BUREAU OF RECLAMATION

Draft Environmental Assessment

West County 19th Street Solid Waste Transfer Station
Yuma County, Arizona

Lower Colorado Basin Region 8

October 2024

Mission Statements

The Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities. The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

YAO-EA 25-01

Draft Environmental Assessment

West County 19th Street Solid Waste Transfer Station
Yuma County, Arizona
Lower Colorado Basin Region 8

prepared by

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Table of Contents

Page

Tables

Appendixes

Acronyms and Abbreviations

%	Percent
µg/m^3	Micrograms Per Cubic Meter
AADT	Average Annual Daily Traffic
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
APE	Area of Potential Effect
APN	Assessor's Parcel Number
AQMD	South Coast Air Quality Management District's
AZ	Arizona
AZDWR	Arizona Department of Water Resources
AZGFD	Arizona Game and Fish Department
BTS	Bureau of Transportation Statistics
CAA	Clean Air Act
CFR	Code of Federal Regulation
CH_4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalents
DOI	Department of the Interior
EA	Environmental Assessment
EIA	United States Energy Information Administration
EO	Executive Order
ESA	Endangered Species Act of 1973
FEMA	Federal Emergency Management Agency
FPPA	Farmland Protection Policy Act
FTHL	Flat-tailed Horned Lizard
GHG	Greenhouse Gas
GWP	Global Warming Potential
HDMS	Heritage Data Management System
ICC	Flat-tailed Horned Lizard Interagency Coordinating Committee
IPaC	Information, Planning, and Conservation

ITA	Indian Trust Asset
LND	Land Management and Development
MSW	Municipal Solid Wastes
mtpy	Metric Tons per Year
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
N_2O	Nitrous oxide
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
O_3	Ozone
Pb	Lead
$PM_{2.5}$	Particulate Matter with a diameter less than or equal to 2.5 micrometers
PM_{10}	Particulate Matter with a diameter less than or equal to 10 micrometers
ppb	Parts Per Billion
ppm	Parts Per Million
Reclamation	Bureau of Reclamation
SGCN	Species of Greatest Conservation Need
SHPO	State Historic Preservation Office
SO_2	Sulfur Dioxide
THPO	Tribal Historic Preservation Office
tpy	Tons per Year
USCB	United States Census Bureau
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile Organic Compound
WBO	Western Burrowing Owl
WRAP	Western Regional Air Partnership
YCAA	Yuma County Airport Authority

Chapter 1. Purpose and Need for Proposed Action

1.1 Introduction

The Bureau of Reclamation (Reclamation) has prepared this environmental assessment (EA) to evaluate potential impacts associated with the proposed construction of a solid waste transfer station along West County 19th Street in Yuma County, Arizona. This EA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code 4321), the Council on Environmental Quality regulations (40 Code of Federal Regulations (CFR) 1500-1508) for implementing NEPA, and the Department of the Interior's NEPA Regulations (43 CFR 46), and Reclamation Manual NEPA Policy. The EA is intended to serve environmental review and consultation requirements pursuant to Executive Order (EO) 11988 (Floodplain Management), EO 11990 (Wetlands Protection), EO 12898 (Environmental Justice), Section 106 of the National Historic Preservation Act of 1966 (NHPA), Section 7 of the Endangered Species Act of 1973 (ESA), and Department of the Interior (DOI) and Reclamation Indian Trust Asset (ITA) policies. Reclamation is the lead Federal agency pursuant to NEPA. Because the Project would be implemented on Reclamation lands and introduce new facilities within Reclamation, a land use authorization from Reclamation is required in accordance with Reclamation's Directives and Standards Land Management and Development (LND) 08-01 (dated January 3, 2002, and last revised September 16, 2021).

Yuma County intends to undertake the Proposed Action if a land use authorization is granted by Reclamation.

1.2 Background

Yuma County has experienced a consistent rise in its population, particularly within the towns of San Luis, Somerton, and Yuma, which has led to an increase in solid waste production. With future growth expected in the southern region, the absence of a municipal solid waste transfer station poses a significant obstacle to efficient waste management. Over the past several years, the West County 19th Street area has been used as an illegal dump site. Trash and unauthorized vehicle use have resulted in impacts to environmental resources in the area.

Illegal dumping is the disposal of waste in unauthorized or unpermitted areas such as public rights-of-way or City, County, and private property. In recent years, Yuma County has seen an increase in illegal dumping of debris containing household trash, furniture, lawn trimmings, and commercial materials. This debris has been found polluting multiple locations throughout Yuma County, predominantly in desert areas. Debris may contain sharp edges, harmful chemicals, and vermin that have been attracted to food wastes. Dump sites that are not abated often grow in size and can become informal, illegal disposal sites. Illegal dumping poses significant social, environmental, and economic impacts within Yuma County. Cleaning costs to the local government are passed to residents as higher service fees and/or property taxes, cleanup costs, and reduction in property values due to visual disruption from roadside wastes.

Most illegal dumping occurs to avoid either disposal fees at landfills or the time and effort required for proper disposal. To combat this, Yuma County operates multiple solid waste transfer stations, including the North Gila Valley, Wellton, Tacna, and Dateland Transfer sites. The stations offer free waste disposal options for the approximately 125,000 customers within Yuma County. The County also offers several sites for commercial, industrial, or large loads of solid waste.

The nearest transfer station to Somerton is the North Gila Valley Transfer Station, located over 16 miles, or approximately 30 minutes by car, from the City of Somerton, Arizona (AZ). This site is time-consuming to reach, causing many residents to resort to illegal dumping. The Proposed Action would develop a transfer station on 10 acres of land located along West County 19th Street, approximately three miles from Somerton. The proposed transfer station intends to provide a more logistically and financially viable waste disposal site for the residents of Somerton and surrounding areas.

1.3 Purpose and Need for the Proposed Action

The purpose of the Proposed Action is to construct a solid waste transfer station in south Yuma County to enable the County to meet the expanding waste management needs of the community, facilitate the disposal of Municipal Solid Wastes (MSW) and recyclable materials, and emphasize environmental sustainability, public health, and safety. The absence of a solid waste transfer station and the rapid population growth in the southern corridor of Yuma County has created a host of challenges that need to be addressed. The establishment of a new transfer site is a crucial step towards minimizing illegal dumping within Yuma County and streamlining waste collection and disposal processes. This new facility will provide a cost-effective solution for both Yuma County and its residents and will enhance waste sorting, recycling, and disposal practices toward achieving environmental objectives.

Developing a solid waste transfer station in south Yuma County is essential to meet the increasing waste management requirements of the region while prioritizing environmental responsibility, sustainability, public health, safety, economic efficiency, and regulatory compliance. The Reclamation's endorsement of this project highlights its significance towards the well-being and sustainability of the Yuma County community. By implementing efficient and sustainable waste management solutions, including a waste transfer station, Yuma County will continue to prosper and grow while preserving its environment and public health.

1.4 Proposed Action

Under the Proposed Action, a solid waste transfer station would be constructed along West County 19th Street (Assessor's Parcel Number [APN] 211-23-003), between Avenue D and Avenue E (Figure 1-1 and Figure 1-2). The transfer station would consist of a 10-acre fenced area containing a variety of waste storage containers from 24 yards to 50 yards, an office structure, safety railings, lighting, a green waste grinder and burner, and paved avenues for customer and County vehicles. Final design plans for site layouts are forthcoming. However, the analysis in this EA assumes all potential Proposed Action elements would be implemented. Details regarding the Proposed Action are included in Section 2.2.

1.5 Purpose of the Environmental Assessment

The Proposed Action consists of construction, operation, and maintenance of a new solid waste transfer station on withdrawn lands managed by Reclamation. Reclamation's decision to issue a license to Yuma County is considered a federal undertaking and triggers the requirement under NEPA to assess environmental effects.

Reclamation is the federal lead agency for NEPA and is responsible for the preparation of an EA to evaluate the environmental effects associated with the Proposed Action. As such, this EA was prepared to meet the environmental compliance requirements for federal agencies. This EA includes an assessment of the effects that could reasonably be expected should Reclamation grant authorization to Yuma County for construction, use, and maintenance activities associated with the Proposed Action. Furthermore, this EA identifies minimization and mitigation measures that would reduce potential environmental effects and considers alternatives to the Proposed Action. As discussed in the introduction to Chapter 3, the scope of this EA is focused on effects determined to have a potential environmental effect. The EA serves as an informational document to provide public disclosure of potential effects of the Proposed Action, identify ways to minimize those effects, and consider alternatives to the Proposed Action.

1.6 Determinations to be Made

This EA will be distributed to appropriate decision-makers within Reclamation for review to determine whether a Finding of No Significant Impact is appropriate. This decision will be based on a determination that all potential impacts are either not significant or can be reduced to non-significant levels through the implementation of mitigation measures. If any potential impacts are considered significant and cannot be avoided or reduced to non-significant levels, the preparation and processing of an Environmental Impact Statement is required to implement the Proposed Action.

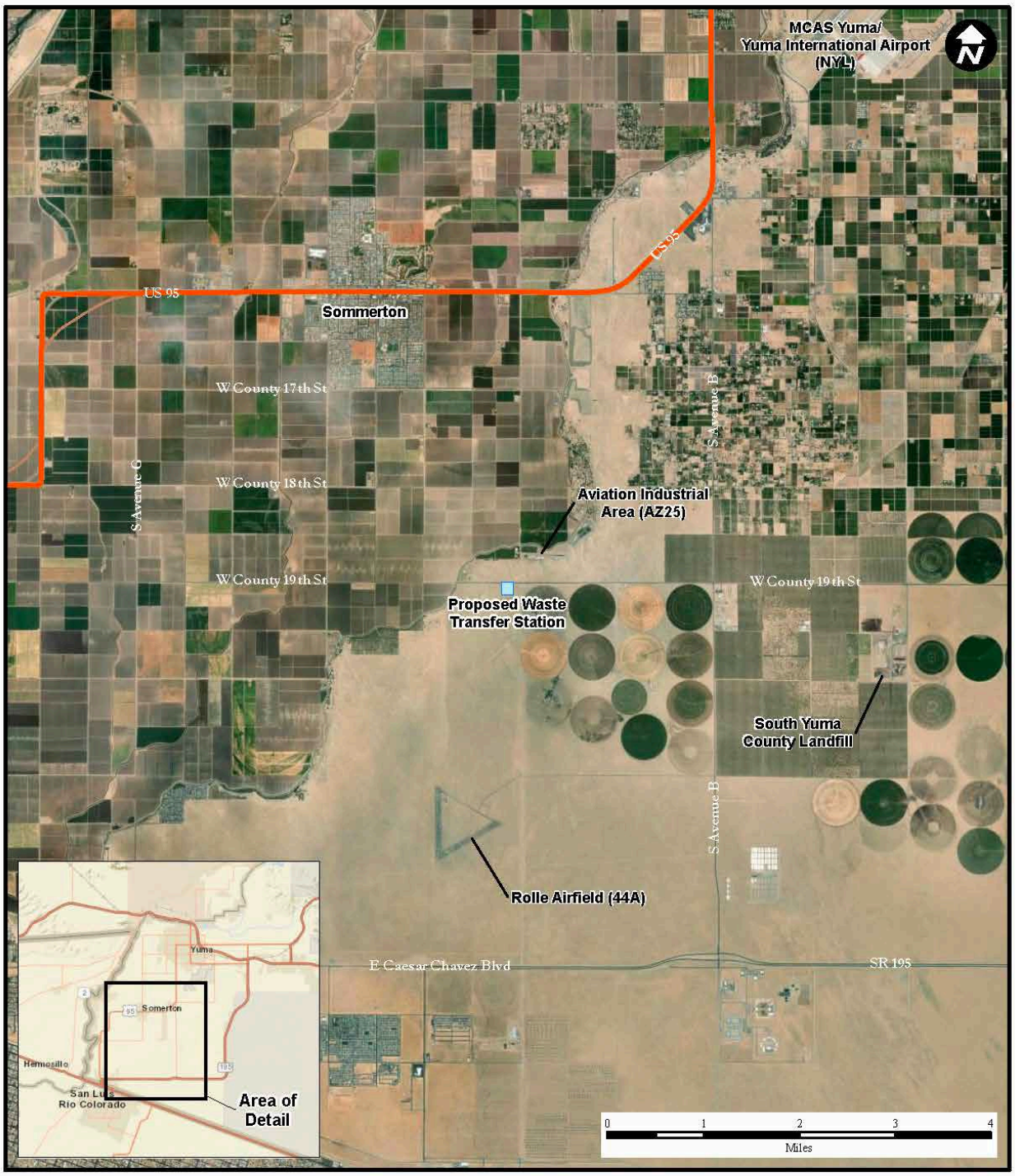
1.6.1 Permits and Approvals

Permits and approvals required from Reclamation and from other coordinating or responsible agencies to authorize construction, operation, and maintenance of the Proposed Action are as follows:

- **License Agreement:** Reclamation would issue a license to Yuma County to allow for construction and operation of a solid waste transfer station.

- **Federal Endangered Species Act Section 7 Consultation:** Prior to issuing a license, Reclamation shall determine whether the Project would adversely affect threatened or endangered plants or wildlife.

- **National Historic Preservation Act Section 106 Consultation:** Prior to issuing a license, Reclamation shall determine whether the Proposed Action would adversely affect cultural or historic resources and ensure the Section 106 process is complete.



Legend

Waste Transfer Station

Figure 1-1

Project Location
Environmental Assessment
Waste Transfer Station
Yuma County, Arizona

Legend

Waste Transfer Station

Figure 1-2

Proposed Development Area
Environmental Assessment
Waste Transfer Station
Yuma County, Arizona

Chapter 2. Alternatives Considered

This chapter describes the alternatives considered for the West County 19th Street Solid Waste Transfer Station project. Alternatives considered include the Proposed Action and the No Action alternatives.

2.1 No Action Alternative

NEPA guidelines require that an EA evaluate the "No Action" alternative in addition to the "Proposed Action". The No Action alternative provides a basis for comparison of the environmental consequences of the Proposed Action. In this EA, the No Action alternative assumes that the Project would not occur and the current state of illegal dumping within the south Yuma County area would remain unchanged. Residents of Somerton and the surrounding communities would continue to dump within various properties in the area, continuing the economic, social, and environmental burden on the County and its residents.

2.2 Proposed Action

The Proposed Action is to construct a solid waste transfer station along West County 19th Street between Avenue D and Avenue E. Developments to support this action are described in the following section.

2.2.1 Site Preparation

The existing site would be graded with the exception of areas surrounding the storage containers. Existing illegal dumping waste would be removed from the site. The southern portion of the site would be raised approximately 10 feet with local fill and paved to provide a level surface with the top of the storage containers. This design allows customers to park vehicles next to the storage containers for accessible and safe dumping.

2.2.2 Transfer Station Facility Construction

The site would be encompassed by a chain link fence to discourage trespassing, reduce wildlife encounters, and prevent trash from blowing into neighboring areas. County staff would maintain a daily schedule to walk the fence line and remove stuck debris. The fence would include three gates along the border of West County 19th Street: two for dedicated customer access and egress and one larger fence for County vehicles. Four 25-foot light poles would be installed at each corner of the facility, with the potential for additional light poles throughout the facility, as required. A permanent structure would be constructed to function as an office and check-in area. The office would be manned by County staff who monitor waste that is being disposed of. Electrical utilities would be constructed to provide power to the light poles, office structure, and surveillance systems. Trenching would be required for the installation of utility elements. County staff would also operate heavy machinery on site and maintain operation of the green waste grinder and burner. The green waste burner to be installed is anticipated to be diesel-powered with a capacity of 5-7 tons per hour and equivalent to the AirBurners Firebox S-220 Air Curtain Burner (AirBurners, Inc., 2022). The burner would be compatible with United States Environmental Protection Agency (USEPA) Tier 4 emissions standards and 40 CFR 60, *Standards of Performance for New Stationary Sources*.

2.2.3 Waste Storage Elements

Municipal solid waste would be dumped at the proposed transfer station by residents of south Yuma County. Six 50-yard waste storage containers would be placed in the center of the facility. The containers would store waste for no more than two days. Contained waste would be compacted as needed to increase container capacity and reduce the potential for wind to agitate disposed materials. County staff would also operate a watering vehicle for dust suppression in unpaved areas. Additional bins would be included along the western border of the site for tire, home appliance, and concrete/rock disposal. County-operated roll-off trucks would be used to haul full containers and ship them to the South Yuma County Landfill to be emptied prior to being returned to the site. The trucks are also anticipated to be used to transport equipment such as end loaders, backhoes, and excavators to the site.

2.2.4 Alternatives Considered but Eliminated from Further Review

Use of various parcels along County 19th Street

Alternative siting locations are available; however, site conditions vary in topography, accessibility, and proximity to agricultural or commercial properties. The selected parcel for the Proposed Action contains the most favorable balance of these factors to eliminate difficulties encountered during construction, potential environmental impacts, and community disturbances. Therefore, other siting alternatives along County 19th Street were eliminated from further review.

Chapter 3. Affected Environment and Environmental Consequences

This section describes the existing environmental resources in the proposed development area that may be affected by the Proposed Action and the No Action alternative, if implemented. It also serves as the baseline for the comparisons of alternatives.

The following critical elements of the human environment are not present or would not be affected by the alternatives; therefore, they will not be addressed in this EA:

Noise: The Proposed Action and No Action alternatives have no potential to create a source of noise that could have any effects on any noise-sensitive receptors such as residences, schools, hospitals, and similar facilities. The nearest residence to the proposed transfer station is more than three miles away, and the Proposed Action would not exceed peak noise levels found in the existing noise environment generated by vehicle traffic, agricultural activities, and agricultural aviation. Typical construction noise for excavation and grading would not generate any unusual noise levels. There is no noise associated with the long-term operation of the transfer station. The Proposed Action does not have the potential to generate excessive noise, and no further analysis of noise impacts is required.

Recreation: There are no recreational facilities in the vicinity of the Proposed Action, and neither the Proposed Action nor the No Action alternative has any potential effect on existing or planned recreational facilities or activities. No further analysis of potential effects on recreation is required.

