ecological Reserve	2,544.9
MWD	Plan Area Projects	Primarily at junction of Cajalco and El Sobrante Ro	154.5
	Operations Areas	Northwest bank of Lake Mathews	728.6
		Total	5,993.5

The Existing State Ecological Reserve was created in 1979 as mitigation for impacts of the State Water Project on wildlife within property owned by the Department of Water Resources (DWR) and MWD. The Ecological Reserve was owned by MWD and managed by CDFG. The Mitigation Bank is also referred to as the Conservation Easement. The Mitigation Bank was created by the Lake Mathews MSHCP/NCCP as a preemptive agreement to mitigate for potential impacts to sensitive species within the Reserve. The impacts would occur within the Plan Area Projects areas, and any potential impacts would have already been mitigated through the creation of the Mitigation Bank.

Z:\Projects\668501\MAPDOC\MAPS\

INTENTIONALLY LEFT BLANK

[redacted]

[redacted]

[redacted]

[redacted]

Z:\Projects\668501\MAPDOCMAPS\

INTENTIONALLY LEFT BLANK

The Mitigation Bank was created to provide 2,544.9 acres of mitigation credits for impacts to sensitive species resulting from current MWD operations within the Operations Areas, from Plan Area Projects, and from future MWD projects in the region. The Mitigation Bank also accounts for 1,269.3 acres of Stephens' kangaroo rat occupied habitat intended to fulfill conservation requirements of the SKR HCP. The Conservation Easement that covers Mitigation Bank lands was conveyed to the County by MWD and the Conservation Easement is managed by RCHCA.

MWD-managed property consists of Operations Areas and Plan Area Projects, which are areas currently utilized by MWD or anticipated to be used by MWD for projects. Operations Areas were defined in 1995 at the time the MSHCP/NCCP was written. Operations Areas contain the facilities, pump stations, and other necessary equipment for operation of Lake Mathews as a water storage facility. Plan Area Projects are allocated to MWD for future operations relating to the operation of Lake Mathews as a water supply facility, and many of the Plan Area Projects areas have already been developed.

Also included in the Plan Area Projects is the approximately 84 acre lease to the Western Municipal Water District (Western) for expansion, construction, operation, and maintenance of their facilities located west of El Sobrante Road. Western has completed construction of the Cajalco Dam and detention basins.

The Lake Mathews-Estelle Mountain Core Reserve includes the Lake Mathews Reserve and RCHCA-owned parcels south of Cajalco Road. The RCHCA-owned parcels are managed specifically for Stephens' kangaroo rat under the Long Term SKR HCP and the Stephens' Kangaroo Rat Habitat Management and Monitoring Plan and Fire Management Plan for RCHCA Lands in the Lake Mathews and Steele Peak Reserves (Dudek 2007) (Figure 2-7; Section II.A). The Lake Mathews-Estelle Mountain Core Reserve encompasses 11,243 acres.

III.A.3 Easements

Within the Plan Area, easements have been conveyed over time by MWD to various third parties (Figure 3-3). Southern California Edison (SCE), AT&T, and Time Warner currently have power line easements, ranging from 5 to 10 feet in width. The Western Municipal Water District (Western) and Southern California Gas Company (SoCal Gas) both have pipeline easements, which are approximately 20 to 30 feet in width.

Additional easements within the Reserve have been granted to other organizations and companies. It should be noted that some of these easements pre-date the establishment of the Lake Mathews Reserve and therefore are not governed by the requirements of the Lake Mathews MSHCP/NCCP.

Utility Easements

Utility easements are maintained by SCE, AT&T, Time Warner, and SoCal Gas (Figure 3-3). Terms and conditions of the various easements may vary but all activities pertaining to these easements should be in accordance with existing agreements and with the intent to minimize disruption of habitats and wildlife, in coordination with the Reserve Manager. If needed, the Reserve Manager should be provided with copies of the license agreements within the Reserve as situations arise.

III.A.4 Infrastructure (Roads and Water Management Facilities)

Infrastructure located within the Plan Area centers around water management facilities located primarily in the northwestern region of the Reserve, as well as facilities for Western. Additional infrastructure includes roads and necessary fencing. The Reserve Manager Office is also found within the Plan Area.

III.A.4.a Water Management Facilities

A vast network of water control and water storage structures is used to maintain water inflow from the Colorado River Aqueduct and sustain stable water levels in Lake Mathews. Existing facilities include the dam, two dikes, a 176-foot outlet tower, old and new 200-foot channel spillways on the dam, a diversion tunnel, a power plant, and support buildings (MWD and RCHCA 1995a, Savolainen, pers. comm. 2012). Most water facilities, including the main pumping station, are located on the northern border, at the junction of La Sierra Avenue and El Sobrante Road. Additional facilities are located at the eastern tip of the Reserve, at the junction of El Sobrante Road and Cajalco Road. Five sediment-detention basins are located south of Cajalco Road, along the eastern stretch of the property.

III.A.4.a.1 MWD

In 2001, MWD completed the Cajalco Creek Dam and Detention Basin Project, which now allows MWD to control storm flows in Cajalco Creek by operating and maintaining a detention dam, and a basin and saddle dams apart of its water quality management plan. In 2003, new outlet facilities were constructed along the north shore and include four large sliding gate control water delivery downstream (Jacobs Associates 2011).

MWD proposed the two projects below within the Plan Area Projects when writing the MSHCP/NCCP. Both projects are under consideration in long-term strategic planning, but there are no current plans for construction of either at this time.

- Central Pool Augmentation Project: MWD would operate and maintain a water outlet structure, short tunnel, and access road, which would meet new drinking water quality standards and improve water deliveries to Orange and Los Angeles Counties.
- Bypass Project: MWD proposed an underground bypass system to bring water from the Colorado River Aqueduct to MWD's distribution facilities (MWD and RCHCA 1995a).

III.A.4.a.2 Western Municipal Water District

Western has a lease within the Plan Area located in the northeast region of the Reserve, south of El Sobrante Road and north of the Cajalco Dam. This lease allows for expansion and continued operation and maintenance of Western's facilities -megawatt solar plant and fire station were recently installed within this easement (Savolainen, pers. comm. 2012). Western also maintains water pipeline easements throughout the Reserve.

Western is considering construction of a new water treatment plant at Lake Mathews to meet future demands for treated water, with a capacity of 40 million gallons per day. This plant would increase delivery reliability during shutdowns of regional water treatment facilities. The plan is part of a larger arrangement to increase supply reliability within the jurisdiction of Western (Western 2011).

III.A.4.b Roads

The main thoroughfares of Cajalco Road, El Sobrante Road, and La Sierra Avenue cross through the Plan Area. Access to the main MWD facilities is via El Sobrante Road within the northwest portion of the Plan Area.

There are service roads intersecting the perimeter roads. These service roads provide access to one main, managed dirt road that encircles the perimeter of the lake. Locked gates and fencing surround the Reserve and separate MWD Operations Areas and Plan Area Projects areas from wildlife habitat. These roads are used for security patrols, Reserve management, and reservoir access. Some of the internal roads also are maintained as wildfire fuel breaks and function as movement corridors for species such as Stephens' kangaroo rat

III.A.4.c Fencing

Secure fencing is needed around the Reserve for public safety, protection of sensitive species, and MWD security. Current fencing around the perimeter of the Reserve is variable and includes four-strand barbed wire, 5-foot chain-link fencing with and without three-strand barbed wire, and

5-foot mesh fencing with three-strand barbed wire. Throughout the property, there are locations where there is no fencing. Figure 3-4 illustrates fencing around the Reserve, although the figure provided differentiates only between regions where four-strand barbed wire is in place and areas where chain-link or mesh fencing is used.

Historical fencing was erected by MWD to enclose the Existing State Ecological Reserve. Per the September 1982 Agreement, MWD is required to maintain and repair this fencing. Much of the rest of the Reserve still remains to be fenced, especially delineation of the Mitigation Bank in the northern region. In general, the interior of the Reserve is fenced (e.g., north side of Cajalco Road, east side of La Sierra Avenue) using 5-foot mesh fencing with three-strand barbed wire. The south side of Cajalco Road is generally fenced using four-strand barbed wire (Figure 3-4).

III.A.4.d Reserve Manager Office/Residence

The office for the Reserve Manager is located south of Cajalco Road, immediately adjacent to Cajalco Road and surrounding property. The office consists of two trailers, parking, and two small storage sheds. The site is secured with chain-link fencing, gates, and security lighting.

III.A.5 MWD and Affiliated Activities (As authorized by the MSHCP/NCCP [e.g., facility operation, maintenance and construction, water quality protection, etc.])

MWD is authorized to manage its operations and facilities with respect to the Lake Mathews MSHCP/NCCP. Allowed maintenance and operational activities for MWD outlined in the MSHCP include, but are not limited to, the use of chemicals, vegetation control, water control, rodent control, and use of associated equipment. Fish may be collected for water quality testing. Rights-of-way for roads, trails, firebreaks, irrigation works, flood-control structures and channels, utility corridors, sewers, facilities for metering natural water inflow into Lake Mathews, structures to divert or detain water, pipelines and ancillary improvements, and telephone and electric power lines may be delineated and constructed within the Reserve (MWD and RCHCA 1995a).

Additional management activities were identified in the MSHCP/NCCP and are broader in scope. MWD is authorized to conduct operations and maintenance activities at the Lake Mathews facility as necessary to provide water supply to Southern California. Additionally, MWD is authorized under the MSHCP/NCCP to create the Mitigation Bank and provide mitigation for impacts that are approved by USFWS and CDFG. MWD also works with RCHCA with respect to the Reserve and the 6WHSKHQV¶ Kangaroo Rat Core Reserve (MWD and RCHCA 1995a).

As the Reserve is part of the Lake Mathews-Estelle Mountain Core Reserve, MWD operations DQG PDLQWHQDQFH DFWLYLWLHV TXDOLI\ DV 6WHSKHQV¶ .DQJDURR Rat HCP and are approved under HCP permits (MWD and RCHCA 1995a).

[redacted]

[redacted]

[redacted]

INTENTIONALLY LEFT BLANK

Z:\Projects\j668501\MAPDOC\MAPS\

[redacted]

[redacted]

INTENTIONALLY LEFT BLANK

III.B Environmental Conditions

The following sections describe the environmental conditions found on the Reserve, including climate, hydrology, soil profiles, topography, and geology.

III.B.1 Climate and Hydrology

III.B.1.a Climate

The western Riverside County climate is Mediterranean, with hot, dry summers and cool, wet winters. The majority of annual precipitation falls between the months of November and April, with an average annual rainfall of approximately 13 inches (33 centimeters), according to local Remote Automated Weather Stations (RAWS) data (RAWS 2007). However, average rainfall varies greatly within western Riverside County due to weather patterns, topography, and rain shadow effects, and the El Niño Southern Oscillation, with some years having just a few inches of rain or less (La Niña events) and others having 20 inches (51 centimeters) of rain or more (El Niño events). Most rainfall events occur from November through April, and, consequently, the highest rate of stream flows throughout the area occur during those months as well, although most of the year there is no surface water.

The yearly average temperature for the area is 63.7°F (17.6°C). Summer temperatures often exceed 100°F (37.8°C) and temperatures of 120°F (48.9°C) have been recorded during the summer months. The lowest temperature recorded in the area was 10°F (-12.2°C) (Western Regional Climate Center 2011).

III.B.1.b Hydrology

The Reserve is within the South Coast hydrologic region, an area encompassing the western portion of Southern California, draining from the Transverse and Peninsular mountain ranges westward to the Pacific Ocean. The San Gabriel and San Bernardino Mountains form the northern and eastern borders. It is the most populated and urbanized region of California, with RYHU KDOI RI WKH VWDWH¶V SRSXODWLRQ UHVLGLQJ W only 11,000 acres, RU RI WKH VWDWH¶V ODQG

Within this hydrologic region, the Reserve lies in the Santa Ana hydrologic unit, an area that extends from the Santa Ana Mountains to the west, to the middle of the San Jacinto Valley floor on the east (Figure 2-6). Hydrology in this watershed eventually flows into the Santa Ana River, which has its mouth in the Pacific Ocean (Dudek 2008). The Santa Ana River watershed is approximately 2,800 square miles and extends inland 96 miles from its mouth at the Pacific Ocean to its headwaters (Riverside County Integrated Project 2010).

Because the Santa Ana watershed is an arid region, there is very little perennial surface water flowing throughout the watershed. Flows begin in the San Bernardino and San Gabriel Mountains, and are primarily comprised of snowmelt and storm runoff. At lower elevations, flow is perennial and has high concentrations of pollutants, including discharges from wastewater treatment plants. Urban and irrigation runoff are also incorporated into the water flow in the greater Riverside area (Santa Ana Watershed Project Authority 2011).

Groundwater is an important additional water supply for MWD, which supplies 40% of the U H J L R Q ¶ V Z D W H U Q H H G V * U R X Q G Z D W H U O H Y H O L Q Z K L Q although production has increased by 18% from 1985 levels in the Riverside region (MWD 2007).

The Reserve is characterized by ephemeral drainages and stream courses (Dudek 2007). The mouth of Cajalco Creek is to the east, where it spreads out to create braided channels surrounded by riparian habitats. Cajalco Creek flows westward from the lake into Cajalco Canyon, and contains water flows from groundwater and dam seepage. Lake Mathews is fed by the Colorado River Aqueduct at the inlet (Figure 3-5). Water for use by MWD travels north from the reservoir and is eventually distributed to MWD customers throughout Southern California

III.B.2 Physical Conditions (Soils and Topography)

III.B.2.a Soils

Soils found in the Lake Mathews Reserve are described by the 8 6 6 R L O 6 H U Y H F H ¶ V V X western Riverside County (Knecht 1971) and are mapped by the National Resources Conservation Service (NRCS). The following discussion focuses on soils found only within the Reserve.

Soils in the Reserve are relatively diverse, with 30 soil series mapped in the Plan Area (Table 3-2, Soil Types and Acreages within the Reserve, Figures 3-6, 3-6a-1). The majority of soils within the Reserve are comprised of either sandy loam or fine sandy loam. These soils total approximately 63% of the Reserve. The remaining 37% of the Reserve is comprised of clay, coarse sandy loam, cobbly clay, cobbly loam, loam, loamy sand, stony loam, and non-soil materials (dams, made land, rock land, and terrace escarpments). Cajalco fine sandy loam accounts for the majority of the fine sandy loam soils and is the predominant soil series in the northeastern area. The Cieneba series and Monserate sandy loam account for the majority of the sandy loam soils, and are the predominant soil types in the western and southeastern portion of the Reserve, respectively. Clay soils, which are a prime indicator for the presence of special-status plant species, account for approximately 12% of the soils on site and are located primarily south of Lake Mathews between Lake Mathews Drive and La Sierra Avenue. A smaller patch of clay soils is located along Cajalco Creek east of the lake.