3.1 Land Use

3.1.1 Affected Environment

The Proposed Action will be implemented on federal land withdrawn for project purposes by Reclamation, and within County of Yuma's jurisdictionally-managed lands. The proposed development area is located on undeveloped land covered by native Sonoran desert plant life. Agriculture is the dominant land use to the north, east, and west. Land south of the proposed development area is predominantly undeveloped. The existing land use is designated by Yuma County as Rural and is permitted to require a minimum development of 10 acres. The Proposed Action is permitted in this area under Yuma County Zoning Ordinance Article VI, Section 601.03(l), land clearing, landfills, and construction and demolition landfills (Yuma County, 2006).

The proposed development area is formally an empty and unused site. However, existing conditions indicate that this parcel is used as an informal, illegal dumping area. Various metal, plastic, and household trash items can be found across the site and in adjacent parcels. Signs of off-roading activities can also be found throughout the area.

It should also be noted that the Proposed Action is not located within any Airport Influence Areas (Yuma County Airport Authority [YCAA], 2015). A private airfield operated by an agricultural aviation business is located approximately 1,600 feet north of the proposed development area. The nearest general aviation airfield is Rolle Field, located over two miles south of the development area. The Proposed Action is not anticipated to influence activities in either of these areas.

Under the Farmland Protection Policy Act (FPPA), federal agencies are directed to identify and take into account the adverse effects of federal programs on the preservation of farmland to consider appropriate alternative actions that could lessen adverse impacts and assure that such federal programs are compatible with state or local government programs and policies to protect farmland. The FPPA guidelines apply to farmland classified as prime, unique, or of state or local importance as determined by the appropriate government agency, with concurrence by the Secretary of Agriculture. The entire proposed development area is located on Natural Resource Conservation Service (NRCS)-designated farmlands, as shown in Figure 3-1 (United States Department of Agriculture [USDA], 2024b).

3.1.2 Environmental Consequences

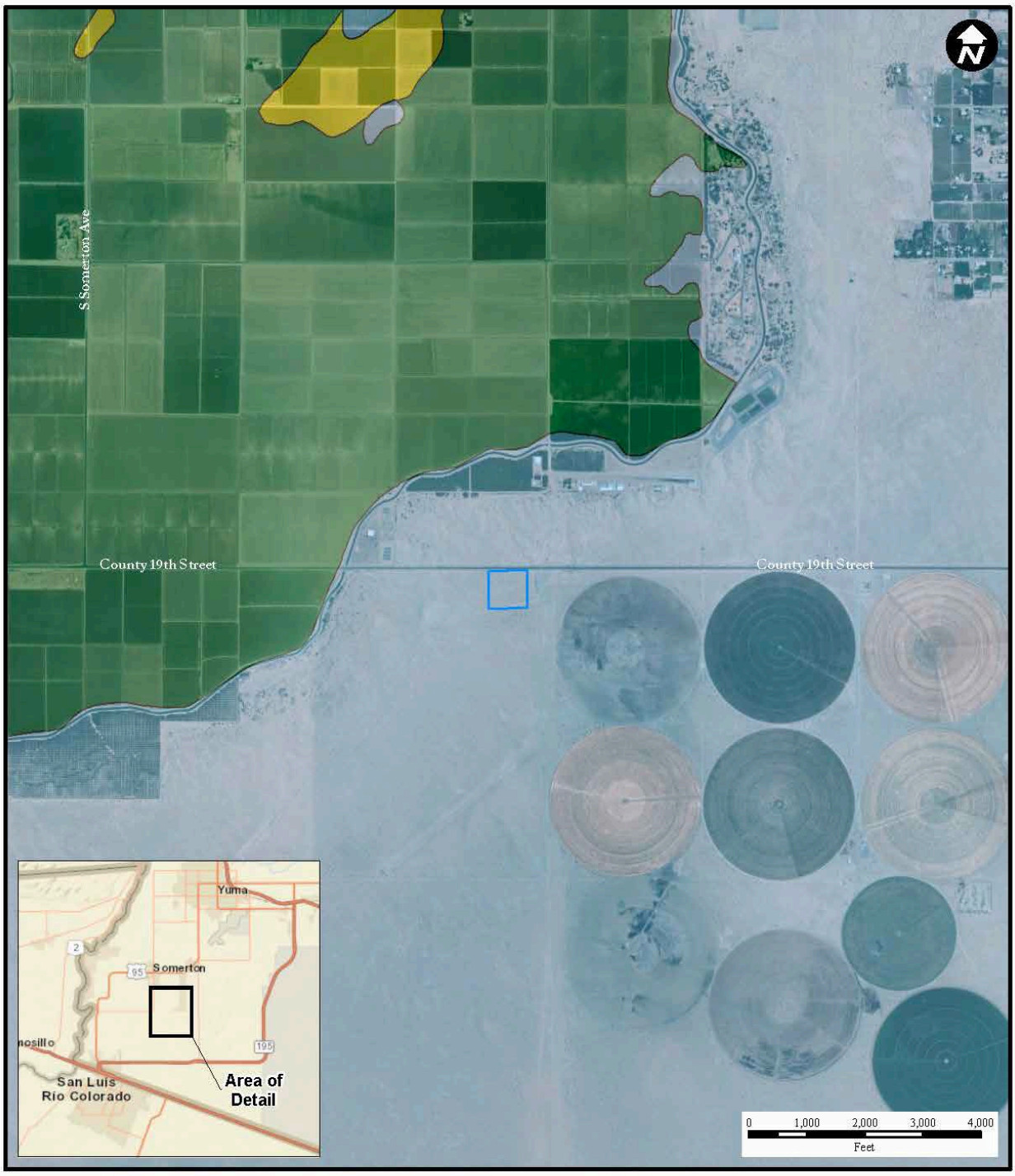
No Action – Under this alternative, the use and status of the land would not change. The waste transfer station would not be constructed, and the site would remain an empty parcel. Yuma County and the proposed parcel would continue to experience the effects of illegal dumping, with wastes accumulating over time and spreading to adjacent parcels.

Proposed Action – Under the Proposed Action, the land would be modified to an industrial land use. This use conversion would comply with Yuma County's 10-acre minimum development requirement for this area. The abundance of open space in surrounding parcels, especially south and west of the proposed development area, would negate any potential impacts resulting from the decrease in rural open space. Management and use of adjacent lands would not be negatively impacted. A reduction in illegal dumping in the surrounding area is anticipated once the site has transitioned from an informal, illegal dump site to a County-operated waste transfer site. Therefore, long-term, beneficial impacts to the surrounding environment are expected as a result of the reduction of waste in the surrounding parcels.

The entire 10-acre proposed parcel is located on classified prime farmland of unique importance, as shown in Figure 3-1 (USDA, 2024b). Therefore, the Proposed Action would convert 10 acres of classified farmland to a non-farmland use. The loss of this agricultural resource would be considered an unavoidable and adverse impact due to the resource value placed on farmland of this designation. A farmland conversion impact rating form was delivered to the USDA for review per FPPA guidelines. Consultation with the USDA is forthcoming. However, preliminary analysis indicates that the Proposed Action would have little to no adverse impact on farmlands. The average farm size in Yuma County is 534 acres, with a total of 212,153 acres of farmland within the county. The Proposed Action represents 1.9 percent (%) of the size of the average farm and less than 0.00005% of the farmland in the County (USDA, 2024a). Therefore, this land use conversion would have no impact to the overall availability and use of farmland within the county.

3.1.3 Minimization and Mitigation Measures

No minimization and mitigation measures are proposed for the changes in land use.



Legend

- Waste Transfer Station
- Prime Farmland if Irrigated
- Prime Farmland if Irrigated and Reclaimed
- Farmland of Unique Importance
- Not Prime Farmland

Figure 3-1

Farmland Classification
Environmental Assessment
Waste Transfer Station
Yuma County, Arizona

3.2 Air Quality

3.2.1 Affected Environment

This section discusses the law and regulatory requirements and existing air quality in the Proposed Action area. Existing conditions of the Proposed Action area, including regional climate, ambient air quality standards, attainment status, and existing ambient air quality, are described in this section.

Section 108 of the Clean Air Act (CAA) requires that the USEPA establish National Ambient Air Quality Standards (NAAQS) for six common air pollutants (known as criteria air pollutants): carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), Ozone (O_3), sulfur dioxide (SO_2), and particulate matter with a diameter less than or equal to 2.5 micrometers ($PM_{2.5}$) and less than or equal to 10 micrometers (PM_{10}). The NAAQS are standards to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly, as well as to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. Arizona Department of Environmental Quality (ADEQ) has adopted and enforces the NAAQS at the state level. Table 3-1 provides NAAQS set forth by USEPA for Arizona.

Table 3-1: National Ambient Air Quality Standards

Pollutant	Primary/ Secondary	Averaging Time	Level	Form
CO	Primary	8-hour	9 ppm	Not to be exceeded more than once per year
		1-hour	35 ppm	
Pb	Primary and Secondary	3-month	0.15 μg/m³	Not to be exceeded
NO_2	Primary	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Primary and Secondary	Annual	53 ppb	Annual Mean
O_3	Primary and Secondary	8-hour	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
$PM_{2.5}$	Primary	Annual	9.0 μg/m³	Annual mean, averaged over 3 years
	Secondary	Annual	15.0 μg/m³	Annual mean, averaged over 3 years
	Primary and Secondary	24-hour	35 μg/m³	98th percentile, averaged over 3 years
PM_{10}	Primary and Secondary	24-hour	150 μg/m³	Not to be exceeded more than once per year on average over 3 years
SO_2	Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Notes: ppb = parts per billion; ppm = parts per million; μg/m³ = micrograms per cubic meter
Source: USEPA, 2024a

USEPA Region 9 and ADEQ regulate air quality in Arizona. Yuma County is within the Mohave-Yuma Intrastate Air Quality Control Region (40 CFR 81.268). The USEPA assigns classifications to geographic areas based on monitored ambient air quality conditions. Areas that meet both the

primary and secondary standards of a pollutant subject to NAAQS are classified as being in attainment for that pollutant. Areas that do not meet the NAAQS for a pollutant are designated as being in nonattainment for that pollutant. The Proposed Action is within the PM_{10} nonattainment area for Yuma County (USEPA, 2024b). Federal projects occurring in the PM_{10} nonattainment area are required to adhere to the *Yuma PM_{10} Maintenance Plan* (ADEQ, 2006). Contributing PM_{10} emission sources in the Yuma area, including the City of Yuma, Yuma County, the City of Somerton, and the City of San Luis, are natural windstorms, agricultural activities, paved and unpaved road dust, and disturbed areas.

Since 1963, the CAA and subsequent amendments in 1970, 1977, and 1990 have provided the authority and framework for the USEPA regulation of air emission sources. Regulations have been promulgated pursuant to the CAA to serve as requirements for the monitoring, control, and documentation of activities that will affect ambient concentrations of pollutants that may endanger public health or welfare.

The General Conformity Rule was established under CAA Section 176(c)(4) and serves to ensure that federal actions do not inhibit states' attainment plans for areas designated as nonattainment or maintenance. The rule effectively applies to all federal actions that take place in areas designated as nonattainment or maintenance, except for actions covered under the transportation conformity rule, actions with associated emissions below specified de minimis levels, and other actions that are exempt or presumed to conform. The Proposed Action is located in a nonattainment area for PM_{10}, and therefore, emissions from the project are subject to General Conformity. Per 40 CFR 93.153, de minimis levels for criteria pollutants are based on the severity of an area's air quality problem and establish a threshold for determining if a General Conformity determination must be performed. Activities below this threshold level are assumed to have no significant impact on air quality, and the activity is exempt. The General Conformity Rule establishes more restrictive de minimis emission levels for certain nonattainment and maintenance areas in ozone transport regions. The de minimis emission rate for all PM_{10} moderate nonattainment and maintenance areas is 100 tons per year (USEPA, 2023c).

The construction activities associated with the Proposed Action will occur in Yuma County, Arizona. These activities are governed by the applicable rules and regulations promulgated by the ADEQ (which includes Yuma County). The Proposed Action must comply with applicable ADEQ and Yuma County fugitive dust rules, regulations, and ordinances. These include Arizona Administrative Code Title 18, Environmental Quality, Chapter 2, Department of Environmental Quality, Air Pollution Control, Section R18-2-604, -605, -606, -607, -614, -702, -802, -805, and Yuma County Ordinance 05-01. These regulations govern various aspects, including limitations on fugitive dust during construction in open areas and roadways, directives on material handling and storage piles, criteria for opacity and visibility from both standard and off-road machinery, guidelines for opacity during roadway and site clearing operations, and requirements concerning signage throughout the construction process.

Stationary Sources

The term "stationary source" refers to any building, structure, facility, or installation which emits or may emit any air pollutant. The proposed green waste burner qualifies as a stationary source, as emissions from the burner's engine and the incinerated material would release criteria pollutants during operation.

The green waste burner, also referred to as an "air curtain incinerator", would be required by the ADEQ to obtain an Air Curtain Incinerators General Permit under CAA Title V (Arizona Revised Statutes Title 49, Chapter 3, Article 2, Section 49-426,). Air Curtain Incinerator General Permits are issued for incinerators processing up to 35 tons per day of 100 percent wood waste, yard waste, clean lumber, or a mixture of the three. While the proposed burner has an operational capacity of 5-7 tons per hour, daily use past 35 tons is not anticipated.

The General Permit typically requires emissions and operating limits, air pollution control measures, and implementation of monitoring, recordkeeping, reporting, and testing requirements. These requirements intend to reduce the potential for impacts related to waste burning. The General Permit would be obtained prior to operation of the green waste burner, and all applicable requirements under the permit would be followed for the operational lifetime of the burner.

Climate Change and Greenhouse Gasses

CEQ's *NEPA Guidance on Consideration of Greenhouse Gas Emissions and Climate Change* [88 FR 1196] advises agencies to quantify direct and indirect impacts from greenhouse gasses (GHGs) emissions for proposed actions. This guidance, issued on January 9, 2023, recommends determining the social cost of GHG emissions from a proposed action where feasible as a means of comparing the GHG impacts of the alternatives (CEQ, 2023).

The primary GHGs produced by fossil-fuel combustion are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). These three GHGs represent more than 97% of all United States GHG emissions. Emissions of GHGs are typically quantified and regulated in units of CO_2 equivalents (CO_2e). CO_2e accounts for the global warming potential (GWP) of each GHG. The GWP is the measure of a particular GHG's ability to absorb solar radiation as well as its residence time within the atmosphere. The GWP allows for the comparison of global warming impacts between different gases; the higher the GWP, the more gas contributes to climate change in comparison to CO_2.

USEPA implements the GHG Reporting Program, requiring certain facilities to report GHG emissions from stationary sources if such emissions exceed 25,000 metric tons of CO_2e per year (40 CFR 98). Major source permitting requirements for GHGs are triggered when a facility exceeds the major threshold of 100,000 tons per year (tpy) for CO_2e emissions.

According to the 2011 National Emissions Inventory, the major pollutants emitted in Yuma County are GHGs, volatile organic compounds (VOCs), and CO. Natural organisms, or biogenics, are the major source contributing to VOC emissions in Yuma County, while fires and mobile sources are the major contributors to GHGs. The major sources contributing to CO emissions are biogenics and mobile sources. PM_{10} emissions are principally generated from dust and agriculture, and $PM_{2.5}$ emissions are primarily attributable to dust, fires, agriculture, and mobile sources. Mobile sources and biogenics are the major contributors to nitrogen oxides (NO_X) emissions in the county. SO_2 emissions are mostly generated in Yuma County through fires and mobile sources.

The effects of climate change on proposed actions and the environment are also considered. For smaller projects, minimal discussion of air quality environmental impacts is required for qualitative assessments; however, the effect of climate change on and from the Proposed Action is assessed subjectively.

3.2.2 Environmental Consequences

No Action – Under the No-Action Alternative, air quality would not be negatively influenced because no construction activity would occur.

Proposed Action – Because construction details for the intermediate and long-term project were not available and it is unknown what the PM_{10} status of the proposed development area could be in the future, for the purpose of conducting a General Conformity determination, an analysis has been conducted for the construction phase (short term) and annual operational emissions (long term) assuming current conditions remain constant.

In the short term, the development of the Proposed Action would temporarily increase dust emissions during construction. Ground-clearing activities may temporarily create a source of blowing dust that may be exacerbated during periods of high winds. Watering trucks would be utilized during this phase to reduce potential particulate matter emissions. Equipment used during construction activities is usually larger and may increase exhaust emissions in the area. Equipment movement may contribute to increased dust levels. Additionally, construction equipment uses fossil fuels for combustion, which releases pollutants into the air. Combusted fuel would release byproducts such as carbon monoxide, sulfur dioxide, and other oxides into the ambient air, negatively affecting air quality in the proposed development area. Although the Proposed Action may cause potentially negative air quality effects during construction, these effects would be temporary in nature and subside after construction.

Large earth-moving equipment, skid loaders, trucks, and other mobile sources may be powered by diesel or gasoline and are sources of combustion emissions, which include NO_X, CO, VOCs, particulate matter, small amounts of SO_2, trace amounts of air toxics, and GHGs.

Exhaust emissions from construction vehicles and equipment and from the transport of construction workers, equipment, and materials to the project site were determined using the South Coast Air Quality Management District's (AQMD) Off-Road Model Mobile Source Emission Factors. Average emission factors for construction vehicles and equipment in pounds per hour for CO, NO_X, SO_2, VOC, PM_{10}, CH_4, and CO_2 were obtained and multiplied by the quantity and duration of equipment use (AQMD, 2014). For on-road transport of construction workers, equipment, and materials to the project site, average emission factors in pounds per vehicle mile traveled for CO, NO_X, SO_2, VOC, PM_{10}, $PM_{2.5}$, CH_4, and CO_2 were determined. All workers, vehicles, equipment, and materials were assumed to come from Yuma, AZ, approximately 16 miles away from the Project site.

Fugitive dust emissions due to general construction were estimated using methodology within the Western Regional Air Partnership (WRAP) Fugitive Dust Handbook. Fugitive emissions from construction operations and wind erosion from disturbed areas are considered. Fugitive dust emissions due to vehicle travel on paved and unpaved roads were estimated using emission factor calculations from the USEPA's AP-42, Compilation of Air Pollutant Emission Factors. missions from Proposed Action construction activities in tons per year are presented in Table 3-2 and 3-3.

Table 3-2: Construction Phase Emissions in Tons per Year

Emission Source	Emissions (Tons Per Year)							
	CO	**NO_X**	**SO_X[1]**	**$PM_{2.5}$**	**PM_{10}**	**VOC**	**CH_4**	**GHG[2]**
Construction Phase	0.236	0.182	0.001	0.006	0.007	0.029	0.003	45.237
Commuting	0.040	0.002	0.000	0.000	0.000	0.003	0.003	4.550
Total	0.276	0.185	0.001	0.006	0.007	0.031	0.006	49.787
Yuma County Emissions	27491.9	5790.6	105.6	1409.5	5325.4	15287.9	5386.3	N/A[3]
% Total Yuma County Emissions	0.0010	0.0032	0.0006	0.0004	0.0001	0.0002	0.0001	N/A
De Minimis Threshold	N/A	N/A	N/A	N/A	100	N/A	N/A	N/A

Notes:

1. All oxides of sulfur (including SO_2). For purposes of comparison, SO_2 emissions reported in the county inventory are assumed to be equal to SO_X.
2. GHG are based on the Global Warming Potential of CO_2 (1), CH_4 (25), and CO (265), and are reported in metric tons per year (mtpy).
3. GHG emissions are not reported for all sources in the county inventory. Therefore, GHG emissions are not compared to the county inventory.

Sources: (AQMD, 2014; Bureau of Transportation Statistics [BTS], 2023; United States Energy Information Administration [EIA], 2023; H. Cai et, al., 2013; USEPA, 2004; USEPA, 2023a; USEPA, 2023b; USEPA, 2023c)

Table 3-3: Annual Operational Emissions in Tons per Year

Emission Source	Emissions (Tons Per Year)							
	CO	**NO_X**	**SO_X[1]**	**$PM_{2.5}$**	**PM_{10}**	**VOC**	**CH_4**	**GHG[2]**
Waste Hauling	0.047	0.074	0.000	0.001	0.001	0.004	0.000	38.987
Commuting	0.080	0.004	0.000	0.000	0.000	0.005	0.000	8.945
Green Waste Burner	0.676	1.040	0.026	0.286	3.380	0.286	0.364	868.396
Total	0.803	1.118	0.026	0.287	3.381	0.295	0.364	916.327
Yuma County Emissions	27491.9	5790.6	105.6	1409.5	5325.4	15287.9	5386.3	N/A[3]
% Total Yuma County Emissions	0.0029	0.0193	0.0248	0.0204	0.0635	0.0019	0.0068	N/A
De Minimis Threshold	N/A	N/A	N/A	N/A	100	N/A	N/A	N/A

Notes:

1. All oxides of sulfur (including SO_2). For purposes of comparison, SO_2 emissions reported in the county inventory are assumed to be equal to SO_X.
2. GHG are based on the Global Warming Potential of CO_2 (1), CH_4 (25), and CO (265), and are reported in mtpy.
3. GHG emissions are not reported for all sources in the county inventory. Therefore, GHG emissions are not compared to the county inventory.

Sources: (Air Burners, Inc., 2022; BTS, 2023; EIA, 2023; H. Cai et, al., 2013; USEPA, 2004; USEPA, 2023a; USEPA, 2023b; USEPA, 2023c

Given that the results of the air analyses demonstrate that the Proposed Action results in air emissions that are very low relative to county-level emissions and are below significance indicators, negligible, long-term impacts are expected to air quality from the long-term generation of GHGs and the negligible generation of criteria pollutants.

3.2.3 Minimization and Mitigation Measures

The following minimization and mitigation measures are recommended to mitigate impacts to air quality resulting from the Proposed Action:

- During construction, dust abatement measures such as watering should be implemented to minimize dust emissions.
- The construction contractor shall ensure that heavy-duty diesel trucks and other construction equipment are properly tuned and maintained in accordance with the manufacturer's specifications to ensure minimum emissions under normal operations.
- Vehicle and equipment traffic would be limited to existing roads as much as possible. Where equipment traffic or excavation is required outside of paved or graveled roads, water or soil binders would be applied to exposed surfaces. On-site stockpiles shall be covered or watered at least twice per day.
- Vehicle speed shall not exceed 15 miles per hour within the construction limits.
- Ground-disturbing activities would cease temporarily when wind speeds at the site exceed 25 miles per hour.
- A project information sign and contact phone number for citizens to report dust complaints should be posted at the construction site.

3.3 Biological Resources

3.3.1 Affected Environment

A biological evaluation was completed for the project by Harris Environmental Group, Inc., and is included as Appendix A to this EA. The findings of the biological report are summarized below.

The proposed development area lies within the range of the Lower Colorado River Valley subdivision of the Sonoran Desert scrub biotic community (Brown, 1994). Vegetation is distributed sparsely across most of the proposed development area, with large swaths of bare soil and sand interspersed with a few desert-adapted shrubs. Vegetation within the proposed development area consists of upland desert species. Creosote (*Larrea tridentata*) is the dominant species, with fewer individuals of Allscale saltbush (*Atriplex polycarpa*) dispersed throughout. These two species comprise the full inventory of vegetation observed during the site assessment.

No perennial aquatic habitats, caves or rock outcroppings, or significant burrows were present within the proposed development area. Erosion, soil compaction, and disturbance to vegetation were all observed during the site visit. The proposed development area has been significantly disturbed by human use and through its proximity to the roadway (West County 19th Street). Vehicle use along the southern shoulder of West County 19th Street has disturbed the northern boundary of the project footprint, and disturbance due to foot traffic and vehicle tracks were observed

throughout the project footprint and within the immediate vicinity of the proposed development area. Each of these factors has led to reductions in vegetation density and diversity throughout the proposed development area. Roadway runoff has allowed for a slightly higher density of *Larrea tridentata* and *Atriplex polycarpa* to grow along the northern edge of the project footprint than in the surrounding areas.

The United States Fish and Wildlife Service's (USFWS) Information, Planning, and Conservation (IPaC) System was utilized to obtain a list of endangered, threatened, proposed, or candidate species that may occur within one or more delineated United States Geological Survey (USGS) 7.5-minute quadrangles with which the proposed development area polygon intersects (USFWS, 2023). In addition, the Arizona Game and Fish Department's (AZGFD) Heritage Data Management System (HDMS) was queried to determine whether any Species of Greatest Conservation Need (SGCN) have been documented as occurring within three miles of the proposed development area (AZGFD, 2007; 2014; 2022; 2023a; 2023b; 2023c). A total of three federal status species and three SGCN species were identified through the USFWS IPaC and HDMS systems, respectively, in relation to the proposed development area (USFW, 2023).

These species were analyzed, and determinations were made using expert opinion. An assessment of the proposed development area was conducted to determine resources or habitat types that could potentially be used by any of the sensitive federal and state species documented in the referenced lists. All three of the federally listed species were excluded from further detailed evaluation because the proposed development area does not contain vegetation and/or landscape features known to support the species. The following species were listed in the USFWS IPaC System but have been excluded from further evaluation. Justification for each exclusion is provided below in (Table 3-4). This project is unlikely to affect the species listed in this table.

Table 3-4: Federally Listed Endangered, Threatened, Proposed, or Candidate Species

Species	Status*	Habitat Requirements	Exclusion Justification
Birds			
Yuma Ridgway's Rail (*Rallus obsoletus yumanensis*)	E	Freshwater marshes, dense emergent riparian vegetation, requires wet substrate (mudflat, sandbar, etc.) (AZGFD, 2023a) Elevation: 75 - 1,700 feet	Project limits do not contain required habitat. No freshwater marshes with dense riparian vegetation within proposed development area.
Western Yellow-billed Cuckoo (*Coccyzus Americanus occidentalis*)	T	Sonoran riparian woodlands and forest comprised of cottonwood, willow, and/or tamarisk galleries (AZGFD, 2022). Elevation: 3,564 feet - 5,480 feet	Project limits fall outside of the known elevational range and do not contain required habitat. No riparian or marsh habitat with cottonwood, willow, or tamarisk galleries.

Species	Status*	Habitat Requirements	Exclusion Justification
Insects			
Monarch Butterfly (*Danaus plexippus*)	C	Requires obligate milkweed host plant (primarily *Asclepias* spp.) during breeding season (CEC, 2008).	Project limits do not contain required habitat. No obligate host plant in proposed development area.

Notes: *USFWS: E = Endangered, T = Threatened, C = Candidate for listing; CEC = Commission for Environmental Cooperation

A list of SGCN that could intersect with the project footprint was reviewed through the AZGFD HDMS query. All species with the following vulnerability criteria were evaluated: Extirpated from Arizona, Federal or State status, Declining status, Disjunct status, Demographic status, Concentration status, Fragmentation status, Distribution status. The identified species are described below:

Flat-tailed Horned Lizard (*Phrynosoma mcallii*)

The Proposed Action is within the geographic and elevational range of the Flat-tailed Horned Lizard (FTHL). Vegetation within the proposed development area consists of predominantly Lower Colorado River Valley subdivisions of Sonoran Desert scrub, with a very sparse distribution of Larrea tridentata and a few individuals of Atriplex polycarpa. The majority of the project footprint was disturbed and consisted of flat, sandy substrate and compacted soil, and could be considered potential habitat. A FTHL presence/absence survey was conducted in September 2023. No FTHL or FTHL scat, were observed during the presence/absence survey (Appendix B).

Western Burrowing Owl (*Athene cunicularia hypogea*)

The proposed development area contains habitat that could support Western Burrowing Owls (WBOs), consisting of flat sandy substrate devoid of dense vegetation in which they could potentially create burrows and forage (Brown, 2001). However, the project footprint and surrounding area were significantly disturbed, and no burrows or signs of WBO were observed during the site assessment. While the Western Burrowing Owl is not within the SGCN criteria above, it was noted in the HDMS query as a species that has been recorded within the project vicinity, and it was included for further discussion.

3.3.2 Environmental Consequences

No Action – Under this alternative, the status of biological resources in the proposed development area would not change. The waste transfer station would not be constructed, and the site would remain an empty parcel. Yuma County and the proposed parcel would continue to experience the effects of illegal dumping, with wastes accumulating over time and spreading to adjacent parcels. Wastes would degrade the quality of existing habitats for flora and fauna. Continued off-roading would further degrade habitat and pose a danger to individuals located on the property. Minor, long-term impacts are expected on biological resources resulting from the No Action Alternative.

Proposed Action – The Proposed Action would have no effect on listed species nor on critical habitat as no federally proposed or designated critical habitat exists within or near the project limits. Species-specific impacts are detailed below.

Flat-tailed Horned Lizard (*Phrynosoma mcallii*)

FTHLs have a limited distribution and are susceptible to habitat destruction and fragmentation by nearby urban and agricultural expansion, military activities, energy development, and off-highway vehicle activities within the proposed development area. While the overall vegetation and terrain within the proposed development area meets FTHL habitat requirements, the geographic proximity of the Proposed Action to roads, agricultural fields, border traffic, and other rural development fragments available habitat. While no evidence of FTHLs was seen during the site visit, it is possible they could occur in the proposed development area. Increased vehicle traffic within the footprint could increase human disturbance and contribute to mortality, as FTHLs are known to bask on roadways and in open areas. Removal of vegetation and soils could also further disturb habitat and increase erosion in the project vicinity.

FTHL are not listed and are not protected under the ESA. However, efforts are ongoing to protect the species and its habitat within its current range, which has been impacted by urban development. It is unlikely that the development of the Proposed Action will have any effect on the FTHL during construction since no FTHLs were observed during the site assessment, and the proposed development area is already heavily disturbed. However, if FTHL are documented during construction activities, mitigation strategies would be implemented as outlined in the Flat-tailed Horned Lizard Interagency Coordinating Committee's (ICC) *Flat-tailed horned lizard rangewide management strategy, 2003 revision* and as described in Appendix A (ICC, 2003). Appendix B provides a description of conservation and mitigation measures intended to eliminate the possibility of encountering or adversely affecting FTHL during construction activities With the implementation of mitigation measures described in Appendix B, no impacts are anticipated to the FTHL.

Western Burrowing Owl (*Athene cunicularia hypogea*)

WBOs are not listed and are not protected under the ESA; however, efforts are ongoing to protect the species and its habitat within its current range, which has diminished considerably due to urban development. It is highly unlikely that the development of the Proposed Action will have any effect on WBOs since no WBOs were observed during the site assessment. However, if WBOs are encountered during the active construction phase, appropriate measures would be taken to mitigate any potential impacts. If WBOs are documented during construction activities, WBOs would not be disturbed as it may violate federal and state laws. Mitigation guidelines would be followed as presented in AZGFD Arizona Burrowing Owl Working Group's *Burrowing Owl Mitigation Standards and Guidelines* and described in Appendix A (AZGFD, 2007).

It is unlikely that the project will have any direct impact on WBOs. No WBOs were observed, and no suitable burrows were found within the proposed development area. It is unlikely that WBOs would inhabit the area since the recent site assessment. No indirect effects are anticipated, given the lack of WBO presence in the proposed development area.

3.3.3 Minimization and Mitigation Measures

The following minimization and mitigation measures are recommended to mitigate potential impacts to biological resources under the Proposed Action:

- All disturbed soils that would not be landscaped or otherwise permanently stabilized by construction would be seeded using species native to the vicinity of the Proposed Action.
- To prevent the introduction of invasive species seeds, all earth moving and hauling equipment should be cleaned free of dirt and debris at the contractor's storage facility prior to entering the construction site.
- Site construction workers shall be educated on biological resources that may occur on the site, with emphasis on listed and special status species such as the FTHL and WBO. Education shall include, but not be limited to, ecology, natural history, endangerment factors, legal protection, site mitigation measures, and hierarchy of command. Site rules of conduct shall be identified, including but not limited to speed limits, parking areas, looking under parked vehicles prior to moving them, trash deposition, off-site conduct in the area of the Proposed Action, and other employee response protocols.
- Prior to project initiation, an individual shall be designated as a field contact representative. The field contact representative shall have the authority to ensure compliance with protective measures for the FTHL and will be the primary agency contact dealing with these measures. The field contact representative shall have the authority and responsibility to halt activities that are in violation of these terms and conditions.
- All work areas shall be clearly flagged or similarly marked at the outer boundaries to define the limit of work activities. All construction and restoration workers shall restrict their activities and vehicles to areas that have been flagged to eliminate adverse impacts to the FTHL and its habitat. All workers shall be instructed that their activities are restricted to flagged and cleared areas.
- Existing roads shall be used for travel and equipment storage whenever possible.
- If personnel involved with the construction of the Proposed Action were to encounter any federal, state, or special-status species, work would stop, and the Reclamation Yuma Area Office would be contacted immediately at (928) 343-8100.

3.4 Cultural Resources

3.4.1 Affected Environment

The NHPA establishes a national policy for protecting significant cultural resources that are defined as "historic properties" under 36 CFR 60.4. Pursuant to Section 106 of the NHPA (36 CFR 800), Reclamation is required to identify historic properties that may be impacted by federal undertakings. Cultural resources are broadly defined as the remains of past human activity. Cultural resources may include resources such as archaeological sites, historic buildings and structures, and places of traditional importance and use by Native American groups. Those cultural resources eligible for or listed on the National Register of Historic Places (NRHP) are historic properties.

Harris Environmental Group, Inc. was contracted to prepare a file and records search and Class III pedestrian Cultural Resources Survey for the proposed waste transfer station (Appendix C). In compliance with the regulations specified in 36 CFR 800.16, the affected environment for cultural resources is identified as the area of potential effects (APE). The APE is defined as the geographic

area within which federal actions may directly or indirectly cause alterations in the character or use of historic properties if any are present. The APE of the Proposed Action is the 10-acre proposed development area that contains the existing empty desert parcel. The intent of this assessment was to determine the potential for activities associated with this project to affect historic properties (i.e., significant cultural resources). The APE contains evidence of illegal off-roading activities and dumping. No cultural resources were identified in the APE during the pedestrian survey, and Harris Environmental Group recommends no further cultural resources work is necessary.

The records search revealed that five cultural resource studies have been previously conducted within a one-mile radius of the APE. One of the five previous studies, a 2007 overhead powerline survey along West County 19th Street, intersected a portion of the APE. No cultural resources were identified during the powerline survey.

3.4.2 Environmental Consequences

No Action – Under the No Action Alternative, there would be no effects to historic properties from ground disturbance associated with construction activities. Existing conditions would continue.

Proposed Action – No cultural features, artifacts, or archaeological sites were identified during the pedestrian survey. Additionally, no districts, sites, buildings, structures, or objects that could be considered eligible for inclusion on the National Register of Historic Places (NRHP) were identified. Illegal off-roading has the potential to expose or destroy resources of archaeological or cultural significance below the ground surface. There is a likelihood that any resources near the ground surface would have been degraded beyond historical significance and context. If, during any phase of this undertaking, historic properties are discovered or unanticipated effects on historic properties are found, the construction contractor would notify the Reclamation immediately and stop work at the work site. Reclamation would notify the State Historic Preservation Office (SHPO)/Tribal Historic Preservation Office (THPO) and any relevant Indian tribes within 48 hours of the discovery. A finding of no historic properties affected has been determined for the Proposed Action. Reclamation will initiate formal consultation under Section 106 of the NHPA with the Arizona SHPO and Native American tribes/THPOs regarding this determination.

3.4.3 Minimization and Mitigation Measures

The following minimization and mitigation measures are recommended for the preservation of cultural resources:

- In the unlikely event of an inadvertent discovery of archaeological or historical cultural resources or human remains, all activities within the immediate area of discovery must cease immediately. Telephone notification of the discovery must be made immediately to Reclamation's Environmental Group Manager and project archaeologist at (928) 343-8100. Reclamation will inform appropriate Native American Communities of any discovery. Reclamation would ensure that the stipulations of 36 CFR Part 800.11 are satisfied before activities can resume. The activity may resume only after Reclamation has authorized a continuance.
- Construction activities would be designed to avoid and minimize impacts to cultural resources by predominantly limiting project activities to previously disturbed areas. Consultation with the Arizona SHPO and local and regional tribes will be conducted prior to implementing the Proposed Action.