Table 3-2
Soil Types and Acreages within the Reserve

General Soil Type	Soil Series Name	Acreage	Percentage of Reserve
Clay	Bosanko clay, 2 to 8% and 8 to 15% slopes	400.3	7.8%
	Porterville cobbly clay, 2 to 15% slopes	230.1	4.5%
	Clay subtotal	630.4	12.3%
Coarse sandy loam	Hanford coarse sandy loam, 2 to 8% slopes	110.5	2.2%
	Vista coarse sandy loam, 2 to 8% and 8 to 15% slopes	36.6	0.7%
	Coarse sandy loam subtotal	147.0	2.9%
Cobbly loam	Yokohl cobbly loam, 2 to 25% slopes, eroded	5.5	0.1%
	Cobbly loam subtotal	5.5	0.1%
Fine sandy loam	Arlington fine sandy loam, 2 to 15% slopes	12.7	0.2%
	Buren fine sandy loam, 8 to 15% slopes, eroded	21.4	0.4%
	Cajalco fine sandy loam, 2 to 8%, 8 to 15%, and 15% to 35% slopes, eroded	1,254.0	24.5%
	Cajalco rocky fine sandy loam, 5 to 15% and 15% to 50% slopes, eroded	279.0	5.5%
	Fallbrook fine sandy loam, shallow, 8 to 15% slopes, eroded	0.3	<0.1%
	Friant rocky fine sandy loam, 8 to 25% slopes, eroded	0.8	0.1%
	Grangeville fine sandy loam, drained, 0 to 2% slopes	21.2	0.4%
	Grangeville fine sandy loam, loamy substratum, drained, 0 to 2% slopes	13.8	0.3%
	Pachappa fine sandy loam, 2 to 8% slopes, eroded	11.4	0.2%
	Placentia fine sandy loam, 2 to 15% slopes	68.9	1.3%
	Fine sandy loam subtotal	1,683.3	32.9%
Loam	Arlington loam, deep, 0 to 15% slopes	0.3	<0.1%
	Buchenau loam, slightly saline-alkali, 2 to 8% slopes	13.9	0.3%
	Buren loam, deep, 2 to 8% slopes, eroded	183.2	3.6%
	Honcut loam, 2 to 8% slopes, eroded	20.9	0.4%
	Las Posas loam, 2 to 8%, 8 to 15%, and 8 to 25% (severely eroded slopes)	269.5	5.3%
	Temescal loam, 15 to 50% slopes, eroded	18.3	0.4%
	Temescal rocky loam, 15 to 50% slopes, eroded	91.3	1.8%
	Yokohl loam, 2 to 8% and 8 to 15% slopes	30.9	0.6%
	Loam subtotal	628.3	12.3%
Loamy sand	Gorgonio loamy sand, 0 to 8% and 2 to 8% slopes	151.4	3.0%
	Loamy sand subtotal	151.4	3.0%
Sandy loam	Cieneba rocky sandy loam, 15 to 50% slopes, eroded	591.9	11.6%
	Cieneba sandy loam, 8 to 15% and 15% to 50% slopes, eroded	318.9	6.2%
	Fallbrook sandy loam, 8 to 15% slopes, eroded	27.0	0.5%
	Honcut sandy loam, 2 to 8% slopes	14.1	0.3%
	Monserate sandy loam, 0 to 5%, 5 to 8%, 5 to 15%, and 8 to 15% slopes	570.8	11.2%

Table 3-2
Soil Types and Acreages within the Reserve

General Soil Type	Soil Series Name	Acreage	Percentage of Reserve
Sandy loam subtotal		1,522.8	29.8%
Stony loam	Las Posas stony loam, 8 to 15% slopes, eroded	19.2	0.4%
	Stony loam subtotal	19.2	0.4%
Other	Dams	14.7	0.3%
	Made Land	2.0	0.03%
	Rock Land	34.7	0.7%
	Terrace Escarpments	256.6	5.0%
	Water	14.0	0.3%
	Other subtotal	322.1	6.3%
	Grand Total	5,109.9	100%

*Numbers may not total due to rounding.

Cajalcofine sandy loam comprises approximately 1,254.0 acres (24.5%) of the Reserve. Cajalco soils are well drained with medium runoff, are fairly permeable, and are found on moderate to steep slopes in regions of weathered, basic igneous rocks. Surface layers range from brown to dark brown to yellowish brown, and more acidic underlying layers. Cajalco soils support annual grasses and chaparral shrubs (NRCS 2011).

Cieneba rocky sandy loam constitutes a total of approximately 591.9 acres (11.6%) within the Reserve. This soil is found primarily on the western boundary of the project, as well as on the eastern border where Cajalco Creek flows into Lake Mathews. This soil series is an excessively drained soil found on moderate to steep slopes. The surface layer is sandy loam, 14 inches deep, and rock outcrops consist of 10% of the soil surface. Yellow-brown coarse sand is below this surface layer, and parent material of weathered granodiorite is found at a depth of 22 inches. Chaparral and chamise chaparral are vegetation communities supported on this soil type, as well as oaks, thin annual grasses, and weeds (NRCS 2011).

Monserate sandy loam is found on 570.8 acres (11.2%) within the Reserve. It is a moderately drained to well-drained soil characterized by slow to rapid runoff. The surface is brown, grayish brown, or reddish brown, and is underlain by blocky, hard material with very little organic matter. Grasses and forbs, oaks, and shrubs grow on this soil series (NRCS 2011).

Clay soils are found on 630.4 acres (12.3%) within the Reserve, and include Bosanko clay and Porterville cobbly clay. Clay soils are well-drained, and are found on gently sloping hills covered with annual grasses and forbs (NRCS 2011). Many special status plant species, including those that are Covered Plant Species under the MSHCP/NCCP and addressed in this RMP, are found on clay soils.

Rancho Cucamonga

San Bernardino

Pomona

Ontario

Riverside

Santa Ana

Irvine

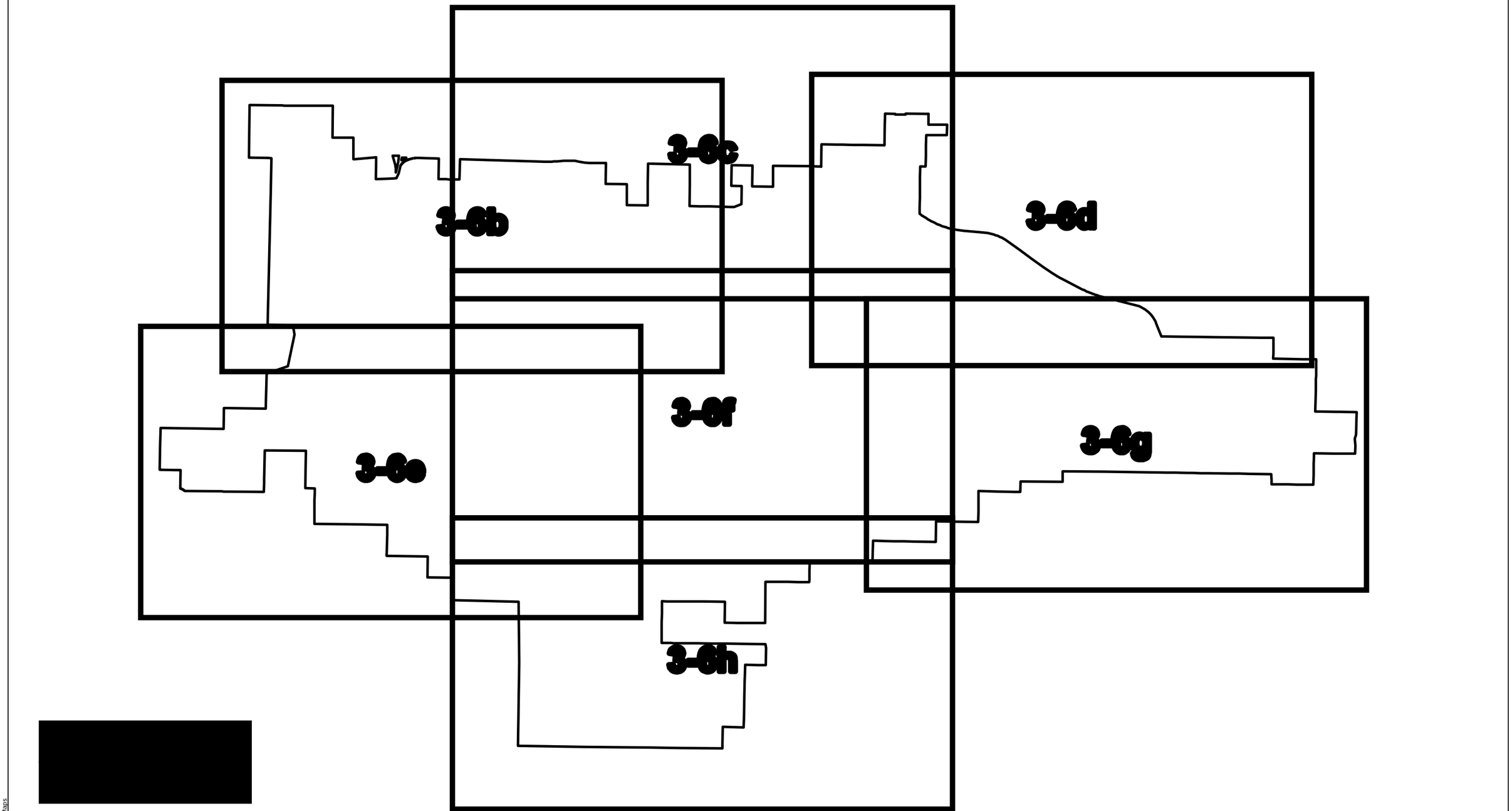
El Toro

Hemet

P a c i f i c

Z:\Projects\668501\MAPDOC\MAPS\

INTENTIONALLY LEFT BLANK



Z:\Projects\668501\MAPDOC\MAPSIR\MP Maps

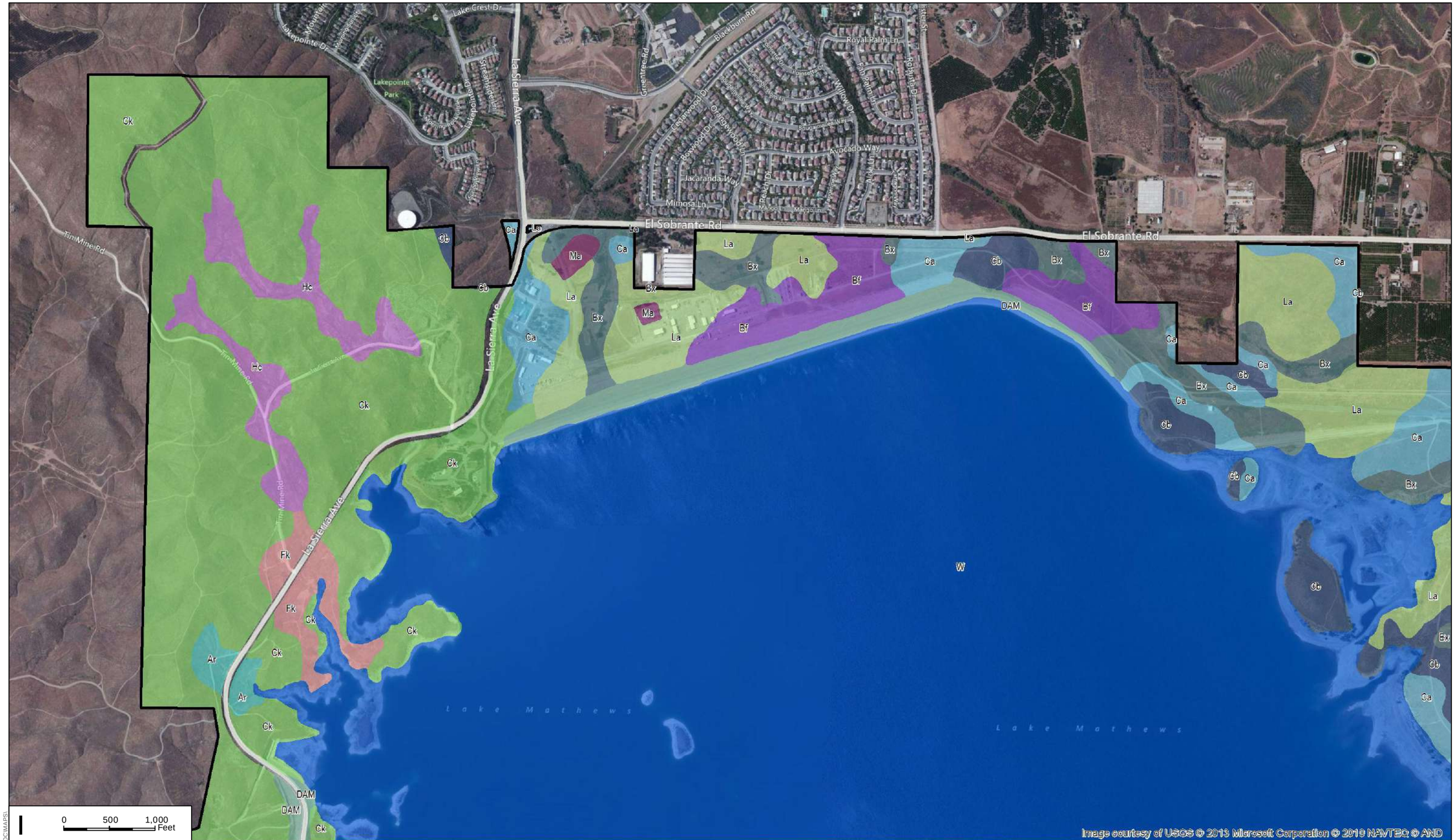
INTENTIONALLY LEFT BLANK

[redacted]

[redacted]

Z:\Projects\668501\MAPDOC\MAPS\RMP Maps

INTENTIONALLY LEFT BLANK



SOURCE: USDA 2011; Bing Maps 2011.

Plan Area *See Legend Page for Soil Types

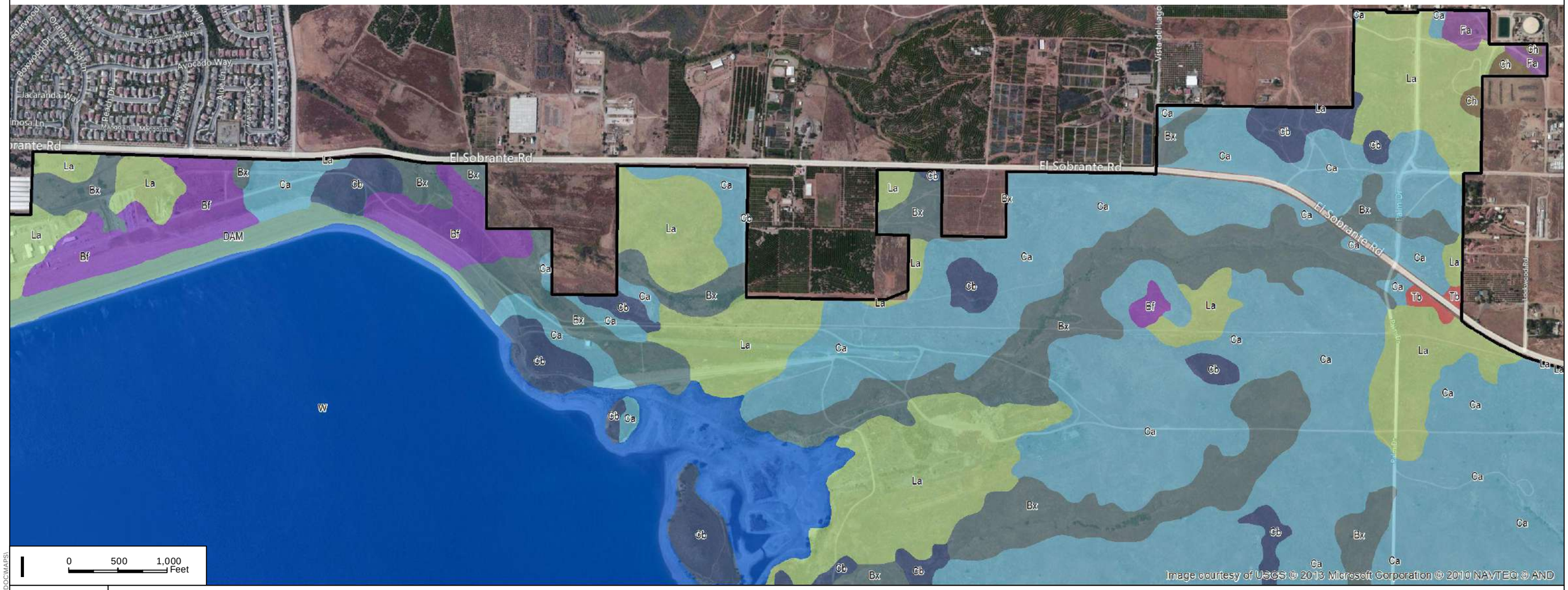
FIGURE 3-6b
Soils Map

6685
JUNE 2013

LAKE MATHEWS RMP

Z:\Projects\6685\MAPDOC\MAPS\

INTENTIONALLY LEFT BLANK



SOURCE: USDA 2011; Bing Maps 2011.

Plan Area *See Legend Page for Soil Types

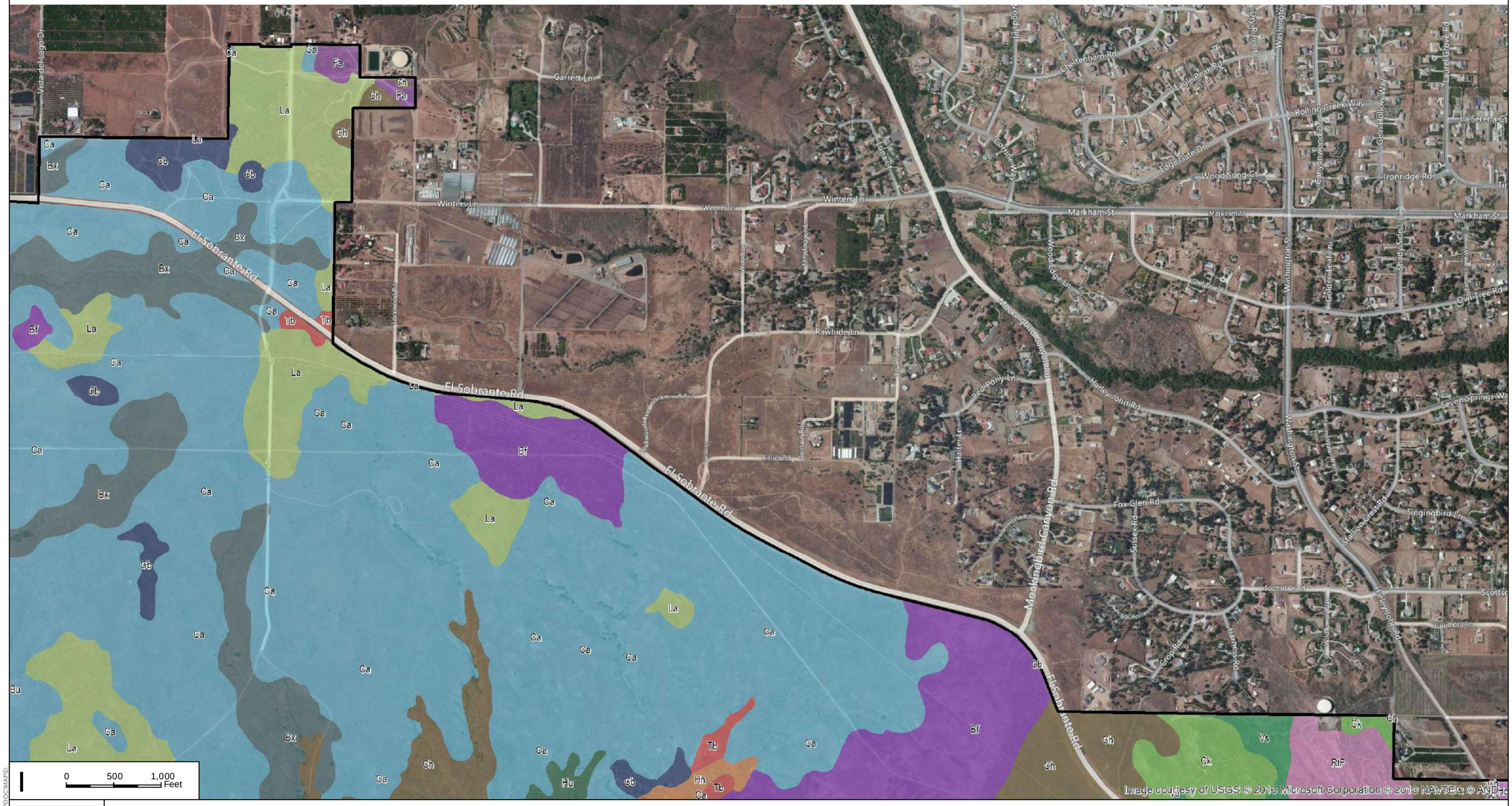
FIGURE 3-6c
Soils Map

6685
JUNE 2013

LAKE MATHEWS RMP

Z:\Projects\6685\01\MAPDOC\MAPS\

INTENTIONALLY LEFT BLANK



SOURCE: USDA 2011; Bing Maps 2011.

Plan Area *See Legend Page for Soil Types

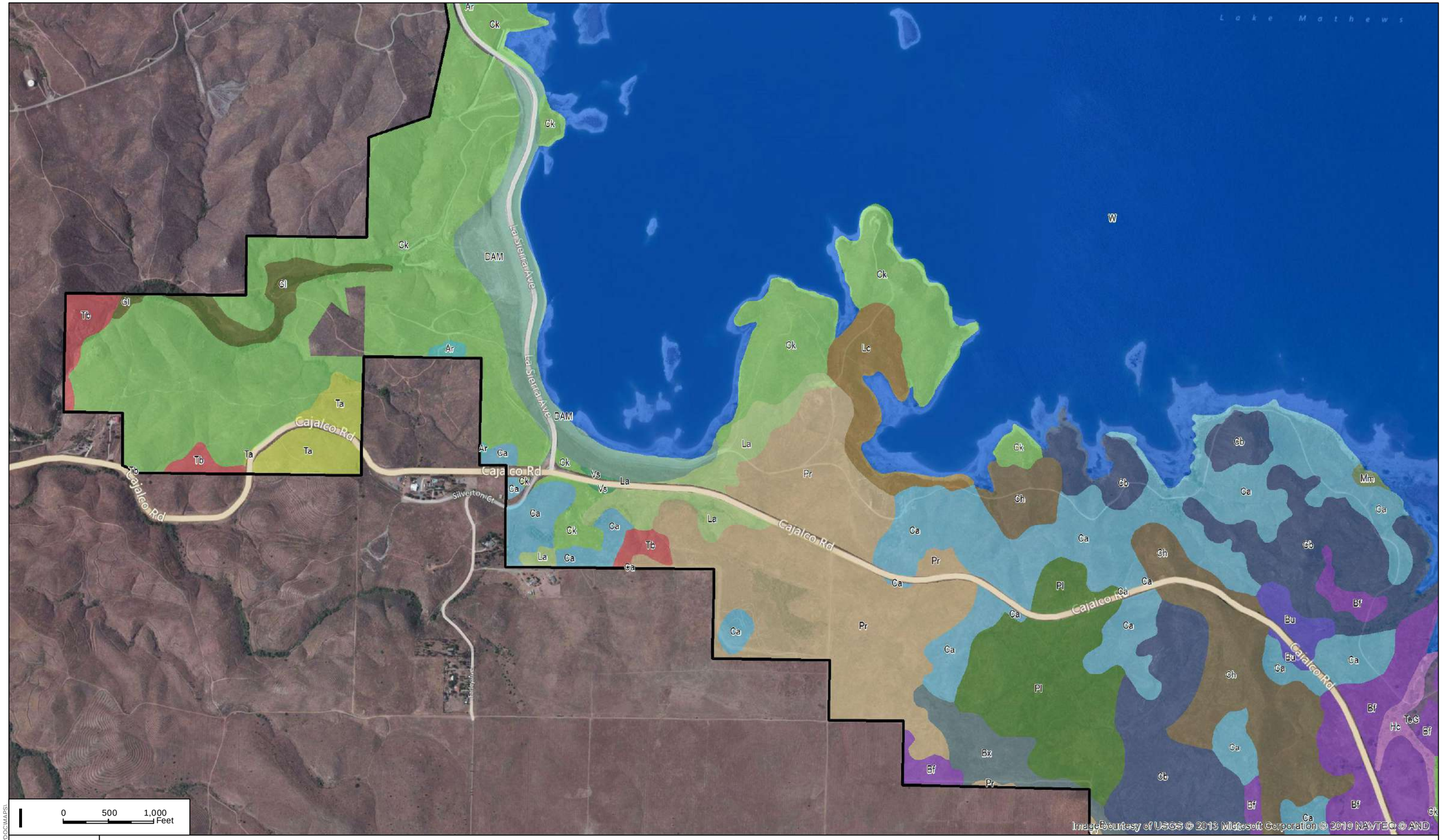
FIGURE 3-6d
Soils Map

6685
JUNE 2013

LAKE MATHEWS RMP

Z:\Projects\6685\011\MAPDOC\MAPS\

INTENTIONALLY LEFT BLANK



SOURCE: USDA 2011; Bing Maps 2011.

Plan Area *See Legend Page for Soil Types

FIGURE 3-6e
Soils Map

6685
JUNE 2013

LAKE MATHEWS RMP

Z:\Projects\668501\MAPDOC\MAPS\

INTENTIONALLY LEFT BLANK

SOURCE: USDA 2011; Bing Maps 2011.

Plan Area *See Legend Page for Soil Types

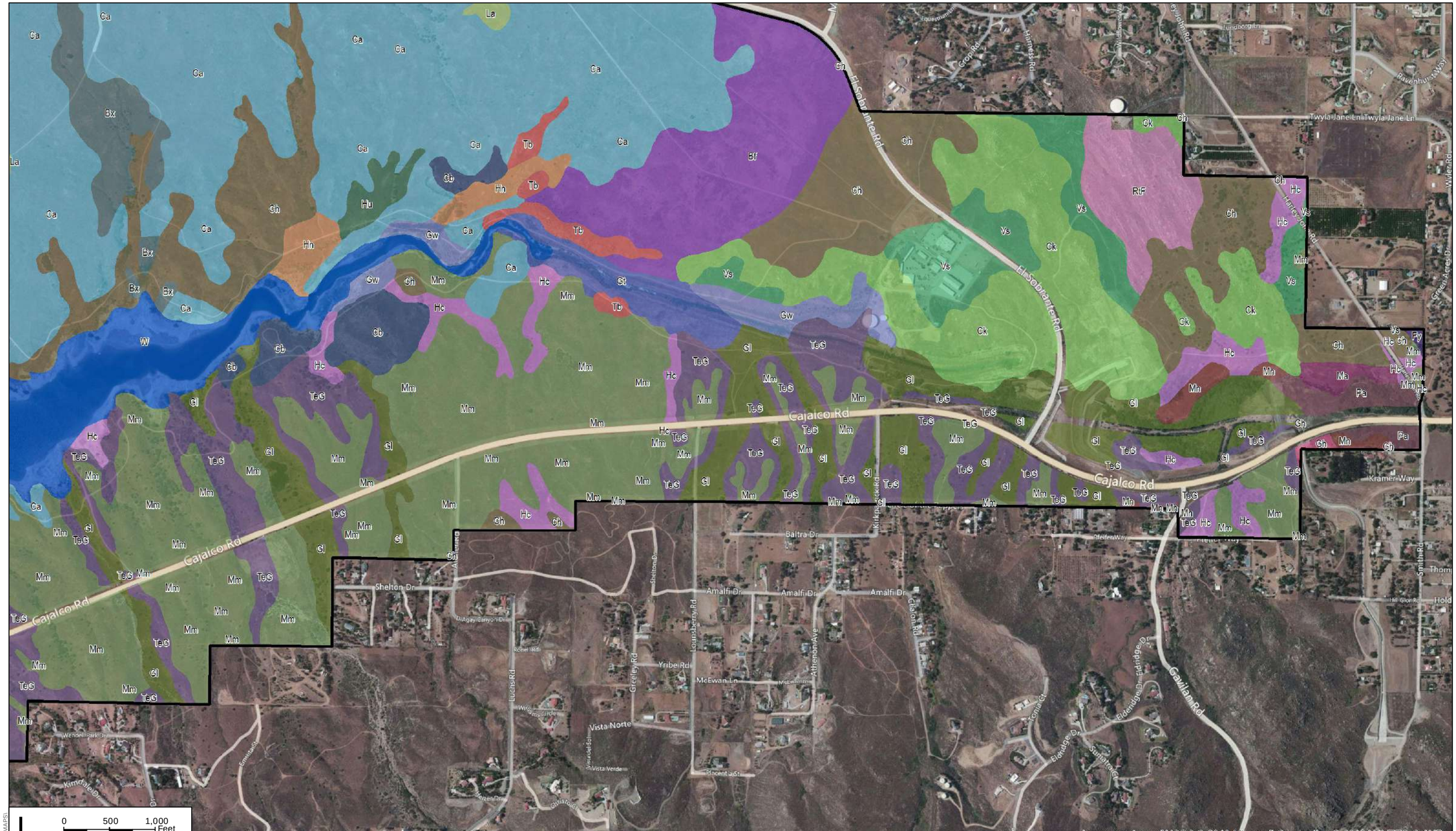
FIGURE 3-6f
Soils Map

6685
JUNE 2013

LAKE MATHEWS RMP

Z:\Projects\6685\01\MAPDOC\MAPS\

INTENTIONALLY LEFT BLANK



SOURCE: USDA 2011; Bing Maps 2011.