3.5 Indian Trust Assets

3.5.1 Affected Environment

ITAs are defined as "legal interests in property held in trust by the United States for Indian tribes or individuals". ITAs are those properties, interests, or assets of a Federally recognized Indian tribe or individual Indian over which the Federal government also has an interest, either through administration or direct control. Examples of ITAs include lands, minerals, timber, hunting rights, fishing rights, water rights, in-stream flows, and other treaty rights. All Federal bureaus and agencies are responsible for protecting ITAs from adverse impacts resulting from their programs and activities.

Yuma County is home to the Cocopah Tribe of Arizona, whose land is composed of three noncontiguous bodies known as the North, East, and West Reservations. Today, the three Reservation properties comprise over 6,500 acres, much of which is leased as agricultural land to non-Indian farmers (Reclamation, 2018).

The development boundary of the Proposed Action is located approximately 180 feet southwest of the Cocopah Tribe's East Reservation, which is a recognized ITA. Housing in the East Reservation is located along the Yuma Project's East Main Canal, over 0.8 miles from the proposed development area. The Cocopah Casino, Cocopah Resort & Conference Center, and Wild River Family Entertainment Center are located over 4.0 miles from the Proposed Action. Between the housing and the casino areas are approximately 2,000 acres of undeveloped ground (Reclamation, 2018).

3.5.2 Environmental Consequences

No Action – Under the No Action Alternative, construction of the waste transfer station would not take place. Therefore, no change to Federal actions will occur that could result in an adverse effect to ITAs.

Proposed Action – Reclamation departmental policy requires the agency to address potential impacts to ITAs even if impacts are found to be non-significant. Potential impacts to ITAs as a result of the Proposed Action are analyzed in the following subsections.

Trust lands – The Proposed Action is not located ITA lands. The Cocopah Tribe's East Reservation is in close proximity to the project area. However, the Proposed Action would not interfere with any Trust Lands, tribal residences and/or facilities and would not prevent the use or management of any tribal or Trust Lands. Therefore, no adverse impacts to trust lands are anticipated. The Proposed Action would help deter illegal dumping in the East Reservation. Long-term beneficial impacts are expected from the reduction of illegal dumping within the area.

Water Rights – The Proposed Action would not result in a change to any tribal water rights, or to the diversion or delivery of trial water entitlements. Therefore, no impacts to water rights are anticipated.

Hunting, Fishing, and Gathering Rights – The Proposed Action would not interfere with any hunting, fishing, and gathering rights that could be exercised by any tribe. Therefore, no impacts to hunting, fishing, or gathering rights are anticipated.

3.5.3 Minimization and Mitigation Measures

No minimization and mitigation measures are proposed for ITAs.

3.6 Environmental Justice and Socioeconomic Conditions

3.6.1 Affected Environment

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States. Minority populations include persons identified by the Census of Population and Housing to be of Hispanic or Latino Origin, as well as non-Hispanic persons who are African American, American Indian and Alaska Native, Native Hawaiian or other Pacific Islander. Low-income populations are those that fall within the annual statistical poverty thresholds from the United States Census Bureau for the 2020 Census. The definition of poverty is dependent on the size of the family. For example, the poverty threshold for a family of three in Arizona is $23,834, whereas $31,428 is the threshold for a family of four (United States Census Bureau [USCB], 2023). If the total income of a person's family is less than the threshold appropriate for that family, then the person is considered to be below the poverty level.

The immediate project vicinity is currently vacant and contains no residents. However, it is anticipated that Yuma County residents living within the City of Somerton and Cocopah reservation would potentially be most affected by the implementation of the Proposed Action. Information on total population, racial demographics, and poverty status for Arizona, Yuma County, the City of Yuma, and the City of Somerton is provided in Table 3-5. As shown in Table 3-5, Somerton has a substantially larger percentage of Hispanics or Latinos and members of two or more races than the rest of the region as a whole. Hispanics and Latinos remain the largest ethnic groups in Yuma County, Yuma, and Somerton. The poverty level in the City of Somerton is only marginally (0.7%) higher than nearby Yuma and is over 2% higher than that of the County. Therefore, there is a large representation of minority populations within the vicinity of the Proposed Action, while poverty levels are mostly consistent with the surrounding area.

Table 3-5: Population, Race, and Poverty Levels in Arizona Localities

Location	Population	Race and Origin					Population Below Poverty Level
		Hispanic or Latino	White	Black or African American	American Indian	Two or More Races	
Arizona	7,365,684	32.5%	52.9%	5.5%	5.2%	3.2%	12.5%
Yuma County	207,842	66.1%	28.8%	2.5%	2.4%	2.2%	14.6%
City of Yuma	98,527	62.1%	30.6%	2.2%	1.1%	21.9%	16.1%
City of Somerton	14,514	96.2%	3.7%	3.4%	0.1%	39.8%	16.8%

Source: USCB, 2024

3.6.2 Environmental Consequences

No Action – Under the No Action Alternative, the project would not take place. Therefore, the socioeconomic character of the region would be unchanged, and there would be no immediate adverse effect on the health or environment of minority or low-income populations. Illegal dumping incurs cleaning costs on the local government. Higher service fees and/or property taxes and reduction in property values may result in long-term, adverse, minor impacts due to cleanup costs and visual disruption from roadside wastes. This would result in long-term, minor impacts to minority and low-income populations within the area.

Proposed Action – Implementation of the Proposed Action would not disproportionately affect minority or impoverished populations within the area. Project impacts, if any, would be short-term construction-related impacts that would cease upon project completion, and would not affect this population disproportionately greater than other populations. The Proposed Action would have a long-term beneficial impact on the community by providing waste management infrastructure via the transfer station, and by decreasing trash pollution from illegal dumping. The Proposed Action is not expected to measurably affect local socioeconomic character.

Based on the analysis for air quality, water resources, and hazardous materials in this EA, changes resulting from implementing the Proposed Action would not result in disproportionately high and adverse impacts on the environment or on the health of low-income and minority populations.

3.6.3 Minimization and Mitigation Measures

Based on the analyses presented throughout this EA, changes resulting from implementing the Proposed Action would not result in disproportionately high or adverse impacts to the environment or the health of low-income and minority populations. Therefore, no mitigation measures are proposed.

3.7 Hazardous Materials or Solid Waste

3.7.1 Affected Environment

The project site is currently vacant and uninhabited. There is no record of hazardous materials being stored or released at the site. However, due to the prevalence of illegal dumping, there is potential for the presence of household hazardous waste, including batteries, drain cleaners, electronic wastes (e.g., televisions, computer monitors, cell phones), glue and adhesives, household cleaners, oven cleaners, paints, pesticides, pool cleaners, solvents, used oil, waste containing asbestos, wastes containing mercury (e.g., thermometers, fluorescent lights). Site inspections did not yield the discovery of any of these materials. However, the potential for their presence cannot be entirely eliminated.

Hazardous materials routinely used during construction may include petroleum hydrocarbons and their derivatives (for example, fuels, oils, lubricants, and solvents) required to operate the equipment used in the construction activities. Materials, including gasoline, diesel fuels, and hydraulic fluids, are typical for the operation and maintenance of heavy equipment and support vehicles. Such waste would be disposed of at an appropriate waste site that accepts hazardous materials. The waste transfer station would not accept hazardous materials or waste. Unacceptable wastes include

unrinsed pesticide or petroleum containers, liquid waste, mercury-containing devices, polychlorinated biphenyls, or other regulated hazardous wastes. Transfer station staff would verbally confirm load content and visually inspect loads when appropriate.

The waste transfer station would collect MSW such as yard waste, household waste, food scraps, glass bottles, metal cans, plastics, paper products, and textiles. The waste would then be transferred to the South Yuma County Landfill. Fencing surrounding the site would prevent the transport of solid wastes to the surrounding environment. Daily perimeter walks would ensure the fence is cleaned and further enhance the retention of solid waste within the site.

3.7.2 Environmental Consequences

No Action – Under the No Action Alternative, the waste transfer station would not be constructed. Illegal dumping would continue along the West County 19th Street corridor and in the surrounding areas. MSW is expected to increase with Yuma County's consistent rise in population, thereby increasing the volume and occurrence of illegal dumping of solid and potentially hazardous waste. The continued dumping of these wastes would result in a long-term adverse effect to the local environment.

Impacts related to hazardous materials associated with construction activities and vehicles would not occur under the No Action Alternative.

Proposed Action – Under the Proposed Action, construction of the waste transfer station would generate minor amounts of hazardous waste in the form of fuel, oil, or hydraulic fluid residues dripped to the ground by vehicles, contaminated rags from cleaning and maintenance of construction equipment, and used filters from the green waste burner. Hazardous wastes would be disposed of by the contractor at an appropriate hazardous waste accepting disposal facility. Any hazardous wastes encountered during the site clearing or grading process would be collected and disposed of accordingly. Roll-off trucks would be used on a regular basis to remove waste bins from the site. Maintenance is expected to be conducted off site, and petroleum products from potential leaks are not expected to significantly impact the surrounding environment. Short-term minor impacts due to hazardous wastes are expected from construction activities, but implementation of mitigation measures such as proper disposal and regular vehicle maintenance are expected to ensure impacts are reduced to the maximum extent possible. Long-term minor impacts are expected due to the operation of the facility; however, mitigation measures would be implemented to reduce potential impacts.

Construction would generate small amounts of solid waste in the form of concrete or asphalt debris, wood scraps, illegal dumping trash, and excavated materials. These wastes would be disposed of in bins or small roll-off trucks per standard construction procedures and are not anticipated to result in a significant impact on regional solid waste generation. Operation of the waste transfer station would not increase the amount of solid waste generated by customers or the surrounding community. Therefore, no long-term impacts are expected from solid waste.

3.7.3 Minimization and Mitigation Measures

Mitigation actions designed to limit the potential impact of hazardous materials or solid waste would be implemented according to State and Federal regulations. Other hazardous materials anticipated to be used during the construction of the project are small volumes of petroleum hydrocarbons and

their derivatives (for example, fuels, oils, lubricants, and solvents) required to operate the equipment used in the construction activities. These materials are those routinely associated with the operation and maintenance of heavy equipment or other support vehicles, including gasoline, diesel fuels, and hydraulic fluids.

- A site-specific Spill Prevention, Control, and Countermeasures (SPCC) plan would be developed and implemented. The plan shall consist of reporting guidelines in the event of a spill, Best Management Practices applicable to the hazardous materials, and employee training in the use of required equipment and proper handling of potentially hazardous materials.
- Hazardous materials used for this project would be contained within vessels engineered for safe storage.
- Areas for refueling of equipment would be chosen to prevent any accidental fuel leakage from contaminating surface water, groundwater, or soils.

3.8 Water Resources

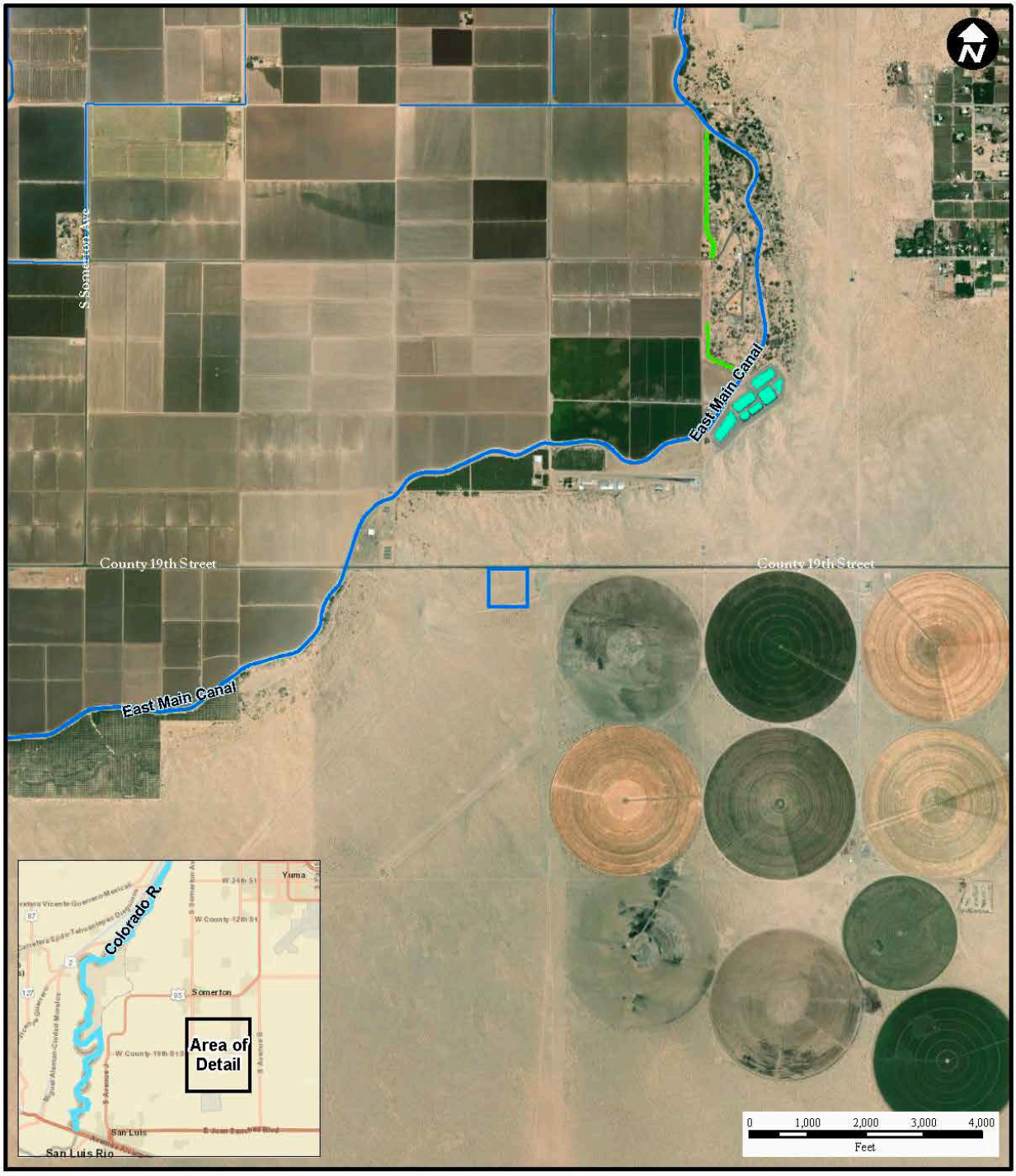
3.8.1 Affected Environment

Surface Water – The Proposed Action is located within the Yuma Desert Watershed. The Yuma Desert Watershed does not have any naturally occurring perennial streams within the watershed. The Colorado River is located over six miles west of the Proposed Action and is the only perennial stream in the vicinity.

Groundwater – Water from rainfall eventually seeps into the ground and occupies the interstices of soil layers, and slowly migrates to underground conveyances called aquifers. A few of these large gravel aquifers, collectively known as the Yuma Basin, underlie the project study area. The Yuma Basin covers approximately 750 square miles of southwestern Arizona. Regional groundwater flow is to the southwest, with most groundwater recharge coming from the Colorado and Gila Rivers and infiltration of irrigation water. Only minor amounts are contributed by precipitation and local runoff. An estimated 34 million acre-feet to 49 million acre-feet of groundwater are in storage in the Yuma Basin to a depth of 1,200 feet. The basin contains two large reservoirs, the largest being Mittry Lake and the other being the Morelos Diversion Dam (Arizona Department of Water Resources [AZDWR], 2009).

Water Quality – Surface water is the primary source of drinking water and is usually of better quality than the salt and nitrate-laden groundwater, which is harder to treat. All community water systems are regulated under the Safe Drinking Water Act and treat water supplies to meet drinking water standards. The ADEQ conducted a baseline study to assess the groundwater quality of the Yuma Groundwater Basin. The study found that the Yuma Groundwater Basin had no dominant water chemistry and is chemically similar to Colorado River water (AZDWR, 2009).

Wetlands – The United States Army Corps of Engineers regulates potential impacts to waters of the United States, also known as jurisdictional waters. There are currently no jurisdictional waters, including wetlands, located within the proposed development area, as shown in Figure 3-2 (USFWS, 2024).



Legend

- Waste Transfer Station
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine

Figure 3-2

Water Resources
Environmental Assessment
Waste Transfer Station
Yuma County, Arizona

3.8.2 Environmental Consequences

No Action – Implementation of the No-Action Alternative would not result in any construction activity; therefore, no impacts to surface water, groundwater, water quality, or jurisdictional waters would occur.

Proposed Action – Implementation of the Proposed Action Alternative would be anticipated to have minimal to no impact on water resources both on and off the project site. Detailed descriptions of impacts on water resources are described below.

Surface Water – No direct, indirect, or cumulative impacts on surface waters in the proposed development area are anticipated with the construction and operation of the Proposed Action as there are no surface water features such as rivers, streams, lakes, ponds, or wetlands in or within proximity of the Proposed Action. Soil erosion impacts would also be mitigated through coordination with the appropriate agencies during permitting and construction.

A National Pollutant Discharge Elimination System (NPDES) permit for stormwater runoff from construction activities would be required as individual and/or cumulative soil disturbances in the proposed development area will exceed one acre of land area.

Groundwater – No impacts on groundwater resources associated with the Proposed Action are anticipated with the construction or operation of the Proposed Action. Proposed activities are not likely to introduce or release any materials from the soil that could adversely affect groundwater.

Water Quality – The Proposed Action is not expected to result in long-term impacts on water quality. Runoff is not expected to reach nearby water sources. The site would not accept hazardous materials, and potential releases would be treated in accordance with the NPDES permit. Therefore, groundwater infiltration would not adversely affect aquifer quality.

Wetlands – There are no jurisdictional waters or wetlands within the vicinity of the Proposed Action, and no migration of contaminants to wetland areas is expected. There would be no impacts to wetlands under the Proposed Action.