Plan Area *See Legend Page for Soil Types

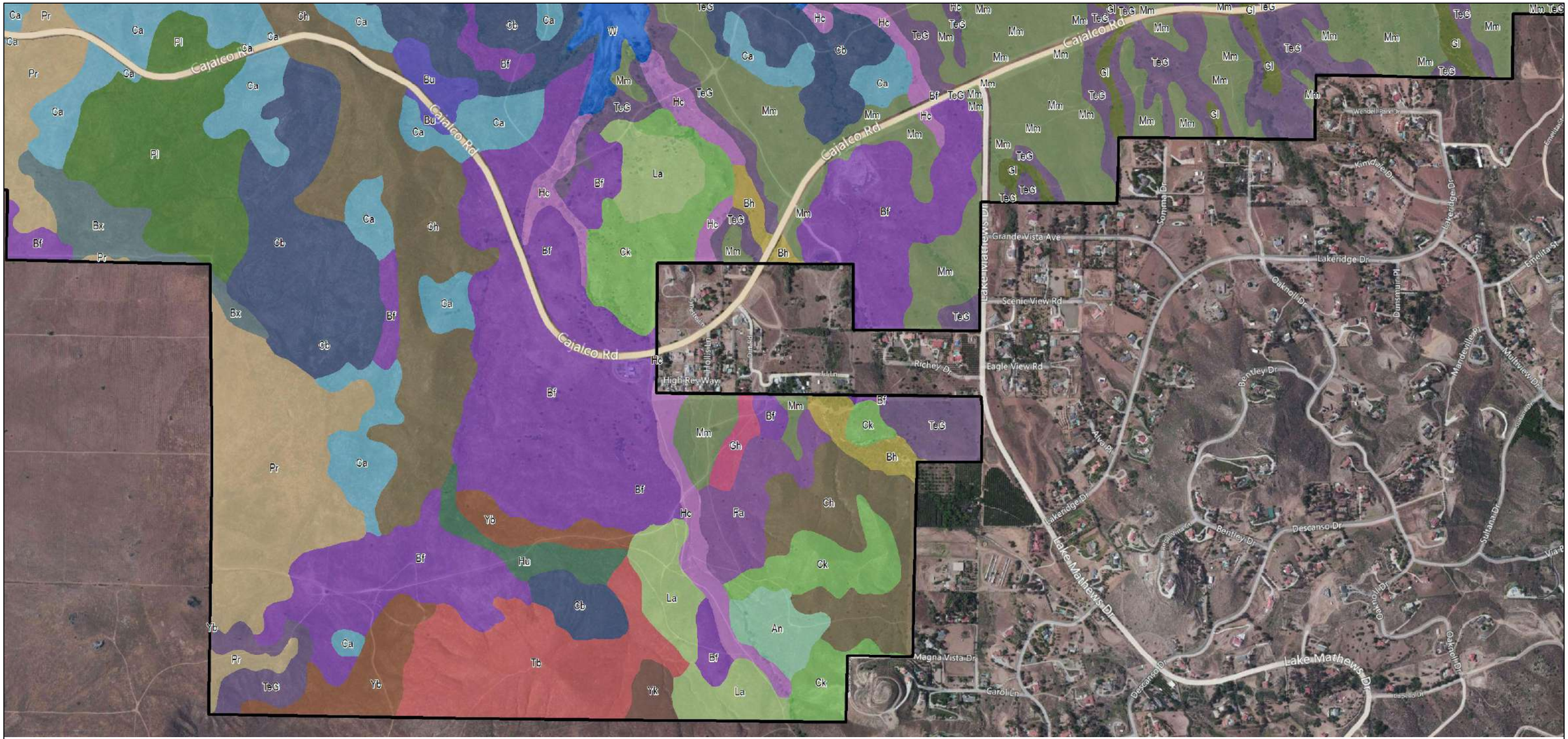
FIGURE 3-6g
Soils Map

6685
JUNE 2013

LAKE MATHEWS RMP

Z:\Projects\6685\01\MAPDOC\MAPS\

INTENTIONALLY LEFT BLANK



0 500 1,000 Feet

SOURCE: USDA 2011; Bing Maps 2011.

Plan Area *See Legend Page for Soil Types

FIGURE 3-6h
Soils Map

6685
JUNE 2013

LAKE MATHEWS RMP

Z:\Projects\6685\MAPDOC\MAPS\

INTENTIONALLY LEFT BLANK

Other soils found within the Reserve are depicted in Table 3-2.

III.B.2.b Geology

The Lake Mathews Reserve is underlain by several geological formations (Figures 3-7, 3-7a – h). The predominant geological formation in the southern region are very old alluvial fan deposits dating from the middle to early Pleistocene and supporting primarily homogeneous mix of sandy alluvium and axial channel deposits (Herzig 1991). Drainages are primarily lined with young axial channel deposits, dominated by sand, dating from the Holocene and late Pleistocene. Braided streams of the Cajalco Creek in the eastern terminus of the Reserve are underlain by young alluvial wash deposits. The northeastern region of the Reserve is primarily dominated by formations of a heterogeneous mixture of granodiorite and gabbro, dating from the Cretaceous period. Also present in the northeastern region are granodiorite of Cajalco pluton consisting of medium-grained biotitie and hornblende-biotite monzogranite and granodiorite.

III.B.2.c Topography

Surrounding topography of the Lake Mathews Reserve is dominated by the many fault lines in the area. The San Andreas Fault zone, which runs in a southeast to northwest direction toward the base of the San Bernardino Mountains, is responsible for the creation of the mountains and the San Gabriel Mountains to the west. The San Jacinto and Elsinore Fault zones are located east of the Reserve. The surrounding mountain ranges are formed from the uplifting of intrusive rocks, whereas the basins are derived from fluvial/alluvial sediments that have eroded from the mountains (Santa Ana Watershed Project Authority 2011).

Topography within the Reserve is varied, consisting of low, gentle rolling hills in some areas combined with higher hills and ridges. Elevations range from 1,100 to 1,700 feet (335 to 518 meters) above mean sea level (msl).

III.B.2.d Grazing and Agricultural History

Cattle and sheep grazing have been an integral part in land use history in the Riverside Lowlands Bioregion since settlement of the area by Europeans. Grazing was heaviest in the late 19th century, with winter sheep drives peaking around the turn of the century (Minnich and Dezzani 1998). Grazing has slowly declined in the area to the present day.

Sheep grazing still occurs throughout much of western Riverside County, especially in grasslands and alfalfa fields. Sheep grazing is utilized to manage brushy fuel loads and reduce numbers of non-native grasses and weeds that contribute to an overall increase in fire risk and outcompete native grasses and forbs. No data is available on the past use of grazing (e.g.,

frequency of grazing, areas grazed) within the Reserve, but it can be assumed that grazing historically took place on Reserve lands.

Much of the area surrounding Lake Mathews was planted with cacao during the early 1900s. Historical remains from cacao operations are still located within the Plan Area (see Section III.E for more detail). RCHCA-owned property south of Cajalco Road was used for citrus operations in the past, and intensive cleanup operations are currently underway. Dead trees, old irrigation systems, and terraced land are being cleaned up (Shomper, pers. comm. 2012).

III.B.3 Fire History

Understanding of fire frequency, vulnerable areas, and important ignition sources is based on fire history and current ecological settings. The fire history for the Reserve is based on CAL FIRE records (CAL FIRE 2011). CAL FIRE has maintained records of wildland fires since the beginning of the 20th century, although the first substantial fire recorded within the Reserve was in 1978. These records describe substantial fires and may not include some small, localized fires of a few acres or less. According to CAL FIRE data, the lands in the Reserve have had a moderate fire history, especially when compared with other areas in the region (CAL FIRE 2011).

Fire frequency is lower within the Reserve than in surrounding areas in western Riverside County (CAL FIRE 2007). As shown in Table 3-3, Fire History of the Lake Mathews Reserve, there were 12 recorded fires within 11 burn years from 1978 to 2004. Although many of these recorded fires in western Riverside County burned large acreages, very little acreage within the Reserve was affected.

Table 3-3
Fire History of the Lake Mathews Reserve[1]

Fire Name	Year	Acres Burned within Reserve	Total Acres Burned	Percentage of Reserve Burned
None	1978	261	2,157	5%
None	1978	236	507	5%
Steele	1979	107	107	2%
None	1982	102	150	2%
Silver	1993	91	217	2%
None	1994	261	2,157	5%
Water	1995	337	337	7%
Weirick	1998	12	2429	<1%

[1] Based on polygon GIS data for CAL FIRE, USDA Forest Service Region 5, BLM, National Park Service, Contract Counties and other agency fires measuring 10 acres and greater in size. The data covers fires from 1978 to 2010 and includes fires 10 acres and greater.

Table 3-3
Fire History of the Lake Mathews Reserve[1]

Fire Name	Year	Acres Burned within Reserve	Total Acres Burned	Percentage of Reserve Burned
Cajalco	1999	104	166	2%
Cajalco	2001	215	225	4%
Cerrito	2004	1	16,447	<1%
Mockingbird	2007	735	737	14%

Of the 11 burn years, 3 years are of particular importance: (1) 1978 with 10% of the Reserve burned in two separate fires; (2) 1995 with 7% of the Reserve burned; and (3) 2007 with 14% of the Reserve burned. Most (65%) of the Reserve has not had a recorded burn since data collection began in 1978. An intensive fire regime is not a defining characteristic of the Reserve. There were notably few fires during the 1980s, with the exception of 1982. The range of fire return intervals varies from 0 years (e.g., two fires in 1978) to 11 years, as there were no fires recorded from 1982 to 1993 within the Reserve.

Approximately 35% of the Reserve, or 1,793 acres of the total 5,110.4 acres, has been burned either once or twice since 1978 (Figure 3-8). A total of 1,334 acres within the Reserve (or 26% of the Reserve) has been burned once since 1978, and a total of 459 acres, or 9% of the total Reserve, has been burned twice since 1978. A small region of the Reserve located in the northeastern region (approximately 3 acres) has been burned three times.

Multiple fires were recorded in the northeastern portion of the Reserve, including large areas of non-native grassland that were burned twice. Fires were recorded along Cajalco Road at the southwestern edge of the Reserve, and at the intersection of La Sierra Avenue and El Sobrante Road in the northwestern portion of the Reserve. Grassland and Riversidean sage scrub habitats were primarily affected by these fires.

Another component of the Reserve fire history is the use of controlled burns to manage for wildfires and habitat management, and these methods should be utilized to manage for Covered Species, control non-native grasses, reduce fuel load, and minimize risk of fire. A Fire Management Plan (FMP, 1994) was created to address fuel load and use of controlled burns in the Plan Area, and has been updated for this RMP (see Appendix B – Fire Management Plan). Additionally, CAL FIRE, as part of its Riverside Unit Fire Management Plan (CAL FIRE 2009), created a Vegetation Management Plan for regions in Riverside County to reduce or eliminate non-native grasses and return the Plan Area to native vegetation using prescribed burns with the assistance of MWD. The CAL FIRE Plan divided Lake Mathews and Estelle Mountain (to the south) into 43 separate fire units that would be burned on a rotation in order to best mimic the natural burn cycles characteristic of the area.

One prescribed burn was conducted in 1991 in the northeastern portion of the Plan Area, and occurred in isolated parcels less than 10 acres; a total of 84 acres were burned, including some areas that had experienced prior wildfire (Figure 3-8). The most recent prescribed burn was conducted in 2004 over approximately 746 contiguous acres located north of Lake Mathews south of El Sobrante Road.

III.C Biological Resources

The following discussion on biological resources within the Lake Mathews Reserve highlights flora and fauna found within the Reserve, with a special emphasis on state and federally protected species, Covered Species under the MSHCP/NCCP, and 6 W H S K H Q V ¶ . N D Q J D U R R U

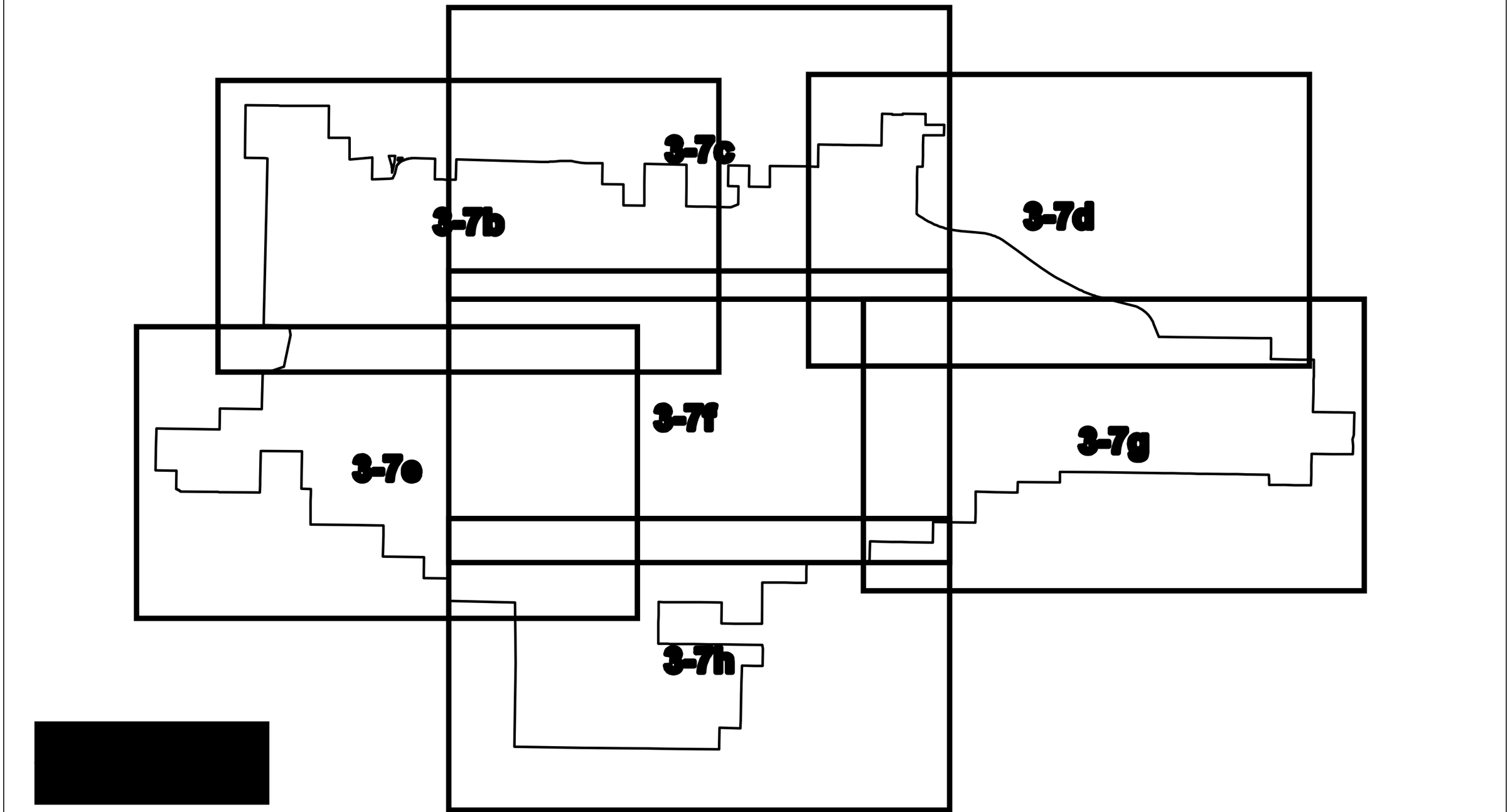
III.C.1 Botanical Resources (General, Covered Species , and Other Species of Interest)

III.C.1.a Methods

The habitat and species data presented in this RMP are largely taken from existing sources and biological surveys conducted during 1992 and 1993 in preparation for the MSHCP/NCCP. Dudek evaluated this compiled data and, based on field investigations of the Reserve during 2011 and knowledge of the local environment, made determinations regarding the adequacy of the data for management purposes. Below is a brief description of the sources used to compile the data; the remainder of the section includes descriptions of biological resources documented as occurring on site as well as those resources that have the potential to occur on site.

Vegetation Mapping

CDFG contracted with the California Native Plant Society (CNPS) and Aerial Information Systems (AIS) to prepare an alliance-level vegetation classification and map for Western Riverside County, encompassing approximately 1.6 million acres. The final report, Vegetation Alliances of Western Riverside County, California (CNPS 2006), was initially published in 2005 and revised in April 2006. CNPS assessed vegetation resources quantitatively through field surveys, including a rapid assessment process; data analysis using specialized clustering software; and final vegetation classification (CNPS 2006). Each vegetation type mapped corresponds to the National Vegetation Classification System at either the alliance level or at the more detailed association level, if possible. A final key was produced to differentiate from 101 alliances, 169 associations, and three unique stands of vegetation (CNPS 2006).



Z:\Projects\668501\MAPDOC\MAPS\

INTENTIONALLY LEFT BLANK

hically m

Z:\Projects\66850\MAPDOC\MAPS\

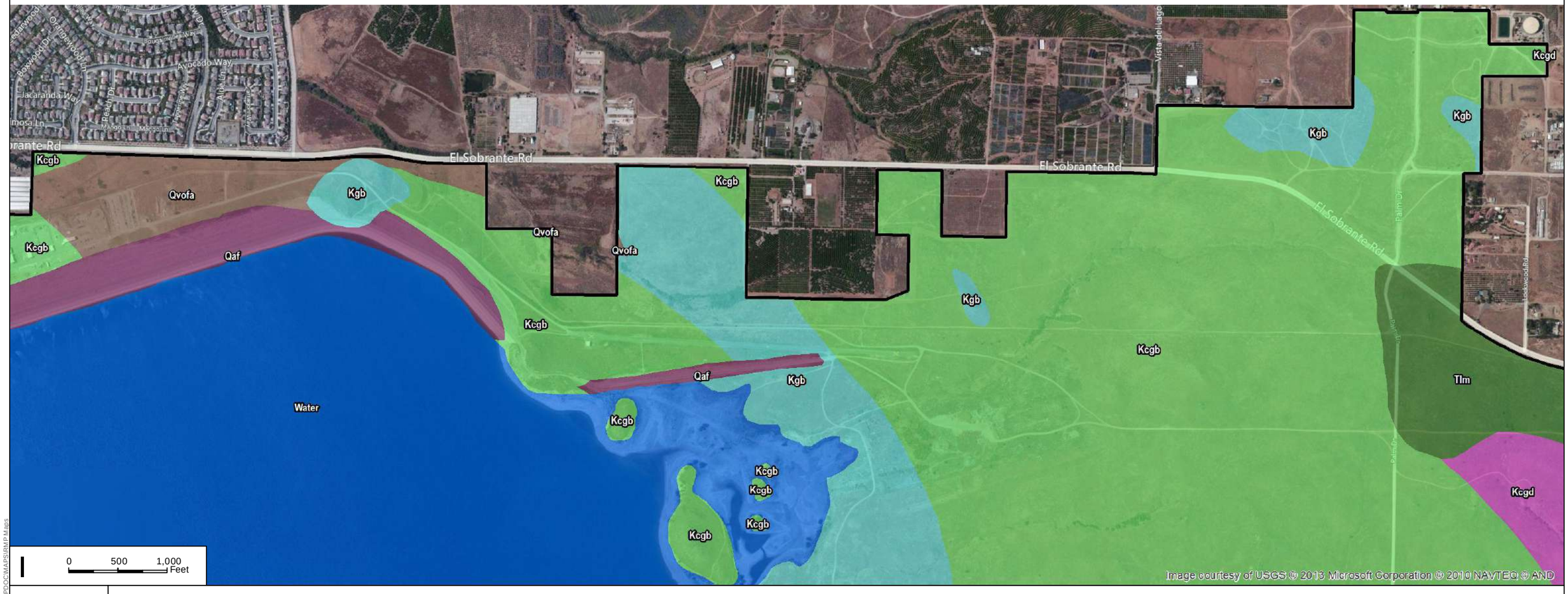
INTENTIONALLY LEFT BLANK

Z:\Projects\6685\01\MAPDOC\MAPS\RMP Maps

6685 JUNE 2013	SOURCE: Bing Maps 2011. LAKE MATHEWS RMP	Plan Area *See Legend Page for Geology Types

FIGURE 3-7b
Geology Map

INTENTIONALLY LEFT BLANK



SOURCE: Bing Maps 2011.

Plan Area *See Legend Page for Geology Types

FIGURE 3-7c

Geology Map

6685

JUNE 2013

LAKE MATHEWS RMP

Z:\Projects\6685\01\MAPDOC\MAPS\RMP Maps

INTENTIONALLY LEFT BLANK

Kcgd
Kgb
Kgb
Tlm
Kcgb
Kcgd
Kcgd
Tlm
Kcgd
Kt
Garrett Ln
Winters Ln
Winters Ln
Winters Ln
El Sobrante Rd
Palm Dr
Lockwood Rd
Luna Ct
Woodlark Ln
Rawhide Ln
Bogan Rd
El Sobrante Rd
Helios Rd
Hallen Ln
Red Pony Ln
Mockingbird Canyon Rd
Fox Glen Rd
Sussex Rd
Equestrian Rd
Crop Rd
Harness Rd
Scottsdale Rd
Stallion Crest Rd
Singingbird Ln
Lundborg Ln
Harley John Rd
Mockingbird Canyon Rd
El Sobrante Rd
Cheltenham Rd
Eagle Peak Rd
Dry Run Ct
Washington St
Rolling Creek Way
Gainsborough Dr
Gain Hollow Way
Laurel Grove Rd
La Serena Ct
Wood Song Ct
Ironridge Rd
Markham St
Markham St
Markham St
Wood Edge Ln
Owl Tree Rd
Owl Tree Rd
Washington St
Goldenrain Ln
Shady Stiel Ln
Seven Springs Way
Visa del Lago Dr
Woodcock Ln
Goldfinch Ln
Meadowlark Ln
Lockwood Ave
Fountain Rd
Equestrian Rd
Scottsdale Rd
Lundborg Ln
Harley John Rd
Singingbird Ln
Stallion Crest Rd
Fox Glen Rd
Sussex Rd
Crop Rd
Harness Rd
Equestrian Rd
Mockingbird Canyon Rd
El Sobrante Rd
Helios Rd
Bogan Rd
Rawhide Ln
Red Pony Ln
Hallen Ln
Woodlark Ln
Luna Ct
Garrett Ln
Winters Ln
Winters Ln
Winters Ln
Palm Dr
Lockwood Rd
El Sobrante Rd
Markham St
Markham St
Markham St
Owl Tree Rd
Owl Tree Rd
Goldenrain Ln
Shady Stiel Ln
Washington St
Seven Springs Way
Wood Edge Ln
Harley John Rd
Mockingbird Canyon Rd
Rolling Creek Way
Gainsborough Dr
Gain Hollow Way
Laurel Grove Rd
La Serena Ct
Ironridge Rd
Wood Song Ct
Cheltenham Rd
Eagle Peak Rd
Dry Run Ct
Visa del Lago Dr
Image courtesy of USGS © 2013 Microsoft Corporation © 2010 NAVTEQ © AND
0 500 1,000 Feet

SOURCE: Bing Maps 2011.

Plan Area *See Legend Page for Geology Types

FIGURE 3-7d

Geology Map

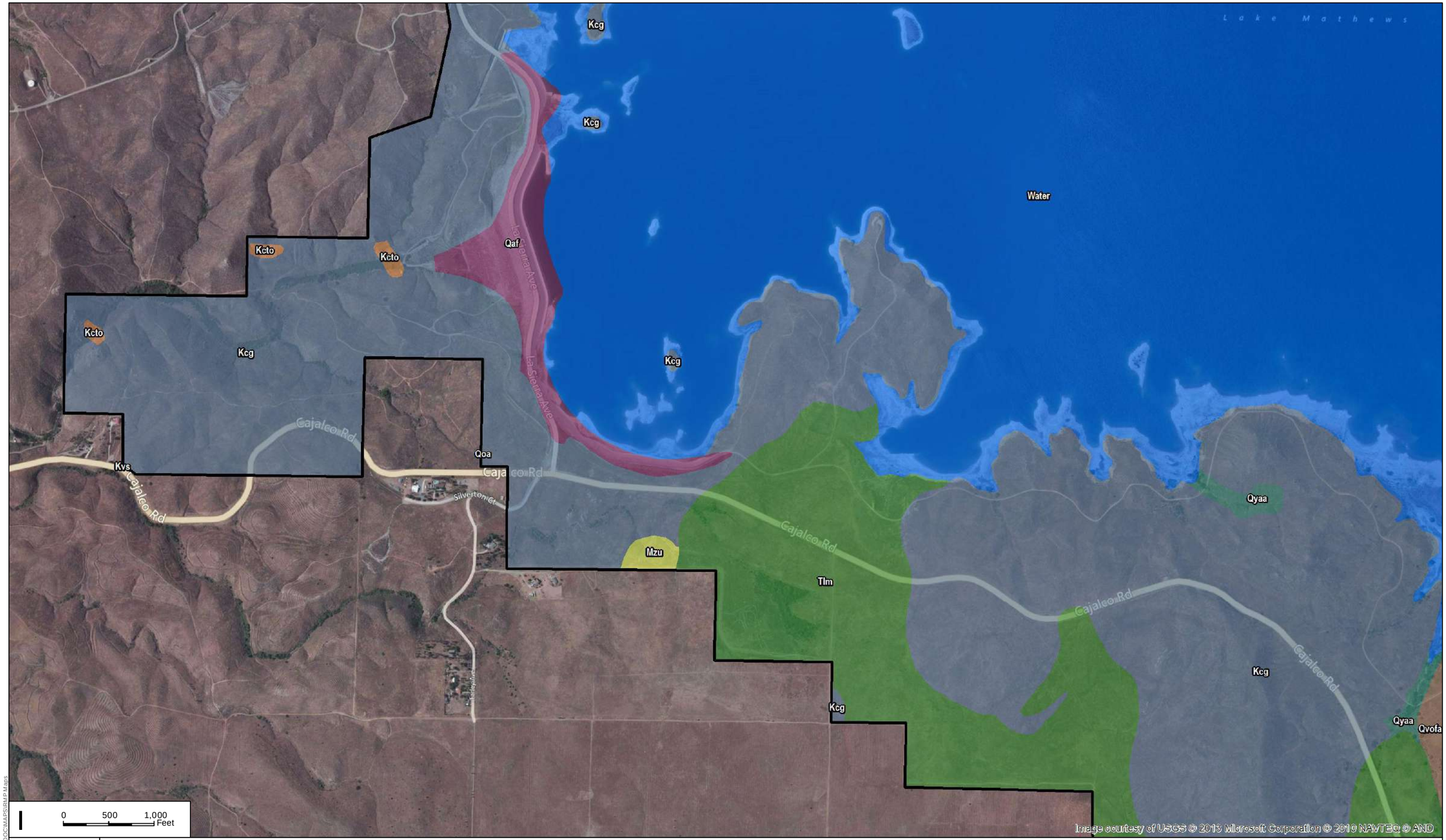
6685

JUNE 2013

LAKE MATHEWS RMP

Z:\Projects\6685\01\MAPDOC\MAPS\RMP Maps

INTENTIONALLY LEFT BLANK



Z:\Projects\6685\01\MAPDOC\MAPS\RMP Maps

SOURCE: Bing Maps 2011.

Plan Area *See Legend Page for Geology Types

FIGURE 3-7e

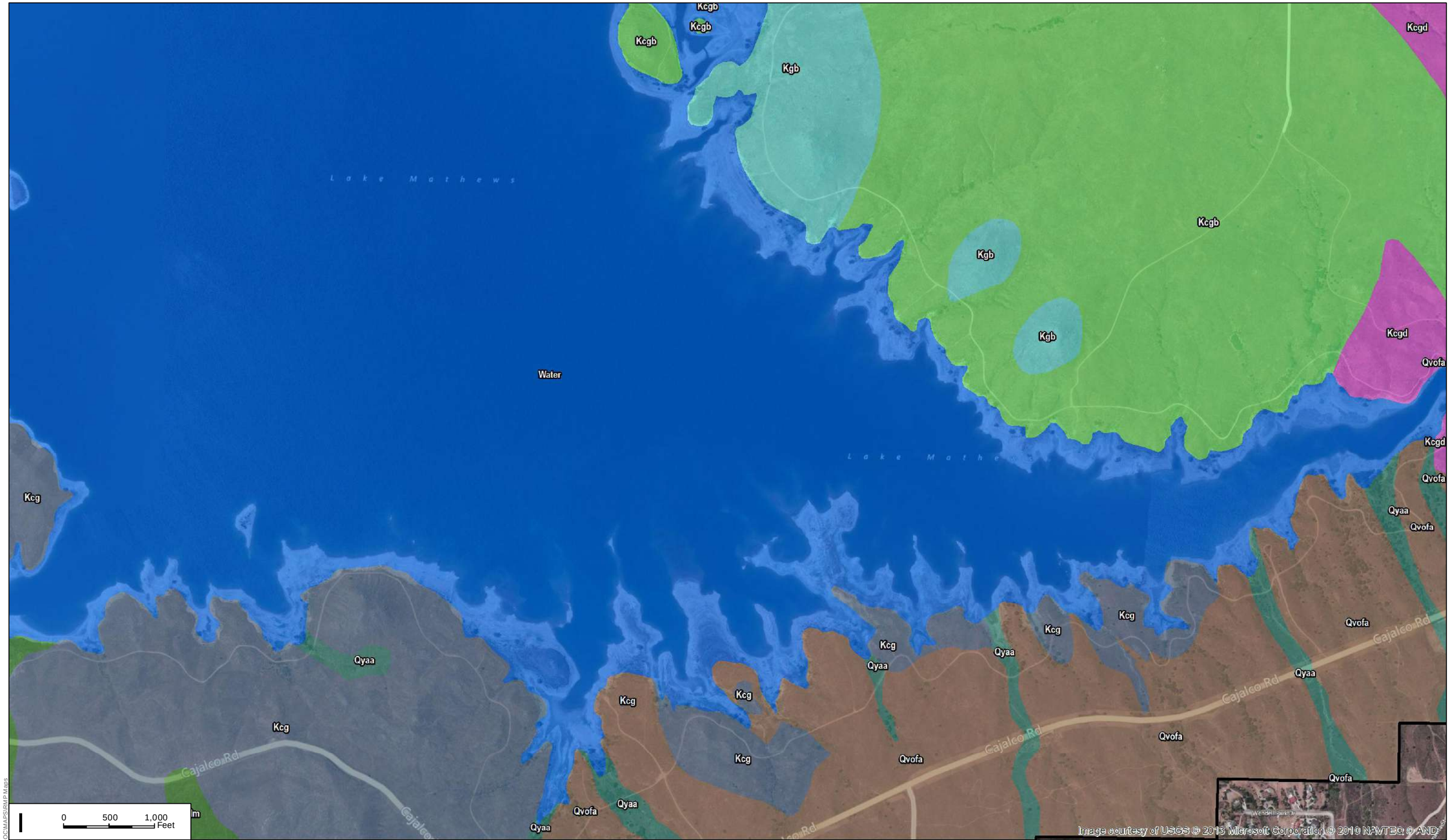
Geology Map

6685

JUNE 2013

LAKE MATHEWS RMP

INTENTIONALLY LEFT BLANK



Z:\Projects\6685\011MAPDOC\MAPS\RMP Maps

SOURCE: Bing Maps 2011.