3.8.3 Minimization and Mitigation Measures

Minimization and mitigation measures shall be implemented during construction and operation of the transfer station in order to protect water resources in the Proposed Action Area. Should an accident or spills occur, the County would implement a SPCC plan to contain and/or remove potential contamination to groundwater as discussed in Section 3.7.3. An NPDES permit would dictate stormwater controls and document potential releases. No additional management or mitigation measures are recommended to protect water resources, as there is low potential to impact water resources.

3.9 Geology and Soils

3.9.1 Affected Environment

The geology of the area consists primarily of unconsolidated to strongly consolidated alluvial and eolian deposits. This area includes coarse, poorly sorted alluvial fan and terrace deposits on middle and upper piedmonts and along large drainages; sand, silt, and clay on alluvial plains and playas; and wind-blown sand deposits (USGS, 2024a).

The soil classification within the subject area is identified as Superstition sand. This deep, somewhat excessively drained soil can be found in the mixed sandy alluvium on the old terrace of the Colorado River. Soil series within and near the proposed development area are shown in Figure 3-3. The average annual high and low air temperature ranges from 102 to 68 degrees Fahrenheit, and the average freeze-free period ranges from 250 to 325 days (ClimateData.org, 2023). Typically, the surface layer is light brown sand about 5 inches thick. The underlying material to a depth of 60 inches or more is light brown and pink sand and contains few to many soft lime masses. In some places, the surface layer is loamy sand. Available water capacity is low to moderate. Surface runoff is very slow. The hazard of soil blowing is high (USDA, 2024b). Furthermore, this area of study is at a moderate risk for earthquakes (USGS, 2014). This risk is caused by the proximity of the nearby San Andreas Fault and its splay faults, the Algodones (5 miles) and Imperial faults (40 miles) (USGS, 2024b).

3.9.2 Environmental Consequences

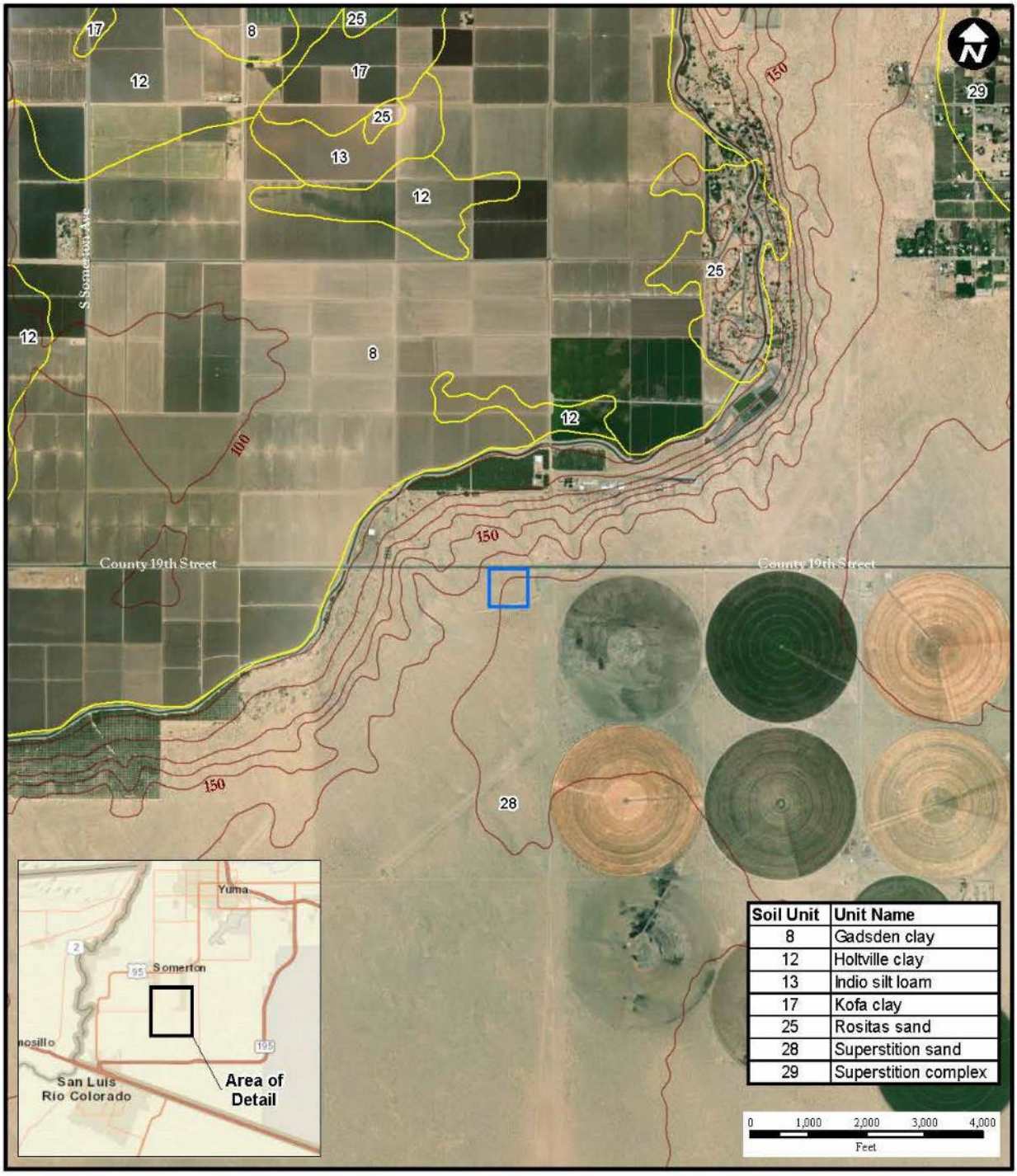
No Action – Implementation of the No-Action Alternative would not affect or change the local geology or soil properties in the area because ground-disturbing activities that may affect these resources would not occur.

Proposed Action – The Proposed Action may have short-term direct and indirect effects on local soil composition. Construction practices for the proposed planned development could potentially result in soil erosion at the project site. However, soils, when replaced, would be compacted tightly to prevent any access erosion. Additionally, the majority of the site would be paved, further reducing erosion potential. Watering trucks would regularly wet exposed soil in windy conditions, reducing the potential for wind erosion. When considering the Proposed Action, there are no apparent obstacles with respect to topography, soil type, and geology.

3.9.3 Minimization and Mitigation Measures

The following minimization and mitigation measures are recommended to mitigate impacts to geology and soil resources under the Proposed Action:

- Disturbed soils should be compacted tightly in order to prevent any excess erosion.
- Watering trucks will be utilized to reduce erosion due to wind.



Soil Unit	Unit Name
8	Gadsden clay
12	Holtville clay
13	Indio silt loam
17	Kofa clay
25	Rositas sand
28	Superstition sand
29	Superstition complex

Legend

- Waste Transfer Station
- Topographic Contour
- Soil Series

Figure 3-3

Geology and Soils
Environmental Assessment
Waste Transfer Station
Yuma County, Arizona

3.10 Visual Resources

3.10.1 Affected Environment

Visual resources consist of natural and manmade features that give a particular environment its aesthetic qualities. Landscape character is evaluated to assess whether the project will appear compatible with the existing features or would contrast noticeably with the setting and appear out of place. Visual sensitivity includes public values, goals, awareness, and concern regarding visual quality.

The local topography of the proposed development area is characterized by sloping plains and broad, flat valleys, with distant mountains in the background. The predominant vegetation character of the study area is dominated by creosote and characterized by a sparse, open shrub canopy that is low to the ground.

Visual resources within the proposed development area generally include open space, agricultural areas, and desert habitats. Various agricultural and industrial facilities are located along the West County 19th Street corridor. The landscape surrounding the Proposed Action site is characterized by undeveloped desert lands and sloping hills. Visible manmade structures in the Proposed Action area consist of numerous utility poles, two fenced groundwater pump stations, a dump pile of reinforced concrete pipe approximately 0.5 acres in size, and a 740-foot-long stacked line of concrete piping along the east border of the proposed development area. Illegal dumping waste is visible across the majority of the site. A single residence associated with the agricultural aviation area is located over half a mile northeast of the Proposed Action. This residence is located in an industrial area and also shares visual space with hangars, vehicle storage, fuel storage areas, and wastewater ponds (Google Earth, 2024).

3.10.2 Environmental Consequences

No Action – With the implementation of the No-Action Alternative, no visual resources would be modified or influenced by the Proposed Action; therefore, no impacts to visual resources would result from this alternative.

Proposed Action – Introduction of the Proposed Action to the visual environment would have minimal impacts on the existing landscape setting. During construction, the Proposed Action could negatively affect the visual quality of the surrounding area. Dust and exhaust from equipment would temporarily lower visibility for individuals crossing the site along West County 19th Street, but this condition would end with the completion of construction.

The only vertical structures proposed would be the lighting poles and office structure. The rest of the development will primarily consist of waste bins, the air burner, and fencing, all of which are visually consistent with other industrial properties in the area and would not obscure the mountains along the horizon. The nearby residential property is in close proximity to various other industrial elements and given the existing environment and distance from the Proposed Action, the transfer station would not change the visual environment for nearby residents. The addition of a fenced industrial facility would be consistent with other facilities along West County 19th Street. Minimal, long-term impacts are expected on visual resources as the transfer station would obstruct a once-clear view of the flat desert landscape south of West County 19th Street.

The proposed development area and multiple surrounding parcels suffer visually from waste located on the ground surface, partially buried in the sand, or blowing in the wind across roadways. The Proposed Action is anticipated to reduce overall illegal dumping, reducing the amount of waste released into the desert landscape. Long-term beneficial impacts are expected from the reduction in illegal dumping waste in the area.

3.10.3 Minimization and Mitigation Measures

The Proposed Action would have no adverse impact on visual resources. Therefore, no minimization and mitigation measures are proposed.

3.11 Floodplains

3.11.1 Affected Environment

Floodplains are low areas next to bodies of water that are periodically covered in water. They are defined by the 100-year and 500-year floods, which have a 1.0% and 0.2% annual chance of occurring, respectively.

The Colorado River is located over six miles to the west of the Proposed Action area. The River is bordered to the east by the Colorado River Levee and Levee Canal in this area. The nearest 100-year floodplain is located over six miles west along the Colorado River at an elevation of approximately 95 feet. The Proposed Action lies within the 500-year floodplain at an elevation of approximately 170 feet, as shown in Figure 3-4 (Federal Emergency Management Agency [FEMA], 2024).

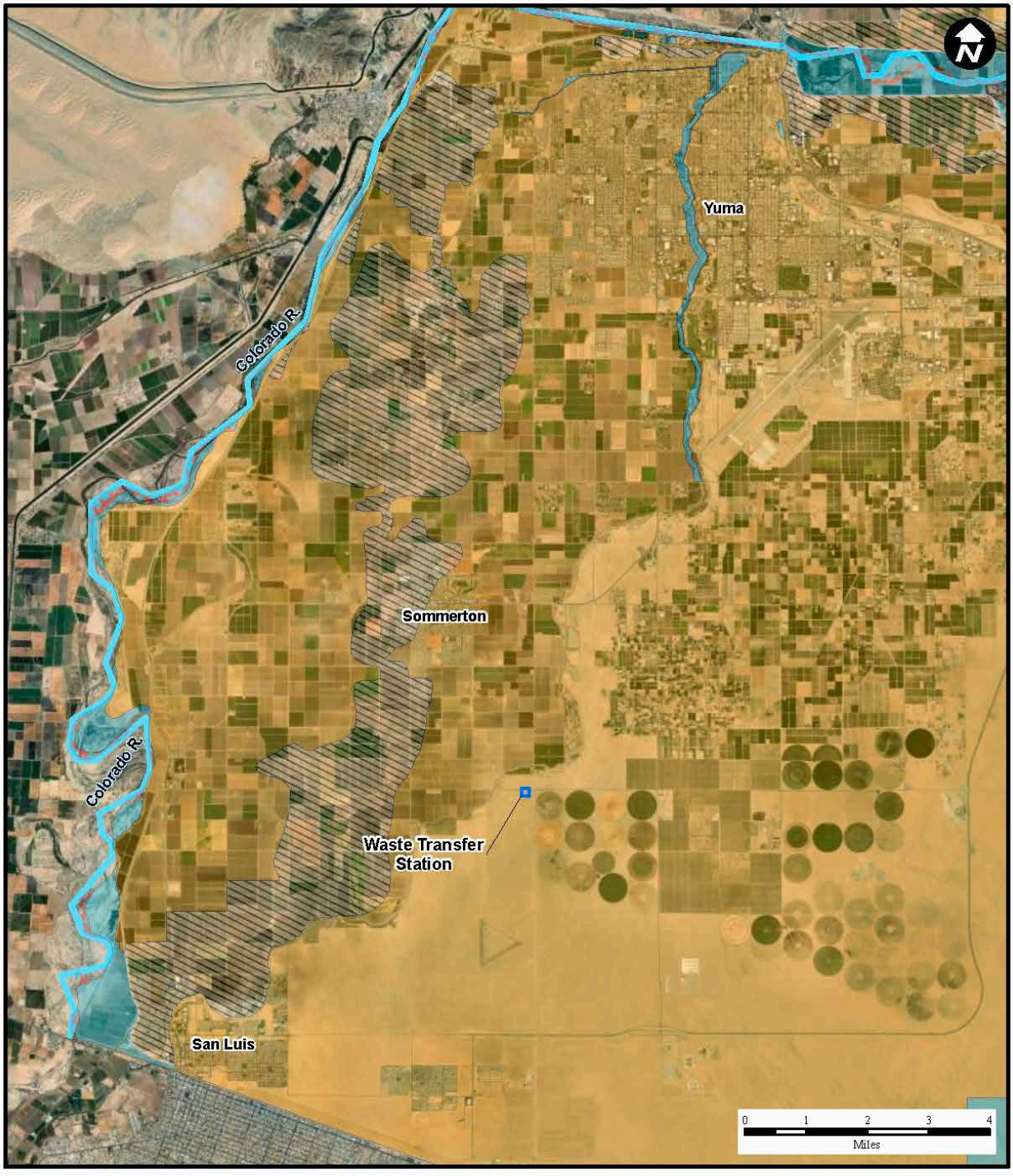
3.11.2 Environmental Consequences

No Action – The No Action Alternative would not affect the integrity of the floodplain or create potential flood hazards as no development would take place. The parcel would remain empty and retain all function within the floodplain.

Proposed Action – Impacts to floodplains from the Proposed Action are extremely unlikely. The project location is over 75 feet uphill from the nearest 100-year floodplain and is protected by a large system of levees bordering the Colorado River floodplain. The Proposed Action is not anticipated to increase flood risks or cause any adverse flood-related impacts within the proposed development area or lower elevation properties. No direct, indirect, or cumulative impacts on floodplains are anticipated.

3.11.3 Minimization and Mitigation Measures

The Proposed Action has no potential to impact floodplain conditions or resources in the project area. Therefore, no minimization and mitigation measures are proposed for impacts to floodplains.



Legend

- Waste Transfer Station
- Colorado River
- 100-Year Floodplain
- 500-Year Floodplain
- Area with Reduced Flood Hazard
- Colorado River Floodway

Figure 3-4

Floodplains
Environmental Assessment
Waste Transfer Station
Yuma County, Arizona

3.12 Traffic and Transportation

3.12.1 Affected Environment

The site would be accessed directly via West County 19th Street. An "in" and "out" gate would provide access and egress for the public. A separate gate would be used exclusively by roll-off trucks to remove and replace collection bins throughout the site.

Construction vehicles would utilize the interstates for transportation of construction materials to the site. Construction contractors and associated vehicle traffic are anticipated to originate from various locations within Yuma County. Construction solid waste would be delivered to the South Yuma County Landfill located 4.6 miles from the Proposed Action. Transportation to this location would occur primarily on West County 19th Street before turning onto a paved road dedicated to the landfill. Alternatively, the Copper Mountain Landfill may be used, but this location is over 50 miles from the Proposed Action, and preference would be placed on disposal at the South Yuma County Landfill.

Normal daily traffic includes passenger, commercial, and agricultural vehicles. West County 19th Street serves as a conduit between San Luis, AZ, and agricultural and industrial areas south of Somerton and the Yuma International Airport. The Average Annual Daily Traffic (AADT) for West County 19th Street at South Avenue B (2.0 miles from Proposed Action) is 2,062 vehicles per day. This count is relatively low compared to South Avenue B, which has an AADT between 8,014 and 10,185 vehicles per day, and Route 95 north of San Luis, AZ, which sees an AADT of 17,978 (Arizona Department of Transportation [ADOT], 2022).

Between July and September 2023, the North Gila Valley Transfer Station served an average of 165 monthly Yuma County residents (Yuma County, 2023b). The North Gila Station is smaller than the Proposed Action (approximately two acres). However, a greater number of monthly customers are expected to utilize the West County 19th Street waste transfer station due to the ease of access.

3.12.2 Environmental Consequences

No Action – Under the No Action Alternative, the Proposed Action would not occur. Therefore, no construction workers, construction equipment, or increases in traffic would be required. This alternative would have no effect on existing transportation, access, or roads.

Proposed Action – The Proposed Action would result in temporary negligible impacts to the traffic environment during construction activities. Intermittent traffic delays may occur in the vicinity of the Proposed Action to allow construction vehicles or large trucks to access the site. To avoid congestion, deliveries could be scheduled outside peak traffic times. Additionally, heavy construction vehicles may be stored on-site for the project's duration, resulting in minimal extra trips. Traffic delays would be temporary in nature, ending once construction activities have ceased. As a result, no long-term or significant impacts on transportation infrastructure are anticipated from the Proposed Actions.

Long-term negligible impacts on the traffic environment are expected during the operation of the transfer station as a result of increased resident traffic and daily waste removal by County-operated roll-off trucks. A conservative estimate of 300 users per month will be used as a baseline for additional resident trips. Roll-off trucks are estimated to make three round trips per day to the South

Yuma County Landfill for a total of 90 trips per month. Cumulatively, this increase in traffic would lead to over 390 additional vehicle trips along West County 19th Street per month. This represents a 19% increase in vehicle traffic per month. Considering the already low AADT relative to roadways in the immediate vicinity, West County 19th Street would not experience excess traffic in exceedance of what is characteristic of the surrounding areas.

There are no features of the Proposed Action that have any potential to create traffic hazards, conflict with any existing traffic flows, or interfere with emergency access.