Plan Area *See Legend Page for Geology Types

FIGURE 3-7f

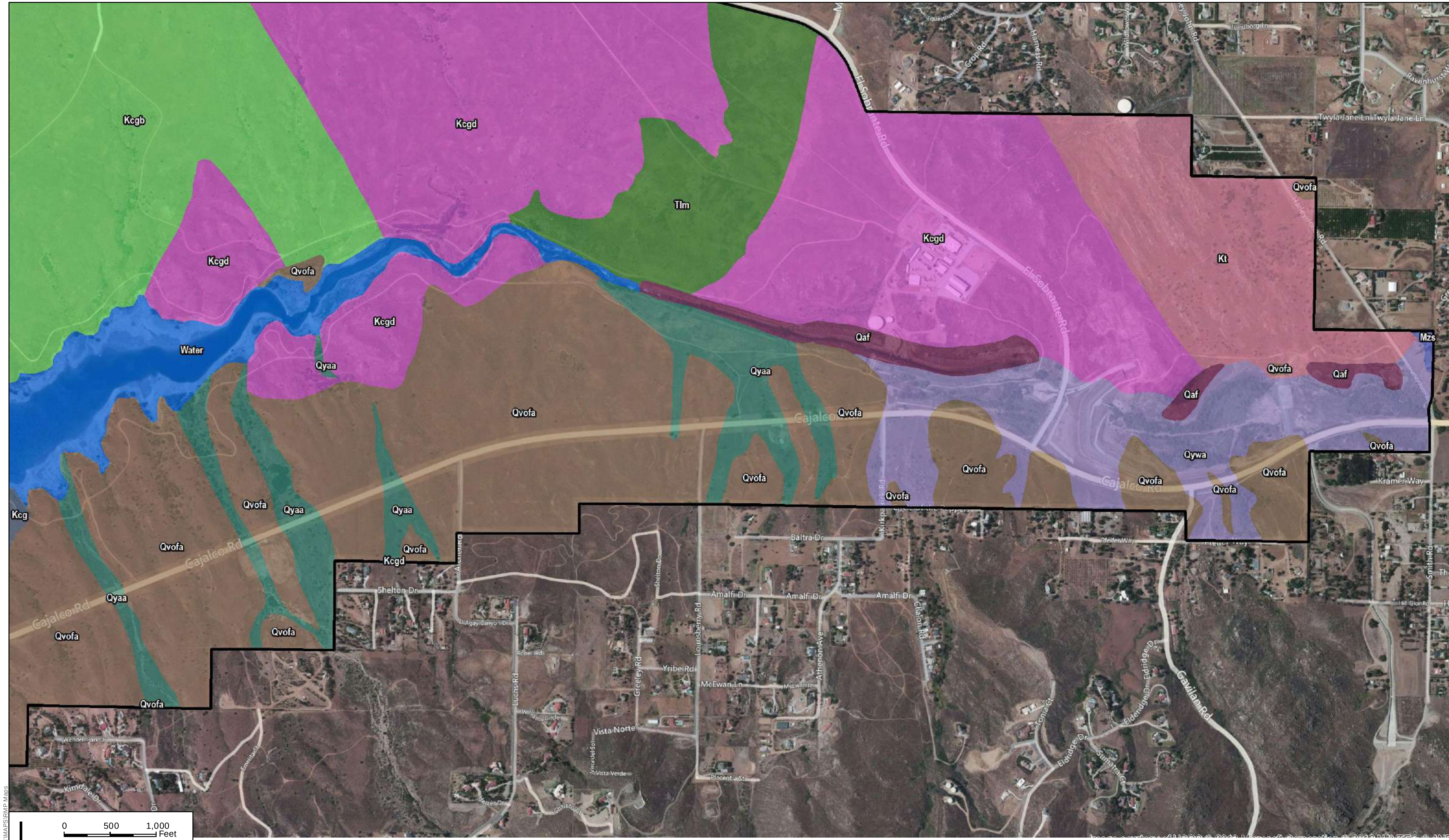
Geology Map

6685

JUNE 2013

LAKE MATHEWS RMP

INTENTIONALLY LEFT BLANK



SOURCE: Bing Maps 2011.

Plan Area *See Legend Page for Geology Types

FIGURE 3-7g

Geology Map

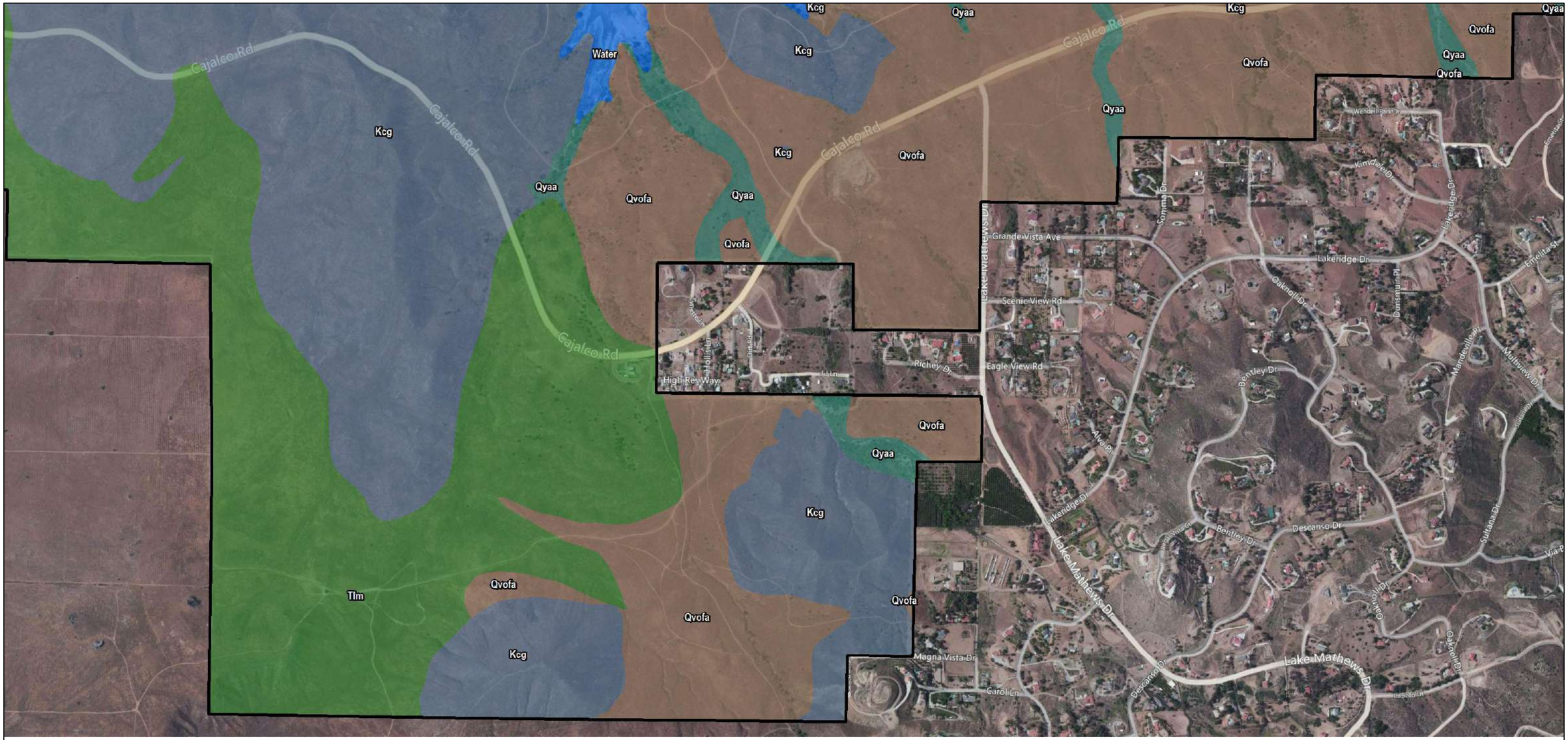
6685

JUNE 2013

LAKE MATHEWS RMP

Z:\Projects\j668501\MAPDOC\MAPS\RMP Maps

INTENTIONALLY LEFT BLANK



0 500 1,000 Feet

SOURCE: Bing Maps 2011.

Plan Area *See Legend Page for Geology Types

FIGURE 3-7h

Geology Map

6685

JUNE 2013

LAKE MATHEWS RMP

Z:\Projects\6685\01MAPDOC\MAPS\RMP Maps

INTENTIONALLY LEFT BLANK

[redacted]

[redacted]

[redacted]

[redacted]

Z:\Projects\668501\MAPDOC\MAPS\

INTENTIONALLY LEFT BLANK

In a separate but parallel process involving AIS, vegetation mapping was created using aerial interpretation of ortho-rectified[2] aerial photographs in both color infrared (CIR) and in natural color imagery flown in the winter and summer. AIS created the base map using three primary processes: 1) hand-delineation of polygons on the base CIR imagery, 2) digitization of those hand-delineated polygons, and 3) attribution of the vegetation types and overstory cover values. The map was created in geographic information system (GIS) digital format, which was then clipped to the boundaries of the Reserve.

The vegetation mapping prepared by CNPS and AIS is intended to update the vegetation mapping that was prepared by Pacific Southwest Biological Services (PSBS) and RTA in 1992 for the MSHCP/NCCP. The 1992 vegetation mapping is considered too general to identify unique vegetation, define special-status species habitats, and map vegetation at a fine scale. However, the updated CNPS/AIS vegetation map used in preparation of this report and analysis is considered adequate for those purposes. Further information about the methods used to create this vegetation map and classification system can be found in the Vegetation Alliances of Western Riverside County, California (CNPS 2006).

In 2011, the vegetation mapping within the Reserve was updated using ground-truthing field assessment and the updated Manual of California Vegetation (MCV; Sawyer et al. 2009). Vegetation communities were mapped to the alliance level and where possible, the association level. In some cases, mapping units or associations derived from the MSHCP mapping effort, although not described in the MCV, were used to map vegetation communities that did not key to a suitable alliance or association found in the MCV.

Cumulative Plant and Wildlife Species Data

A cumulative plant and wildlife species list was compiled from 1992 and 1993 field surveys, ' X G H N ¶ V Y H J H W D W L R Q Y H J H W D W L R Q V D P S O L Q J U H S R U W V, a survey of the plant species on Lake Mathews islands, Christmas bird counts, brood-parasite cowbird trapping efforts, avian bird counts, reptile array work, and 6 W H S K H Q V ¶ N a t u r e d a t a b a s e U D W species lists are included as Appendix C - Plant Species Observed on Site, and Appendix D - Wildlife Species Observed on Site.

III.C.1.b Results : Vegetation Communities, Habitats, and Plant Species

The 2011 vegetation mapping effort identified 49 different vegetation communities and land cover types according to the Holland vegetation mapping classification (Holland 1986) (Table 3-4,

[2] Ortho-rectification is the process of modifying flat aerial maps to match the curvature of the earth, thus improving the accuracy of vector data (i.e., polygon, point, or line data) created from the photo.

Summary of Vegetation Communities and Acreages within Reserve (Figures 3-9, 3-9a-f). The following table outlines vegetation communities and acreages within the Reserve. A discussion of vegetation communities is included as Appendix E – Vegetation Communities Within the Reserve.

Table 3-4
Summary of Vegetation Communities and Acreages within Reserve

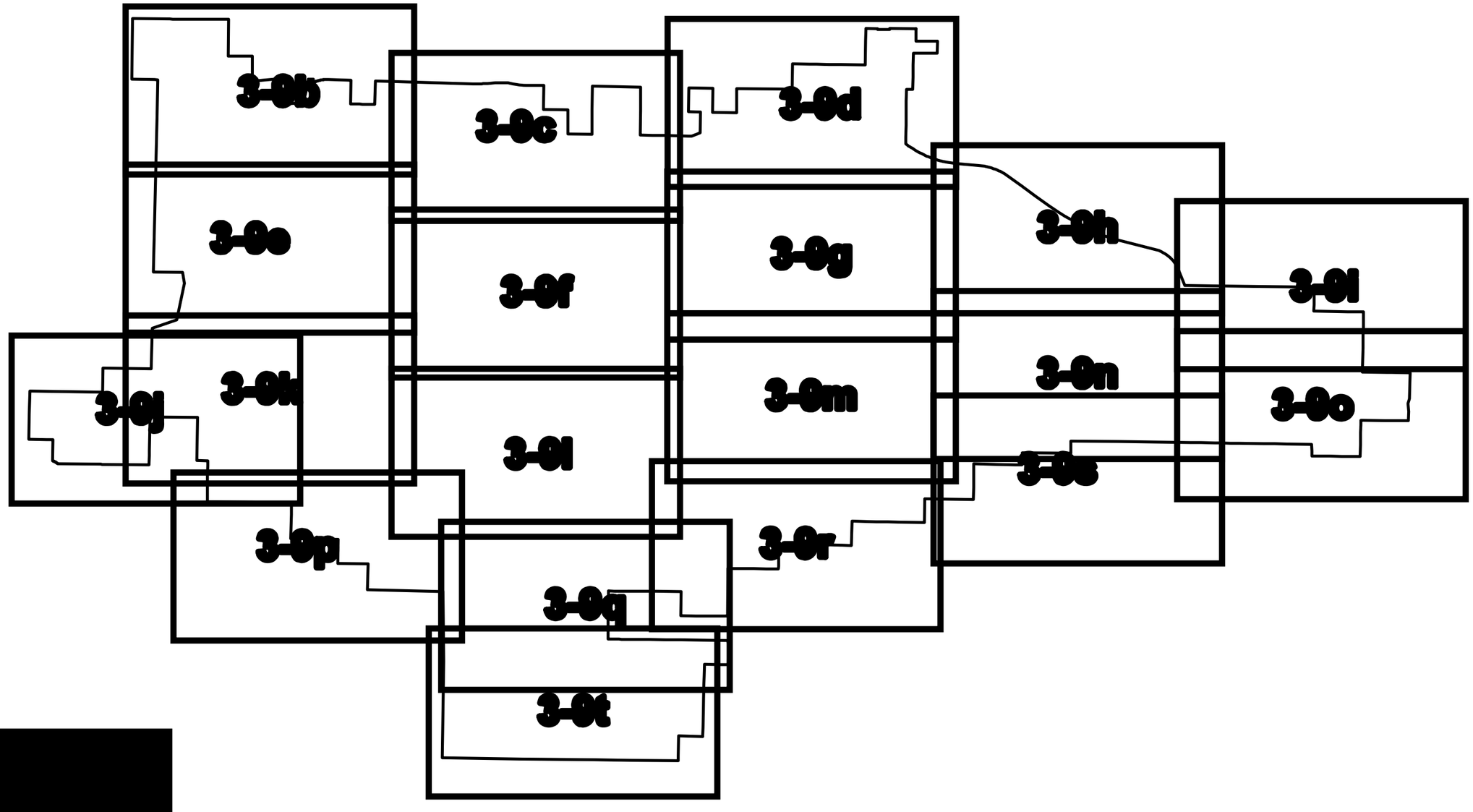
Macrogroup	Alliance	Association	Acreage
None	Non-Native Vegetation/Developed Ar	Agriculture	0.37
		Exotic Trees	5.57
		Urban Interface	12.04
		Urban or Developed	38.46
		Vacant	71.79
		Water	3.16
		None Total	131.40
MG009. California Forest and Woodland	Juniperus californica (California juni woodland) Alliance	California Juniper – California Buckwheat – California Sagebrush Association	96.16
		California Juniper / Annual Grass Association	135.15
		California Juniper Alliance	20.57
		California Juniper Riparian Mapping U	28.23
		California Forest and Woodland To	280.11
MG027. Introduce North American Mediterranean Woodland and Forest	Eucalyptus (globulus, camaldulensis (Eucalyptus groves) Semi-natural Stands	Eucalyptus – Tamarisk	2.19
		Eucalyptus Alliance	3.60
		Introduced North American Mediterranean Woodland and Fore	5.80
MG036. Southwestern North American Riparian, Flooded and Swamp Fore	Baccharis salicifolia (Mulefat thickets alliance	Mulefat – Mexican Elderberry Associati	19.47
		Mulefat Alliance	22.82
	Platanus racemosa (California sycar woodlands) Alliance	California Sycamore Alliance	4.66
		Coast Live Oak – Sycamore Riparian Mapping Unit	1.59
	Populus fremontii (Fremont cottonwood forest) Alliance	Fremont Cottonwood Forest Alliance	0.16
	Salix exigua (Sandbar willow thicket alliance	Sandbar Willow Alliance	1.63
	Salix gooddingii (Black willow thicke alliance	Black Willow / Mulefat Association	10.40
		Black Willow Alliance	50.65
	Sambucus nigra (Blue elderberry sta alliance	Mexican Elderberry	16.37
	Southern Willow Scrub	Southern Willow Scrub	47.23
	Tamarix spp. (Tamarisk thickets) Se natural Stands	Tamarisk – Black Willow	6.89
		Tamarisk Alliance	22.64

Macrogroup	Alliance	Association	Acreage
	Baccharis emoryi (Emory's baccharis thickets) Provisional alliance	Emory's Baccharis Mapping Unit	3.59
		Southwestern North American Riparian, Flooded and Swamp Fore	208.10
MG043. California Chaparral	Adenostoma fasciculatum (Chamise chaparral) alliance	Chamise - Coastal Sage Scrub Disturbance Mapping Unit	0.98
		California Chaparral Tot	0.98
MG044. California Coastal Scrub	Artemisia californica (California sage scrub)	California Sagebrush - Annual Grassland	15.97
		California Sagebrush - Brittlebush - California Buckwheat	0.02
		California Sagebrush / Menzies' Fiddl Association	1.23
		California Sagebrush Alliance	97.15
	Encelia californica (California brittle scrub)	California Encelia	6.20
		California Encelia - California Sagebrush Association	90.24
	(U L F D P H U L D S D O P H U scrub) Provisional alliance	Palmer's Goldenbush Alliance	75.19
	Eriogonum fasciculatum (California buckwheat scrub) alliance	California Buckwheat - Annual Grassland	3.43
		California Buckwheat - Brittlebush Association	315.85
		California Buckwheat Alliance	54.22
	Artemisia californica - Eriogonum fasciculatum (California sagebrush - California buckwheat scrub) alliance	California Sagebrush - (California Buckwheat) - Annual Grass-Herb Mapping Unit	104.91
		California Sagebrush - California Buckwheat Alliance	31.03
		California Coastal Scrub To	795.44
MG045. California Annual and Perennial Grassland	Amsinckia (menziesii, tessellata) (Fiddleneck fields) alliance	Menzies' Fiddleneck	23.37
	Bromus (diandrus, hordeaceus) - Brachypodium distachyon (Annual b grasslands) Semi-natural Stands	Annual grassland - Menzies' Fiddleneck - Filaree	2.48
	California Annual and Perennial Grassland	Annual grassland - Filaree	1.69
		California Annual Grassland Alliance	3,137.77
	Lasthenia californica - Plantago erecta - Vulpia microstachys (six weeks fescue flower fields) alliance	California Goldfields Alliance	0.86
		California Annual and Perennial Grassland Tota	3,166.16
MG083. Warm Semi-Desert/Mediterranean Alkali Saline Wetland	Atriplex lentiformis (Quailbush scrub alliance	Quailbush Scrub	1.77

Macrogroup	Alliance	Association	Acreage
Warm Semi-Desert/Mediterranean Alkali Saline Wetland			1.77
MG088. Mojavean Sonoran Desert Scrub	Encelia farinosa (Brittle bush scrub) alliance	Brittlebush-California Sagebrush-California Buckwheat	0.72
		Brittlebush-California Sagebrush Association	402.53
		Brittlebush Alliance	111.15
Mojavean-Sonoran Desert Scrub Total			514.40
MG092. Madrean Warm Semi-Desert Wash Woodland/Scrub	Lepidospartum squamatum (Scale broom scrub) alliance	Scalebroom-Mulefat Association	8.73
Madrean Warm Semi-Desert Wash Woodland/Scrub Total			8.73
MG098. Inter-Mountain Dry Shrubland and Grassland	Lycium andersonii (Anderson's boxthorn scrub) alliance	Anderson's boxthorn Alliance	4.55
Inter-Mountain Dry Shrubland and Grassland Total			4.55
Lake Mathews Reserve Total Acreage			5,117.44*

* Numbers may not sum due to rounding.

Note: These vegetation acreages are for management purposes only, and do not necessarily correspond to acreages provided within the Mitigation Banking Agreement. Acreages should not be used for mitigation banking purposes.



Z:\Projects\668501\MAPDOC\MAPS\

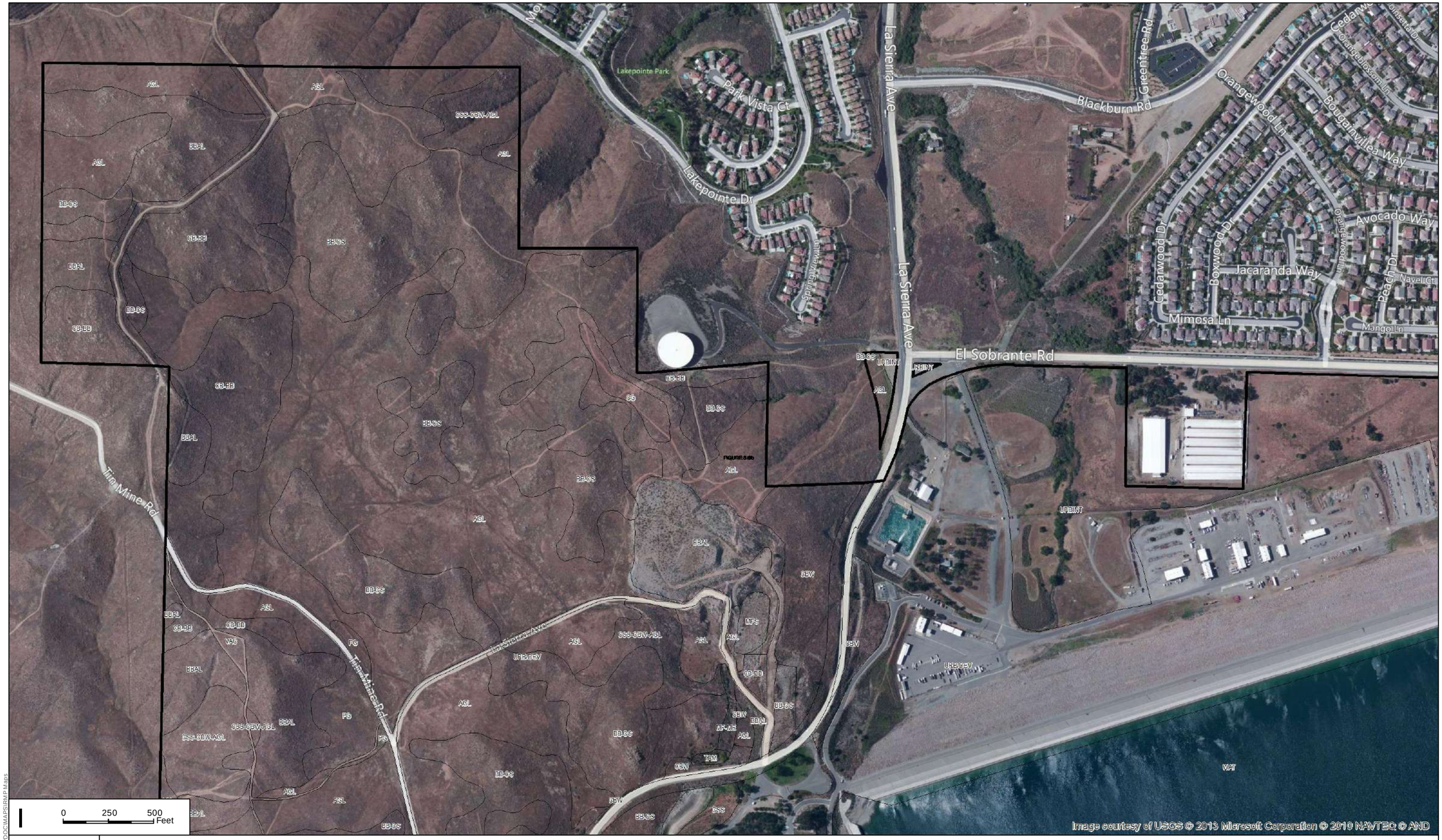
INTENTIONALLY LEFT BLANK

[redacted]

[redacted]

Z:\Projects\j668501\MAPDOC\MAPS\

INTENTIONALLY LEFT BLANK



0 250 500 Feet

SOURCE: Bing Maps 2011.

Plan Area *See Legend Page for Vegetation Types

FIGURE 3-9b
Vegetation Community Mapping

6685
JUNE 2013

LAKE MATHEWS RMP

Z:\Projects\6685\01\MAPDOC\MAPS\RMP Maps

INTENTIONALLY LEFT BLANK

SOURCE: Bing Maps 2011.

Plan Area *See Legend Page for Vegetation Types

FIGURE 3-9c

Vegetation Community Mapping

6685

JUNE 2013

LAKE MATHEWS RMP

Z:\Projects\6685\011\MAPDOC\MAPS\RMP Maps

INTENTIONALLY LEFT BLANK

Z:\Projects\6685\MAPDOC\MAPS\RMP Maps

SOURCE: Bing Maps 2011.

Plan Area *See Legend Page for Vegetation Types

FIGURE 3-9d

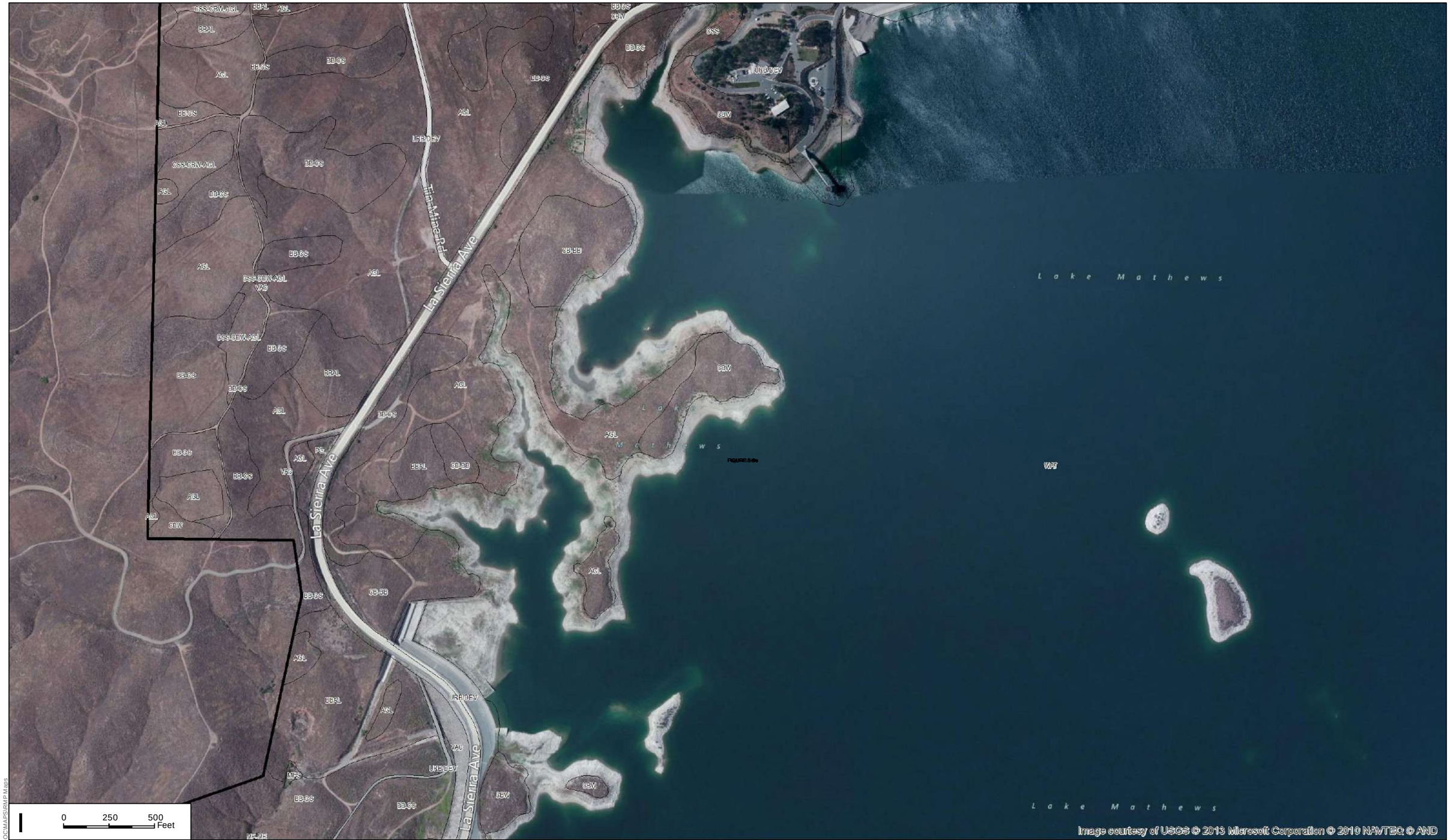
Vegetation Community Mapping

6685

JUNE 2013

LAKE MATHEWS RMP

INTENTIONALLY LEFT BLANK



SOURCE: Bing Maps 2011.