3.12.3 Minimization and Mitigation Measures

Temporary construction-related impacts to traffic and transportation would be minimized and mitigated through the implementation of various traffic control measures, as discussed below:

- A Traffic Control Plan would be submitted prior to initiating construction activities. The plan will detail the work to be completed, construction duration and schedule, and proposed traffic control methods.
- Traffic control devices would be used to direct traffic and support worker safety. These devices include traffic cones, barricades, signage, flags, or lighting devices for night work (as applicable).
- Flagmen or pilot cars will be utilized if construction activities require a lane closure.

3.13 Cumulative Impacts

In addition to Project-specific impacts, Reclamation analyzed the potential for significant cumulative impacts on resources affected by the Project and other past, present, and reasonably foreseeable activities within the watershed. According to the Council on Environmental Quality's regulations for implementing NEPA (40 CFR 1508.1), a "cumulative impact" is an impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. It focuses on whether the Proposed Action, considered together with any known or reasonably foreseeable actions by Reclamation, other Federal or state agencies, or some other entity, combined to cause an effect. There is no defined area for potential cumulative effects. Future and current planning documents were reviewed to determine potential projects that may contribute cumulatively to the impacts of the Proposed Action. These documents include the 2030 Yuma County Comprehensive Plan (Yuma County, 2023a), the City of Yuma General Plan (City of Yuma, 2022), the City of Yuma Transportation Master Plan (City of Yuma, 2014), the Yuma Bikeways Plan (City of Yuma, 2018), and the Rolle Airfield improvements projects (runway, apron, and terminal improvements). This section summarizes the potential for cumulative impacts for the resource areas having the potential for cumulative impacts.

Land Use – There would be no adverse impacts to land use under the Proposed Action. There would be no substantial decrease in rural open space due to the abundant open space in the surrounding areas. The Proposed Action would reduce the potential availability of arable land in the county by a total of 10 acres. Due to the vast availability of farmland in the county, the Proposed Action would represent a very small reduction in available land, and no impacts are anticipated.

Long-term beneficial impacts are expected from the reduction in illegal dumping anticipated by the presence of the waste transfer station. Implementation of the Proposed Action in conjunction with the other actions is not anticipated to have cumulative adverse land use impacts.

Air Quality – Implementation of the Proposed Action may result in increased area emissions associated with construction activities. Due to the short duration of most construction emission sources, emissions in combination with future emission sources would not be expected to contribute to an exceedance of a NAAQS. Operation of the air burner would contribute to increased criteria pollutant emissions. However, relative to significance indicators and county-level emissions, only negligible, long-term impacts are expected due to the generation of GHGs and negligible criteria pollutants.

As a result, the Proposed Action, in combination with other current or foreseeable projects and mitigation requirements, would not produce substantial cumulative impacts to air quality and climate conditions.

Biological Resources – The Proposed Action would have no effect on critical habitat as no federally proposed or designated critical habitat exists within or near the project limits. No WBO burrows were observed during the field investigation, and migration to the area is also not anticipated. Therefore, the presence of WBO is not expected during construction, and no active habitat would be lost. No FTHL were observed in the proposed development area; however, it is possible they could occur in the area. The presence of FTHL in the proposed development area is unlikely due to heavy levels of existing disturbance from off-roading and illegal dumping. With the implementation of mitigation measures, no impacts are anticipated to WBO, and FTHL.

The Proposed Action may result in negligible cumulative impacts on habitat in conjunction with future Rolle Airfield developments. Future developments at the airfield (anticipated to be complete by 2025) include runway extensions, parking apron expansion, and paved roadway construction. These actions may further reduce potential FTHL habitat. While Rolle Airfield is over 2.0 miles south of the Proposed Action, it shares a stretch of contiguous open desert space with the Proposed Action. Environmental review of the Rolle Airfield developments conducted in 2017 yielded a finding of no adverse impacts to the FTHL; however, overall habitat reduction, however minor, cannot be discounted (Reclamation, 2017). Additionally, FTHL mitigation for Yuma County's Avenue E road extension and the City of San Luis's Caesar Chavez Boulevard road improvement projects are in progress Therefore, the Proposed Action, in conjunction with other actions, is not anticipated to have negative cumulative impacts to potential FTHL habitat.

Cultural Resources – A Class III pedestrian Cultural Resources Survey was conducted for the Proposed Action development. No cultural features, artifacts, or archaeological sites were identified during the pedestrian survey. There is a likelihood that any cultural resources near the ground surface would have been degraded beyond historical significance and context. Due to the lack of cultural resources in the APE, no cumulative effects are expected in combination with other current or foreseeable projects.

Indian Trust Assets – Tribal lands are located nearby the proposed project area. However, the Proposed Action's limited use area, in combination with other proposed or on-going projects, would not cause disproportionate cumulative effects on ITA's.

Environmental Justice and Socioeconomic Conditions – Implementation of the Proposed Action would not disproportionately affect minority or impoverished populations within the area. Project impacts, if any, would be short-term construction-related impacts. Long-term beneficial impacts on the community are expected by providing waste management infrastructure, and by decreasing trash pollution from illegal dumping. The Proposed Action, in combination with other current or foreseeable projects, is not expected to have a cumulatively considerable impact on socioeconomics and minority or low-income populations.

Hazardous Materials or Solid Waste – The Proposed Action would generate minor amounts of hazardous wastes in the form of fuel, oil, or hydraulic fluid residues. Short-term minor impacts due to hazardous wastes are expected from construction and operational activities, but implementation of mitigation measures such as proper disposal and regular vehicle maintenance are expected to ensure impacts are reduced to the maximum extent possible. However, with anticipated mitigation measures, these hazardous materials releases would be cumulatively less than considerable as these impacts are localized and temporary. No increase in solid waste generation is expected by the Proposed Action. The Proposed Action, in combination with other current or foreseeable projects, is not expected to have a cumulatively considerable impact on hazardous materials or solid waste generation.

Water Resources – The Proposed Action is not expected to result in any impacts to water resources. There are no surface water features or wetlands within or near the proposed development area. No leaching of contaminants to groundwater is anticipated, and water quality would be managed in accordance with an NPDES permit specific to the waste transfer station. Construction activities and operation of the waste transfer station would not lead to cumulative impacts in combination with other current or foreseeable projects.

Geology and Soils – The Proposed Action may have short-term direct and indirect effects on local soil composition due to erosion. Once operational, the paved surface and regular watering would further reduce surficial soil erosion. There are no apparent obstacles to the development of the Proposed Action when considering topography, soil type, or geology. Therefore, the Proposed Action, in combination with other current or foreseeable projects, is not expected to have a cumulatively considerable impact on hazardous materials or solid waste generation.

Visual Resources – The Proposed Action would not result in a significant change to the surrounding landscape. The waste transfer station would not obscure existing views of surrounding mountains or landscape. Long-term beneficial impacts on the visual environment are expected from the reduction of illegal dumping waste near the transfer station and in surrounding areas. The Proposed Action, in combination with other current or foreseeable projects, is not expected to have a cumulatively considerable impact on visual resources.

Floodplains – Impacts on floodplain resources and function are extremely unlikely due to the small size of the development and the elevation of the Proposed Action relative to flooding sources, such as the Colorado River. No impacts are expected from the Proposed Action, and in combination with other current or foreseeable projects, cumulatively considerable impacts on visual resources are not expected.

Traffic and Transportation – Traffic delays may occur during construction activities; however, these impacts would be limited to the duration of construction. Traffic management practices would be implemented to reduce potential impacts on the transportation environment. Long-term impacts may be expected due to roll-off trucks and the influx of transfer station customers. However, overall traffic would not exceed the average daily rates for similar routes within the area. Efforts by Yuma County, the ADOT, or independent utility companies to repair roadways and utility infrastructure may cumulatively affect the transportation environment, leading to additional traffic compared to baseline conditions. The Proposed Action, in combination with other current or foreseeable projects, is expected to have negligible long-term impacts on the traffic and transportation environment.

Chapter 4. Consultation, Coordination, and List of Preparers

During the preparation of this EA, agency and public involvement efforts were conducted to inform stakeholders and the public about the Proposed Action and to obtain input on the proposed alternatives and environmental issues.

4.1 Coordination and Consultation

Scoping letters were sent to various interested stakeholders to inform and solicit information about the study. Reclamation provided a list of stakeholders to the consultant team. Copies of the delivered scoping letters and their attachments can be found in Appendix D.

4.2 Comment Period

Agencies and members of the public were invited to review and comment on the Draft EA. The Draft EA was available for review on Reclamation's Yuma Area Office webpage, located at https://www.usbr.gov/lc/-yuma/environmental_docs/environ_docs.html. Copies of the Draft EA were also available at the following locations for the duration of the comment period:

Yuma County Administrator's Office
2351 W. 26th Street
Yuma, AZ 85364
Phone: 928-373-1010

Yuma County Library, Somerton Branch
240 W Canal Street
Somerton, AZ 85350
Phone: 928-627-2149

Yuma County Library, San Luis Branch
1075 N. 6th Avenue
San Luis, AZ 85349
Phone: 928-373-6492

Yuma County Main Library
2951 S 21st Drive
Yuma, AZ 85364
Phone: 928-782-1871

The Reclamation point of contact for any inquiries from the public was:

Mr. Julian DeSantiago
Environmental Planning and Compliance Office
Bureau of Reclamation Yuma Area Office
7301 Calle Agua Salada
Yuma, AZ 85364
Phone: 928-343-8259

4.3 List of Preparers

Nicklaus Engineering, Inc.

- Eric Gardner, PE, Project Manager
- Josh Sandige, Environmental Planner
- Serena Scott, Project Scientist
- Parker Watson, Staff Scientist, Quality Assurance

Harris Environmental Group

- Kelsey Hollien, Biologist
- Chase Voirin, Biologist
- David P. Doak, Archaeologist
- Dakota Larrick, Field Archaeologist

Chapter 5. References

ADEQ (Arizona Department of Environmental Quality). 2006. Yuma PM_{10} Maintenance Plan. 2006.

ADOT (Arizona Department of Transportation). 2022. ADOT Transportation Data Management System, 2022 Average Annual Daily Traffic Data. Accessed online at: https://adot.public.ms2soft.com/tcds/tsearch.asp?loc=Adot&mod=TCDS.

Air Burners, Inc. 2022. AirBurners Firebox Specifications, S-220 Tier 4 Final. November.

AQMD (South Coast Air Quality Management District). 2014. Off-road Mobile Source Emission Factors Scenario Years 2007-2025. May.

AZDWR (Arizona Department of Water Resources). 2009. Arizona Water Atlas Volume 7, Lower Colorado River Planning Area. September

AZGFD (Arizona Game and Fish Department). 2007. Arizona Burrowing Owl Working Group. Burrowing Owl Mitigation Standards and Guidelines. Arizona Game and Fish Department, Phoenix, AZ.

AZGFD (Arizona Game and Fish Department). 2014. Guidelines for handling Sonoran desert tortoises encountered on development projects.

AZGFD (Arizona Game and Fish Department). 2022. Coccyzus americanus. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. 4 pp.

AZGFD (Arizona Game and Fish Department). 2023a. Rallus obsoletus yumanensis. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. 6 pp.

AZGFD (Arizona Game and Fish Department). 2023b. Phrynosoma mcallii. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. 1 pp.

AZGFD (Arizona Game and Fish Department). 2023c. Gopherus morafkai. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. 4. pp.

Brown, D.E. 1994. Biotic Communities: Southwestern United States and Northwestern Mexico. University of Utah Press. Salt Lake City, Utah. pp. 180-223.

Brown, N.L. 2001. The howdy owls of Arizona: a review of the status of Athene cunicularia. Journal of Raptor Research 35:344-350.

BTS (Bureau of Transportation Statistics). 2023. Estimated U.S. Average Vehicle Emissions Rates per Vehicle by Vehicle Type Using Gasoline and Diesel. October.

CEC (Commission for Environmental Cooperation). 2008. North American Monarch Conservation Plan. Project report prepared by the Secretariat of the Commission for Environmental Cooperation, Montreal, Quebec.

City of Yuma. 2014. City of Yuma Transportation Master Plan, Final Report. October.

City of Yuma. 2018. Yuma Bikeways Plan, City of Yuma City Council and Planning & Zoning Commission.

City of Yuma. 2022. City of Yuma General Plan. April.

ClimateData.org. 2023. Yuma, Arizona Climate Data. Accessed online at: https://en.climate-data.org/north-america/united-states-of-america/arizona/yuma-16348/

CEQ (Council on Environmental Quality). 2023. 88 FR 1196, National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change. January.

EIA (U.S. Energy Information Administration). 2023. Carbon Dioxide Emissions Coefficients. September. Accessed online at: https://www.eia.gov/environment/emissions/-co2_vol_mass.php

FEMA (Federal Emergency Management Agency. 2024. National Flood Hazard Layer (NFHL) FIRM Panel 04027C1845E. February. Accessed online at: https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd.

Google Earth. 2024. Google Earth 3D Buildings and Terrain View. February.

H. Cai, A. Burnham and M. Wang. 2013. Updated Emission Factors of Air Pollutants from Vehicle Operations in GREET Using MOVES, Systems Assessment Section, Energy Systems Division, Argonne National Laboratory.

ICC (Flat-tailed Horned Lizard Interagency Coordinating Committee). 2003. Flat-tailed horned lizard rangewide management strategy, 2003 revision. 78 pp. plus appendices.

Reclamation (United States Bureau of Reclamation). 2017. Environmental Assessment ADOT Grant No. E5S2Z, Final Report, Rolle Airfield, San Luis, Arizona. April.

Reclamation. 2018. Colorado River Basin Ten Tribes Partnership Tribal Water Study - Study Report, Chapter 5, Section 5.10, Cocopah Indian Tribe. December.

USCB (United States Census Bureau). 2023. 2023 Poverty Thresholds by Size of Family and Number of Children. February. Accessed online at: https://www.census.gov/data/tables/-time-series/demo/income-poverty/historical-poverty-thresholds.html.

USCB. 2024. United States Census Bureau QuickFacts, Arizona. February. Accessed online at: https://www.census.gov/quickfacts/fact/table/somertoncityarizona,yumacityarizona,yumacountyarizona,AZ/PST045223.

USDA (United States Department of Agriculture). 2024a. 2023 Census of Agriculture County Profile, Yuma County, Arizona. February.

USDA. 2024b. USDA National Resource Conservation Service Web Soil Survey. February. Accessed online at: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

USEPA (United States Environmental Protection Agency). 2004. Office of Transportation and Air Quality, Update of Methane and Nitrous Oxide Emission Factors for On-Highway Vehicles. November.

USEPA. 2023a. 2020 NEI Supporting Data and Summaries, Tier 1 Summaries Region 9 Criteria Air Pollutants. March.

USEPA. 2023b. AP-42 Compilation of Air Emissions Factors from Stationary Sources, Fifth Edition, Volume I Chapter 2, Solid Waste Disposal. May.

USEPA. 2023c. 40 CFR 93.153(b)(1) and (b)(2) General Conformity De Minimis Tables. June.

USEPA. 2024a. National Ambient Air Quality Standards Table for Criteria Air Pollutants.

USEPA. 2024b. USEPA Green Book, PM-10 (1987) Designated Area Area/State/County Report for Yuma, Arizona. January.

USFWS (U.S. Fish and Wildlife Service). 2023. U.S. Fish and Wildlife Service Information for Planning and Consultation (IPaC) Report, Consultation Code: 2023-0118531. August.

USFWS. 2024. National Wetlands Inventory Mapper. February. Accessed online at: https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/.

USGS (U.S. Geological Survey). 2014. Seismic Hazard Map of state of Arizona. 2014. Accessed online at: https://www.usgs.gov/media/images/2014-seismic-hazard-map-arizona.

USGS. 2024a. Mineral Resources Online Spatial Data. Accessed online at: https://mrdata.usgs.gov-/#geologic-data.

USGS. 2024b. U.S. Quaternary Faults Web Viewer. Accessed online at: https://usgs.maps.-arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf.

Yuma County. 2006. Yuma County Department of Development Services, Yuma County Zoning Ordinance, Effective September 25, 2006. September.

Yuma County. 2023a. 2030 Comprehensive Plan, Yuma County Department of Development Services. March.

Yuma County. 2023b. North Gila Valley Transfer Station July, August, and September Daily South County Visitation Data provided by Kelly Fricke, Public Works Director at Yuma County Department of Public Works.

Yuma County Airport Authority (YCAA). 2015. Airport Master Plan, Rolle Field Airport Final Report. May.

Appendices

Appendix A

Biological Evaluation

Biological Evaluation

FOR

Yuma County Waste Transfer Station Project

PREPARED FOR:

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DECEMBER 2023

TABLE OF CONTENTS

LIST OF APPENDICES

1. PROJECT LOCATION

This project is located on land under the jurisdiction of the US Bureau of Reclamation in Yuma County (parcel number 211-23-003), within Section 23, Township 10S, Range 24W. The project footprint covers an area of 10.12 acres. Specifically, the project is located near the southwest edge of the city of Somerton, Arizona. The northern boundary of the project footprint is adjacent to the south side of West County 19th Street (Figure 1).

2. PROJECT DESCRIPTION

This report presents the findings and recommendations determined through biological surveys completed over a roughly 650-foot by 650-foot square area south of West County 19th Street, between the Yuma Main Canal and Avenue C Extended Avenue in Yuma County, Arizona (Figure 1). The development of a waste transfer station for Yuma County is planned within the project footprint, and a biological evaluation of the area was requested by Nicklaus Engineering, Inc. These surveys were conducted on September 22, 2023, to document any biological resources present within the project area.

3. PROJECT AREA

Elevation of the project area ranges from approximately 150-170 feet above mean sea level. The site is relatively flat and is comprised of sandy substrate lacking the presence of significant rocks or boulders.

The project area lies within the range of the Lower Colorado River Valley subdivision of the Sonoran Desertscrub biotic community (Brown 1994). Vegetation is distributed sparsely across most of the project area, with large swaths of bare soil and sand interspersed with few desert-adapted shrubs (Appendix A; Photo 1). Vegetation within the project area consisted of upland desert species. Creosote (*Larrea tridentata*) was the dominant species with fewer individuals of allscale saltbush (*Atriplex polycarpa*) dispersed throughout. These two species comprise the full inventory of vegetation observed during the site assessment.

No perennial aquatic habitats, caves or rock outcroppings, or significant burrows were present within the project area. Erosion, soil compaction, and disturbance to vegetation were all observed during the site visit. The project area has been significantly disturbed by human use and through its proximity to the roadway (W County 19th Street). Vehicle use along the southern shoulder of W County 19th Street has disturbed the northern boundary of the project footprint, and disturbance due to foot traffic and vehicle tracks were observed throughout the project footprint and within the immediate vicinity of the project area (Appendix A; Photos 3, 5, and 6). Each of these factors has led to reductions in vegetation density and diversity throughout the project area. Roadway runoff

has allowed for a slightly higher density of *Larrea tridentata* and *Atriplex polycarpa* to grow along the northern edge of the project footprint than in the surrounding areas (Appendix A; Photo 8).

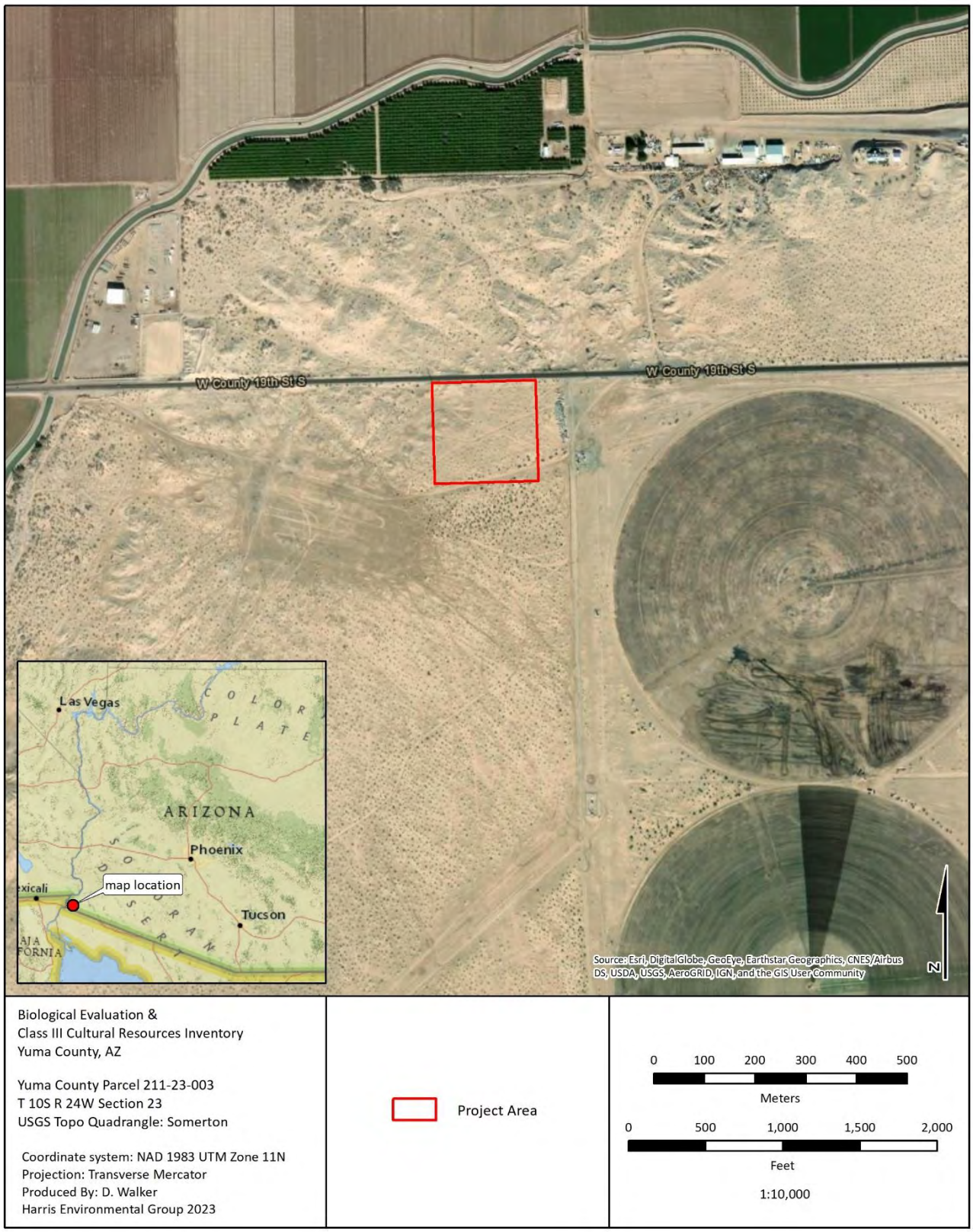

Figure 1. Overview of the project area.

4. SPECIES/CRITITCAL HABITAT CONSIDERED

The US Fish and Wildlife Service's (USFWS) Information, Planning, and Conservation (IPaC) System (accessed by Kelsey Hollien, 17 August 2023, Consultation Code: 2023-0118531) was queried to obtain a list of endangered, threatened, proposed, or candidate species that *may* occur within one or more delineated US Geological Survey (USGS) 7.5-minute quadrangles with which the project area polygon intersects (Appendix B). In addition, we queried the Arizona Game and Fish Department's (AZGFD) Heritage Data Management System (HDMS) (accessed by Kelsey Hollien, 22 August 2023, Project ID: HGIS-20125) to determine whether any Species of Greatest Conservation Need (SGCN) have been documented as occurring within three miles of the project area (Appendix C). A total of three federal status species and three SGCN species were identified through the USFWS IPaC and HDMS systems, respectively, in relation to the project area. These species were analyzed, and determinations were made using expert opinion.

We assessed the project area to determine resources or habitat types that could potentially be used by any of the sensitive federal and state species documented in the referenced lists.

All three of the federally listed species were excluded from further detailed evaluation because the project area does not contain vegetation and/or landscape features known to support the species. The species included in the USFWS IPaC System list but excluded from further evaluation are addressed below with exclusion justifications (Table 1). This project is unlikely to affect the species listed in this table.

Table 1. Federally listed endangered, threatened, proposed, or candidate species (n=3/3) excluded from further evaluation.

Species*	Status*	Habitat Requirements	Exclusion Justification
Birds			
Yuma Ridgway's Rail (*Rallus obsoletus yumanensis*)	E	Freshwater marshes, dense emergent riparian vegetation, requires wet substrate (mudflat, sandbar, etc.) (AZGFD 2023a) Elevation: 75 - 1,700 feet	Project limits do not contain required habitat. No freshwater marshes with dense riparian vegetation within project area.
Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*)	T	Sonoran riparian woodlands and forest comprised of cottonwood, willow, and/or tamarisk galleries (AZGFD 2022). Elevation: 3,564 feet - 5,480 feet	Project limits fall outside of the known elevational range and do not contain required habitat. No riparian or marsh habitat with cottonwood, willow, or tamarisk galleries.
Insects			

Species*	Status*	Habitat Requirements	Exclusion Justification
Monarch Butterfly (*Danaus plexippus)*	C	Requires obligate milkweed host plant (primarily *Asclepias* spp.) during breeding season (CEC 2008).	Project limits do not contain required habitat. No obligate host plant in project area.

***USFWS: E = Endangered, T = Threatened, C = Candidate for listing,**

A list of SGCN that could intersect with the project footprint was reviewed through the AZGFD HDMS query, and all "1" ranked species were evaluated.

A species is ranked vulnerable and given a "1" if one or more of the following vulnerability criteria are met: Extirpated from Arizona, Federal or State status, Declining status, Disjunct status, Demographic status, Concentration status, Fragmentation status, Distribution status.

All "1" ranked species listed on the HDMS query, which used the project limits as the input, are summarized below (Table 2). This table includes species-specific notes to briefly explain habitat preferences and recorded sightings. While many of these species do not warrant federal protection under the Endangered Species Act (ESA), they are considered SGCN by the AZGFD and are included in the consideration of potential impacts that may occur from project activities.

Table 2. AZGFD SGCN "1" ranked list from HDMS query.

Scientific Name	Common Name	Species-specific Notes
Flat-tailed Horned Lizard	*Phrynosoma mcalli*	*See species evaluation*
Sonoran Desert Tortoise	*Gopherus morafkai*	*See species evaluation*
Western Burrowing Owl	*Athene cunicularia hypugea*	*See species evaluation*

We conducted a thorough evaluation of AZGFD "1" tier SGCN and concluded that the following species warrant further discussion during project planning:

Flat-tailed Horned Lizard	*Phrynosoma mcalli*	Not Listed
Sonoran Desert Tortoise	*Gopherus morafkai*	Not Listed
Western Burrowing Owl	*Athene cunicularia hypugea*	Not Listed

While the Western Burrowing Owl is not an AZGFD "1" tier SGCN, it was noted in the HDMS query as a species that has been recorded within the project vicinity and it was included for further discussion.

5. EFFECTS ANALYSIS & DETERMINATION FOR EACH PROTECTED RESOURCE

Site Assessment and Species Evaluation

The potential effects on listed species and habitat of the proposed action should include analyses of direct and indirect effects. Direct effects are those that are caused by the proposed action and occur at the same time and place as the proposed action. Indirect effects are those that are caused or will result from the proposed action, are later in time, but are still reasonably certain to occur. Potential direct effects on state and federally listed species and designated critical habitat include habitat loss, direct mortality, wildfire, noise, human disturbance, and erosion. Indirect effects include potential effects resulting from impacts to groundwater and erosion resulting from fire or human disturbance. A total of three (3) state protected species listed within the AZGFD HDMS query were further investigated to determine potential impacts to the species or their habitat. This project will have no effect on critical habitat as no federally proposed or designated critical habitat exists within or near the project limits.

5.1 Flat-tailed Horned Lizard (*Phrynosoma mcalli*)

Life History Information

The Flat-tailed Horned Lizard (FTHL) was proposed to be federally listed as threatened by the USFWS in 1993, but the proposal was withdrawn in March of 2011 (proposal withdrawal published in Federal Register on 15 March 2011; 76 FR 14210). The FTHL is still considered a SGCN by the state of Arizona and is protected under a multi-agency Candidate Conservation Agreement (CCA). It is in the genus *Phrynosoma* within the Phrynosomatidae family, or North American spiny lizards. The FTHL is a medium-sized lizard with a wide oval-shaped body and a flattened tail. Enlarged pointed scales are scattered on both the upper body and tail. Extending from the back of the head are two elongated occipital horns (3-4 times longer than the basal horn width), and six temporal horns. Their coloring dorsally is pale gray, buff, brownish, tan, or white, matching the sand and soil and belly is white and unmarked. The FTHL is distinguishable from other horned lizards by a dark mid-dorsal strip. The fringe scales consist of round brown spots with yellow or white centers. Ants of the genera *Messor*, *Pogonomyrmex*, *Conomyrma*, and *Myrmecocystus* generally comprise the majority of their diets, as well as other beetles and arthropods opportunistically. In Arizona, the FTHL can be found in the Lower Colorado River Valley subdivision of Sonoran Desertscrub, in a creosote (*Larrea tridentata*)-white bursage (*Ambrosia dumosa*) plant association, at an elevation between 155 feet to 540 feet (AZGF 2023b). They inhabit areas dominated by sandy flats, with fine packed sand or pavement, overlain with loose, fine sand in areas that are sparse or lacking in vegetation.

Survey History

No formal surveys have been conducted within the project area to our knowledge.

Habitat Evaluation and Suitability

The project area is within the geographic and elevational range of the FTHL. Vegetation within the project area consists of predominantly Lower Colorado River Valley subdivisions of Sonoran Desertscrub, with a very sparse distribution of *Larrea tridentata* and a few individuals of *Atroplex polycarpa*. The majority of the project footprint was disturbed and consisted of flat, sandy substrate and compacted soil, and could be considered potential habitat. However, no burrows, scat, or FTHL were observed during the site assessment.

Analysis and Determination of Effects

FTHLs have a limited distribution and are susceptible to habitat destruction and fragmentation by nearby urban and agricultural expansion, military activities, energy development, and off-highway vehicle (OHV) activities within the project area. While the overall vegetation and terrain within the project area meets FTHL habitat requirements, the geographic proximity of the project area to roads, agricultural fields, border traffic, and other rural development fragments available habitat.

Direct effects: While no evidence of FTHLs was seen during the site visit, it is possible they could occur in the project area. Increased vehicle traffic within the footprint could increase human disturbance and contribute to mortality, as FTHLs are known to bask on roadways and in open areas.

Indirect effects: Removal of vegetation and soils could also further disturb habitat and increase erosion in the project vicinity.

Determination

FTHL are not listed and are not protected under the ESA, however, efforts are ongoing to protect the species and its habitat within its current range which has been impacted by urban development. It is unlikely that further development of the project area will have any effect on the FTHL during construction since no FTHLs were observed during the site assessment and the project area is already heavily disturbed. However, if FTHL are documented during construction activities the Flat-tailed Horned Lizard Interagency Coordinating Committee recommends the attached guidelines should any be encountered during the active construction phase (Appendix E).

5.2 Sonoran Desert Tortoise (Gopherus morafkai)

Life History Information

The Sonoran Desert Tortoise (SDT) was federally listed as a candidate species by the USFWS in 2010. In October 2015, after reviewing the best available scientific and commercial information, the SDT was removed from the ESA Candidate list by the USFWS. Its status as an ESA Candidate was reviewed again in August 2020, but was removed as a candidate for listing in February 2022 (notification of finding published in Federal Register on 8 February 2022; 87 FR 7077). The species is still considered a SGCN by the state of Arizona and is protected under a multi-agency Candidate Conservation Agreement (CCA). The SDT is in the genus *Gopherus* within the

Testudinidae family, or terrestrial tortoises. Sonoran Desert Tortoises may reach 8 to 15 inches in length and 4 to 6 inches in height and may weigh 8 to 15 pounds as adults (AZGFD 2023c). The carapace (domed top shell) is usually brownish or dark in color and has a defined pattern with prominent growth lines, the plastron (bottom shell) is yellowish and is not hinged (Stebbins 1985, AZGFD 2023c). Limbs are very stocky; the forelimbs are flattened for digging and covered with large conical scales. Males can be distinguished by elongate gular (throat) shields (AZGFD 2023c). Within the US, the SDT is exclusively found in Arizona and ranges from the northern Sonoran Desert limits to Mexico. Unlike the Mojave Desert Tortoise (*Gopherus agassizii*) (traditionally separated by the Colorado River) which generally occupies desert valley floors; the SDT generally prefers rocky, steep slopes and bajadas. They are most closely associated with the Arizona Upland and Lower Colorado River Valley subdivisions of Sonoran Desertscrub and Mojave Desertscrub but have also been found in semidesert grassland and interior chaparral. Sonoran Desert Tortoises require loose soil in which to excavate their burrows, often constructing them under rocks and boulders, beneath vegetation, on semi-open slopes, within the sidewalls of washes, or by using rocky crevices which may or may not be altered by the tortoise (Barrett & Johnson 1990; Averill-Murray et al. 2002). Primarily herbivores, SDTs eat a variety of fresh, residual, and dried annuals, perennials, and plant litter. Sonoran Desert Tortoises are largely inactive from mid-October to late February or early March when they overwinter in constructed burrows or rocky cavities or crevices.

Survey History

No formal surveys have been conducted within the project area to our knowledge.

Habitat Evaluation and Suitability

Vegetation within the project area consists of predominantly Lower Colorado River Valley subdivisions of Sonoran Desertscrub, with a sparse distribution of creosote and allscale saltbush. While the project area is within the geographic and elevational range of the SDT and the substrate was quite loose, the project footprint is predominately flat and lacking in significant topography, large boulders or rock outcroppings, and vegetation, and therefore would not be considered preferred habitat. No burrows or SDT sign was observed during the site assessment.

Analysis and Determination of Effects

SDTs are susceptible to habitat fragmentation and need connectivity to maintain genetic diversity. The geographic proximity of the project areas to roads, agricultural fields, and other rural development reduces connectivity. Overall vegetation and terrain within the project area do not meet SDT forage and habitat requirements.

Direct Effects: SDT may potentially use the project area as a travel corridor only, therefore, it is unlikely that this species would be observed during project activities. If contractors are trained to identify an SDT, a competent person could be delegated to relocate them should they be encountered.

Indirect Effects: No indirect effects are anticipated given the lack of preferred habitat and forage in the project area.

Determination

While the SDT is not currently listed as a Candidate species, it is recognized by the state of Arizona as a SGCN and we recommend that all contractors working on site be trained to identify SDT. We recommend that a competent person be appointed to properly handle and relocate a SDT following the guidelines set forth by the AZGFD should any be encountered during active construction. AZGFD recommends the following guidelines:

Tortoises encountered in the open should be moved out of harm's way to adjacent appropriate habitat. If an occupied burrow is determined to be in jeopardy of destruction, the tortoise should be relocated to the nearest appropriate alternate burrow or other appropriate shelter, as determined by a qualified biologist. Tortoises should be moved less than 48 hours in advance of the habitat disturbance so they do not return to the area in the interim. Tortoises should be moved quickly, kept in an upright position parallel to the ground at all times, and placed in the shade. Separate disposable gloves should be worn for each tortoise handled to avoid potential transfer of disease between tortoises. Tortoises must not be moved if the ambient air temperature exceeds 40 Celsius (105 Fahrenheit) unless an alternate burrow is available or the tortoise is in imminent danger. A tortoise may be moved up to one-half mile, but no further than necessary from its original location. If a release site or alternate burrow is unavailable within this distance, and ambient air temperature exceeds 40 Celsius (105 Fahrenheit), contact the AZGFD for guidance. Tortoises salvaged from projects which result in substantial permanent habitat loss (e.g., housing and highway projects), or those requiring removal during long-term (longer than one week) construction projects, may be placed in the AZGFD's tortoise adoption program. Managers of projects likely to affect desert tortoises should obtain a scientific collecting license from the AZGFD to facilitate handling or temporary possession of tortoises. Likewise, if large numbers of tortoises (>5) are expected to be displaced by a project, the project manager should contact the AZGFD for guidance and/or assistance. (AZGFD 2014).