Plan Area *See Legend Page for Vegetation Types

FIGURE 3-9e

Vegetation Community Mapping

6685

JUNE 2013

LAKE MATHEWS RMP

Z:\Projects\6685\01\MAPDOC\MAPS\RMP Maps

INTENTIONALLY LEFT BLANK

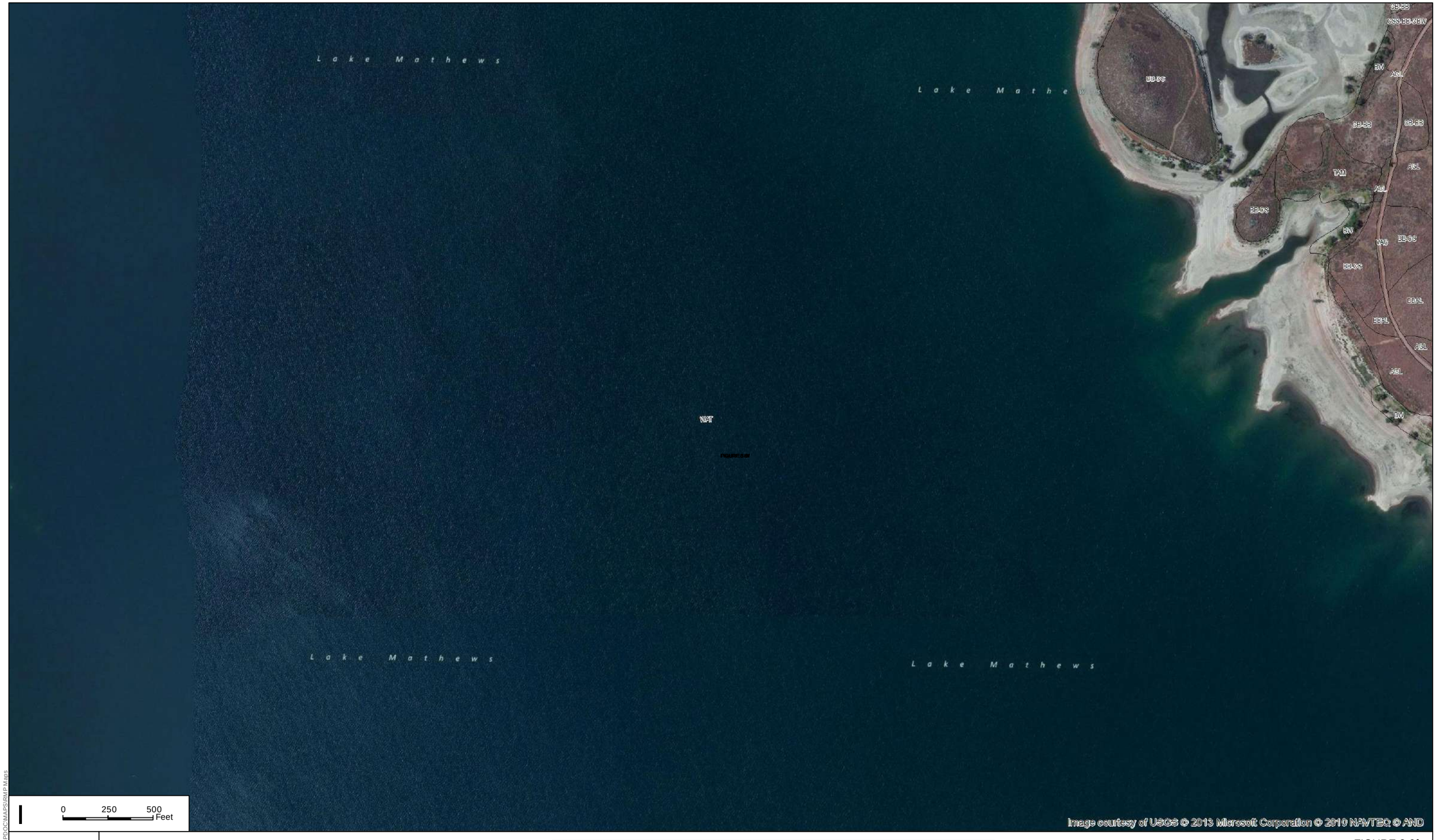


Image courtesy of USGS © 2013 Microsoft Corporation © 2010 NAVTEQ © AND

SOURCE: Bing Maps 2011.

Plan Area *See Legend Page for Vegetation Types

FIGURE 3-9f

Vegetation Community Mapping

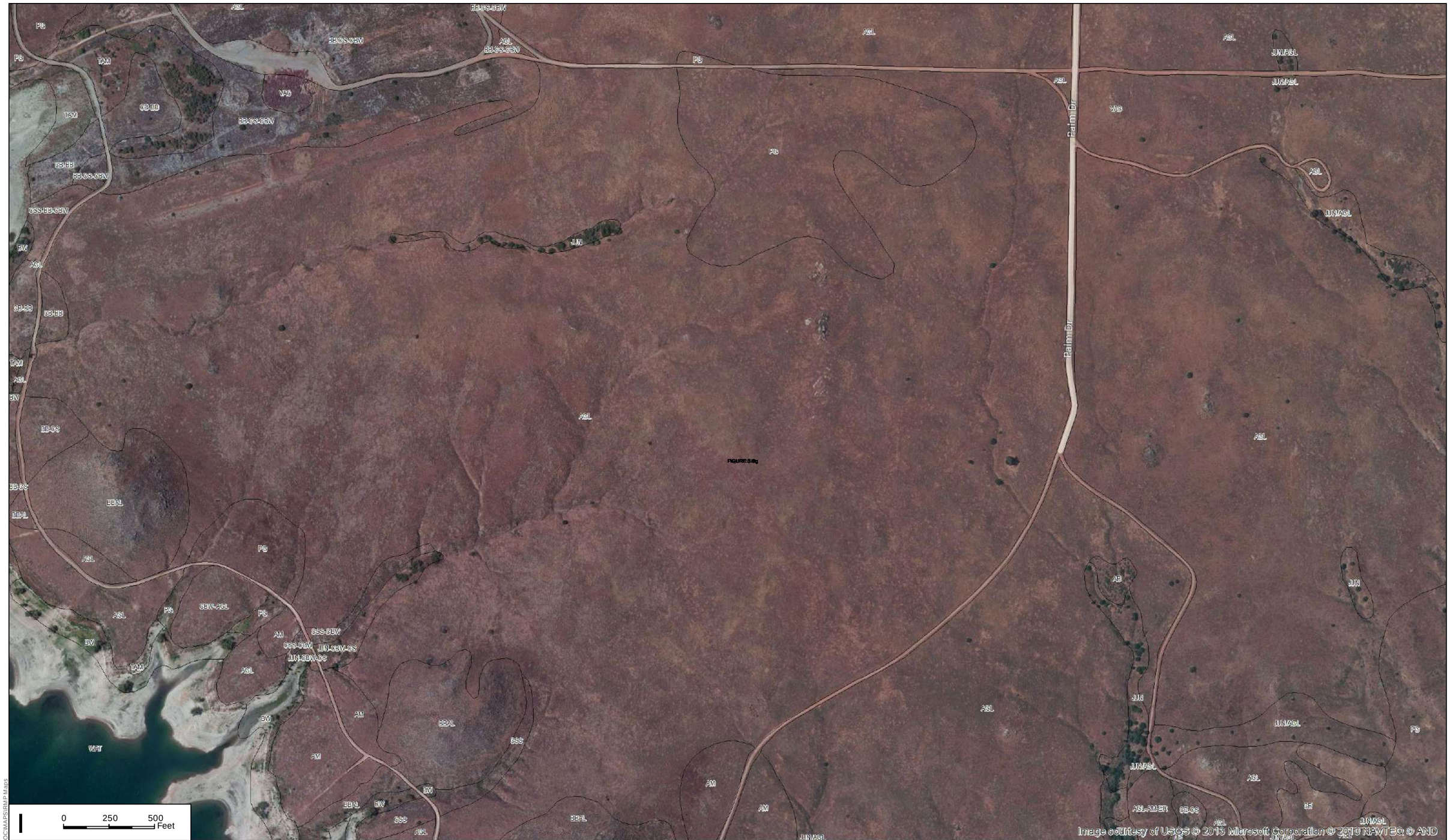
6685

JUNE 2013

LAKE MATHEWS RMP

Z:\Projects\j668501\MAPDOC\MAPS\RMP Maps

INTENTIONALLY LEFT BLANK



SOURCE: Bing Maps 2011.

Plan Area *See Legend Page for Vegetation Types

FIGURE 3-9g

Vegetation Community Mapping

6685

JUNE 2013

LAKE MATHEWS RMP

Z:\Projects\6685\01\MAPDOC\MAPS\RMP Maps

INTENTIONALLY LEFT BLANK

SOURCE: Bing Maps 2011.

Plan Area *See Legend Page for Vegetation Types

FIGURE 3-9h

Vegetation Community Mapping

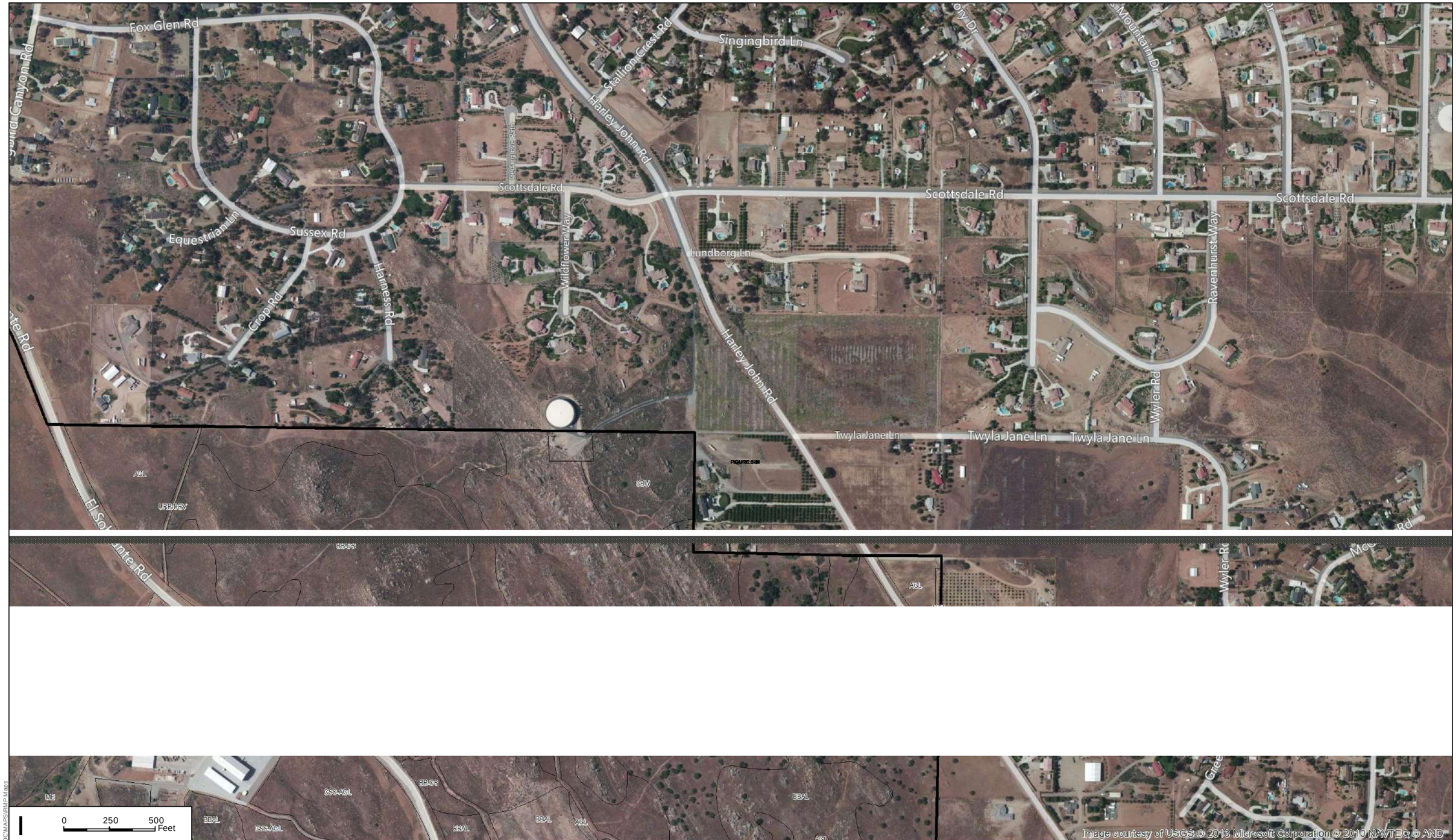
6685

JUNE 2013

LAKE MATHEWS RMP

Z:\Projects\6685\01\MAPDOC\MAPS\RMP Maps

INTENTIONALLY LEFT BLANK



SOURCE: Bing Maps 2011.

Plan Area *See Legend Page for Vegetation Types

FIGURE 3-9i

Vegetation Community Mapping

6685

JUNE 2013

LAKE MATHEWS RMP

Z:\Projects\6685\011\MAPDOC\MAPS\RMP Maps

Lake Mathews Reserve Management Plan

Prepared for:

Metropolitan Water District of Southern California
P.O. Box 54153
Los Angeles, California 90054
Contact: Wendy Picht

Prepared by:

DUDEK
605 Third Street
Encinitas, California 92024
Contact: Brock Ortega

JUNE 28, 2013