5.3 Western Burrowing Owl (Athene cunicularia hypogea)

Life History Information

The Western burrowing owl (WBO) was listed as a Bird of Conservation Concern (BCC) by the USFWS in 2002 and is protected by the Migratory Bird Treaty Act (MBTA) of 1918. WBOs are in the genus *Athene* within the Strigidae family which is the true-owl family. WBOs are a small ground-dwelling owl species: 19.5 to 25.0 centimeters in height and around 150 grams in weight. They have a rounded head lacking ear tufts and an overall chocolate color with white streaking and spotting with buff bars on the wings and tail. The wings are relatively long and rounded at the tip with a short tail (Haug et al. 1993). They range from Canada south to Central America and to the eastern extent of the Great Plains in the US. Throughout most of their range in Arizona, they mainly are non-migratory, however, they are dispersed widely. In non-migratory populations, they use and maintain burrows year-round. WBOs use a variety of arid and semi-arid habitats that are well-drained and flat to gently sloped. Vegetation is typically sparse or absent from preferred areas. Habitats can be native prairies and open fields, and are at times observed in open areas such as

vacant lots near human habitation (Dechant et al. 1999). In Arizona, WBOs can be found in semidesert grasslands, plains grasslands, Great Basin Desertscrub, Lower Colorado River Valley biome of the Sonoran Desertscrub, cropland, rural, and residential areas (Brown 2001). WBOs require natural cavities or animal burrows and the absence of these will limit WBO presence (Desmond and Savidge 1996). Burrows can be located in washes, irrigation canals, near water tanks or corrals on rangelands, and in vacant or other disturbed sites in addition to more natural habitats (Brown 2001). WBOs are mostly associated with prairie dog (*Cynomys* spp.) colonies and round-tailed ground squirrel (*Xerospermophilus tereticaudus*) populations that provide burrows and keep surrounding vegetation short (deVos 1998; Brown 2001). WBOs are predominantly opportunistic feeders preying on arthropods, small mammals, birds, amphibians, and reptiles in areas near their burrows (Haug et al. 1993). WBOs in southern Arizona are thought to be year-round residents living and breeding in the same burrows over long periods of time (Brown 2001). Courtship, pair formation, and breeding occur from March through September, but can occur as early as late December in warmer regions (Huag et al. 1993). The average clutch size for WBOs is 6.5 eggs and females incubate eggs for 28 to 30 days (Huag et al. 1993). The young feather at two weeks, are able to forage on their own by four weeks, and are capable of flight by six weeks (Huag et al. 1993). The greatest threat to WBOs is habitat loss and fragmentation from agriculture and urban development. Populations can also be reduced by a loss of burrowing animal populations through control programs and disease (Haug et al. 1993). Other threats include road mortalities, domestic and feral animals, and diseases such as Trichomoniasis from doves (Latta et al. 1999).

Survey History

No formal surveys have been conducted within the project area to our knowledge.

Habitat Evaluation and Suitability

The project area contains habitat that could support WBOs, consisting of flat sandy substrate devoid of dense vegetation in which they could potentially create burrows and forage, however the project footprint and surrounding area was significantly disturbed and no burrows or WBO sign was observed during the site assessment.

Analysis and Determination of Effects

Direct Effects: It is unlikely that the project will have any direct impact on WBOs. No WBOs were observed and no suitable burrows were found within the project area, and it is unlikely that WBOs would inhabit the area since the recent site assessment.

Indirect Effects: No indirect effects are anticipated given the lack of WBO presence in the project area.

Determination

WBOs are not listed and are not protected under the ESA, however, efforts are ongoing to protect the species and its habitat within its current range, which has diminished considerably due to urban development. It is highly unlikely that development of the project area will have any effect on WBOs since no WBOs were observed during the site assessment. However, if WBO are

documented during construction activities, WBOs should not be disturbed as it may violate federal and state laws. AZGFD recommends the following guidelines:

A 35-meter (100-foot) radius buffer, excluding all heavy machinery and foot traffic, should be set up around all active burrow entrances during construction and until the appropriate conservation action is determined (B. Fox, pers. comm.). To permanently accommodate owls on site, we recommend that a buffer of 35-meter (100-foot) should remain in perpetuity between the burrows and new construction and managed to maintain breeding habitat suitability (Millsap and Bear 2000). Onsite conservation areas should be connected to adjacent burrowing owl habitat through the use of habitat connections. Conservation areas should avoid isolation or fragmentation of burrowing owl habitat. Delineating protected areas (fencing, cones, etc.) is encouraged as long as it does not enclose the owls or prevent the owls' ability to see nearby predators. If after surveys are completed and reports submitted to the AZGFD, burrowing owls or active or potentially active burrows are located within the project boundaries, the landowner is advised to contact the nearest AZGFD office for direction. Further mitigation or costs may be avoided if occupied owl areas can be set aside for at least 10 years and if suitable habitat for nesting and foraging will remain after development is finished. If it is determined that the best option is to disturb and then mitigate for the disturbance of the owls, the owner must obtain a permit from the USFWS. Mitigation may include excluding owls from disturbed burrows prior to construction and/or providing artificial burrows onsite or in a different location and monitoring to determine the success of the actions taken (AZGFD 2007).

6. MITIGATION MEASURES

This biological evaluation was completed within the project area, including the project limits, in September 2023. The following list compiles mitigation actions that we recommend as a result of potential injury to natural resources within the project area. If implemented, these recommendations should result in a "no effect" determination for the species evaluated above.

- Provide awareness training to all contracting personnel for identification of Sonoran desert tortoises, flat-tailed horned lizards, and western burrowing owls.

- Appoint a competent person or provide awareness training to all contracting personnel in approved AZGFD procedures for handling Sonoran desert tortoises and flat-tailed horned lizards, or avoiding disturbance to western burrowing owls should they be encountered.

- If possible, conduct work during the winter (i.e., avoid spring and fall) outside of the known breeding season for bird species protected under the MBTA or species recognized under the BCC.

- If work must be completed during the known breeding season of birds protected under the MBTA, seek the services of a qualified biologist to record nest sites within the project area prior to construction.

- If activities require areas to be graded, mitigate the disturbance footprint after construction is complete to prevent erosion and to rehabilitate the disturbed areas (e.g., re-seed with appropriate native herbaceous seed mix using local species of grasses and forbs).

- Take necessary precautions to avoid introduction of and prevent distribution of nonnative vegetation species that may encroach upon or compete with native vegetation (e.g., clean contracting equipment before construction activities and regularly thereafter).

7. COORDINATION

Applicable land-managing agencies and organizations were scoped for species concerns and project concurrence. These agencies include the US Fish and Wildlife Service and the Arizona Game and Fish Department.

8. LITERATURE CITED

AZGFD (Arizona Game and Fish Department). 2007. Arizona Burrowing Owl Working Group. Burrowing Owl Mitigation Standards and Guidelines. Arizona Game and Fish Department, Phoenix, AZ.

AZGFD (Arizona Game and Fish Department). 2014. Guidelines for handling Sonoran desert tortoises encountered on development projects.

AZGFD (Arizona Game and Fish Department). 2022. *Coccyzus americanus*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. 4 pp.

AZGFD (Arizona Game and Fish Department). 2023a. *Rallus obsoletus yumanensis*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. 6 pp.

AZGFD (Arizona Game and Fish Department). 2023b. *Phrynosoma mcalli*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. 1 pp.

AZGFD (Arizona Game and Fish Department). 2023c. *Gopherus morafkai*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. 4. pp.

Averill-Murray, R.C., Martin, B.E., Bailey, S.J. and Wirt, E.B. 2002. Activity and behavior of the Sonoran Desert tortoise in Arizona. The Sonoran Desert tortoise: natural history, biology, and conservation, pp.135-158.

Barrett, S.L., and T.B. Johnson. 1990. Status summary for the desert tortoise in the Sonoran Desert. Report to US Fish and Wildlife Service, Albuquerque, New Mexico.

Brown D.E. 1994. Biotic Communities: Southwestern United States and Northwestern Mexico. University of Utah Press. Salt Lake City, Utah. pp. 180-223.

Brown, N.L. 2001. The howdy owls of Arizona: a review of the status of Athene cunicularia. Journal of Raptor Research 35:344-350.

CEC (Commission for Environmental Cooperation). 2008. North American Monarch Conservation Plan. Project report prepared by the Secretariat of the Commission for Environmental Cooperation, Montreal, Quebec.

Dechant, J.A., M.L. Sondreal, D.H. Johnson, L.D. Igl, C.M. Goldade, P.A. Rabie, and B.R. Euliss. 1999. Effects of management practices on grassland birds: Burrowing Owl. Northern Prairie Wildlife Research Center, Jamestown, ND.

Desmond, M.J., and J.A. Savidge. 1996. Factors influencing Burrowing Owl (Speotyto cunicularia) nest densities and numbers in western Nebraska. American Midland Naturalist 136:143-148.

deVos, Jr., J.C. 1998. Burrowing Owl (Athene cunicularia). In: R. L. Glinski, editor. The raptors of Arizona. The University of Arizona Press. Tucson, Arizona. pp. 166-169.

Haug, E.A., B.A. Millsap, and M.S. Martell. 1993. Burrowing Owl (*Speotyto cunicularia*) *In* A. Poole and F. Gill, editors. The birds of North America, No. 61. The Academy of Natural Sciences, Philadelphia, PA; The American Ornithologists' Union, Washington, DC.

Latta, M.J., C.J. Beardmore, and T.E. Corman. 1999. Arizona Partners in Flight Bird Conservation Plan. Version 1.0. Nongame and Endangered Wildlife Program Technical Report 142. Arizona Game and Fish Department, Phoenix, AZ.

Millsap, B.A. and C. Bear. 2000. Density and reproduction of burrowing owls along an urban development gradient. Journal of Wildlife Management 64:33-41.

Stebbins, R.C. 1985. A field guide to western reptiles and amphibians. Houghton Mifflin Company, Boston, Massachusetts. 104pp.

9. ADDITIONAL INFORMATION

Field notes, photographs, etc., are located in the project files at Harris Environmental Group's corporate office in Tucson, AZ.

10. SIGNATURE PAGE

Prepared and submitted by:

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Date: December 2023

Reviewed by:

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Date: December 2023

APPENDIX A — SITE PHOTOGRAPHS

Photo 1: Site overview

Photo 2: Site overview looking SE.

Photo 3: Site overview looking NE from SW corner.

Photo 4: Site overview looking NE.

Photo 5: Site overview looking SE from the NW corner.

Photo 6: Site overview looking E from the NW corner.

Photo 7: Creosote within project footprint.

Photo 8: Creosote and allscale saltbush along W Couty 19th St.

APPENDIX B — US FISH AND WILDLIFE SERVICE: INFORMATION, PLANNING, AND CONSERVATION SYSTEM QUERY RESULTS

The USFWS's online Information, Planning, and Conservation System (IPaC) was queried on 17 August 2023 to acquire a list of endangered, threatened, proposed, and candidate species that should be considered within the biological evaluation. The IPaC produces a list of species that *may* occur within one or more delineated USGS 7.5-minute quadrangles for which the project area polygons intersected. These results were used to select species that warranted a thorough evaluation and which species could be incorporated within the exclusion table.

United States Department of the Interior

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#c3
Phoenix, AZ 85051-2517
Phone: (602) 242-0210 Fax: (602) 242-2513

In Reply Refer To: August 17, 2023
Project Code: 2023-0118531
Project Name: BOR Yuma County Waste Transfer Station

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The Fish and Wildlife Service (Service) is providing this list under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The list you have generated identifies threatened, endangered, proposed, and candidate species, and designated and proposed critical habitat, that *may* occur within the One-Range that has been delineated for the species (candidate, proposed, or listed) and it's critical habitat (designated or proposed) with which your project polygon intersects. These range delineations are based on biological metrics, and do not necessarily represent exactly where the species is located. Please refer to the species information found on ECOS to determine if suitable habitat for the species on your list occurs in your project area.

The purpose of the Act is to provide a means whereby threatened and endangered species and the habitats upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of Federal trust resources and to determine whether projects may affect federally listed species and/or designated critical habitat. A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.
If the Federal action agency determines that listed species or critical habitat *may be affected* by a federally funded, permitted or authorized activity, the agency must consult with us pursuant to 50 CFR 402. Note that a "may affect" determination includes effects that may not be adverse and that may be beneficial, insignificant, or discountable. An effect exists even if only one individual

or habitat segment may be affected. The effects analysis should include the entire action area, which often extends well outside the project boundary or "footprint." For example, projects that involve streams and river systems should consider downstream affects. If the Federal action agency determines that the action may jeopardize a *proposed* species or may adversely modify *proposed* critical habitat, the agency must enter into a section 7 conference. The agency may choose to confer with us on an action that may affect proposed species or critical habitat.

Candidate species are those for which there is sufficient information to support a proposal for listing. Although candidate species have no legal protection under the Act, we recommend that they be considered in the planning process in the event they become proposed or listed prior to project completion. More information on the regulations (50 CFR 402) and procedures for section 7 consultation, including the role of permit or license applicants, can be found in our Endangered Species Consultation Handbook at: https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf.

We also advise you to consider species protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712) and the Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. 668 *et seq.*). The MBTA prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when authorized by the Service. The Eagle Act prohibits anyone, without a permit, from taking (including disturbing) eagles, and their parts, nests, or eggs. Currently 1,026 species of birds are protected by the MBTA, including the western burrowing owl (*Athene cunicularia hypugaea*). Protected western burrowing owls can be found in urban areas and may use their nest/burrows year-round; destruction of the burrow may result in the unpermitted take of the owl or their eggs.

If a bald eagle or golden eagle nest occurs in or near the proposed project area, our office should be contacted for Technical Assistance. An evaluation must be performed to determine whether the project is likely to disturb or harm eagles. The National Bald Eagle Management Guidelines provide recommendations to minimize potential project impacts to bald eagles (see https://www.fws.gov/law/bald-and-golden-eagle-protection-act and https://www.fws.gov/program/eagle-management).

The Division of Migratory Birds (505/248-7882) administers and issues permits under the MBTA and Eagle Act, while our office can provide guidance and Technical Assistance. For more information regarding the MBTA, BGEPA, and permitting processes, please visit the following web site: https://www.fws.gov/program/migratory-bird-permit. Guidance for minimizing impacts to migratory birds for communication tower projects (e.g. cellular, digital television, radio, and emergency broadcast) can be found at https://www.fws.gov/media/recommended-best-practices-communication-tower-design-siting-construction-operation.

The U.S. Army Corps of Engineers (Corps) may regulate activities that involve streams (including some intermittent streams) and/or wetlands. We recommend that you contact the Corps to determine their interest in proposed projects in these areas. For activities within a National Wildlife Refuge, we recommend that you contact refuge staff for specific information about refuge resources, please visit this link or visit https://www.fws.gov/program/national-

wildlife-refuge-system to locate the refuge you would be working in or around.

If your action is on tribal land or has implications for off-reservation tribal interests, we encourage you to contact the tribe(s) and the Bureau of Indian Affairs (BIA) to discuss potential tribal concerns, and to invite any affected tribe and the BIA to participate in the section 7 consultation. In keeping with our tribal trust responsibility, we will notify tribes that may be affected by proposed actions when section 7 consultation is initiated. For more information, please contact our Tribal Coordinator, John Nystedt, at 928/556-2160 or John_Nystedt@fws.gov.

We also recommend you seek additional information and coordinate your project with the Arizona Game and Fish Department. Information on known species detections, special status species, and Arizona species of greatest conservation need, such as the western burrowing owl and the Sonoran desert tortoise (*Gopherus morafkai*) can be found by using their Online Environmental Review Tool, administered through the Heritage Data Management System and Project Evaluation Program (https://www.azgfd.com/wildlife-conservation/planning-for-wildlife/project-evaluation-program/).

We appreciate your concern for threatened and endangered species. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office. If we may be of further assistance, please contact our Flagstaff office at 928/556-2118 for projects in northern Arizona, our general Phoenix number 602/242-0210 for central Arizona, or 520/670-6144 for projects in southern Arizona.

Sincerely,
/s/

Heather Whitlaw
Field Supervisor
Attachment

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether

any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Arizona Ecological Services Field Office
9828 North 31st Ave
#c3
Phoenix, AZ 85051-2517
(602) 242-0210

PROJECT SUMMARY

Project Code: 2023-0118531
Project Name: BOR Yuma County Waste Transfer Station
Project Type: Disposal / Transfer
Project Description: The project area footprint covers 10.12 acres in Yuma County. The project area is administered by the BOR and will be developed for a waste transfer station. A biological evaluation is being conducted in preparation.
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@32.5518303,-114.68624505237162,14z

Counties: Yuma County, Arizona

ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

BIRDS

NAME	STATUS
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened
Yuma Ridgway's Rail *Rallus obsoletus yumanensis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3505	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO FWS MIGRATORY BIRDS OF CONCERN WITHIN THE VICINITY OF YOUR PROJECT AREA.

MIGRATORY BIRDS FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as

occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can

implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

THERE ARE NO WETLANDS WITHIN YOUR PROJECT AREA.

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: Kelsey Hollien
Address: 650 N 6th Ave
City: Tucson
State: AZ
Zip: 85705
Email khollien@heg-inc.com
Phone: 5129343084

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Bureau of Reclamation

APPENDIX C — ARIZONA GAME AND FISH DEPARTMENT: HERITAGE DATA MANAGEMENT SYSTEM QUERY RESULTS

The AGFD's Heritage Data Management System (HDMS) On-line Environmental Review Tool was queried on 22 August 2023 to acquire a list of special status species and special areas documented within three miles of the project area. The review tool also uses predicted range models to provide records for the Species of Greatest Conservation Need (SGCN) within the project vicinity. These results were used to select species that warranted a thorough evaluation, and those which could be excluded from further evaluation.

Arizona Environmental Online Review Tool Report

Arizona Game and Fish Department Mission
To conserve Arizona's diverse wildlife resources and manage for safe, compatible outdoor recreation opportunities for current and future generations.

Project Name:

Yuma County Waste Transfer Station

User Project Number:

22-161

Project Description:

The project area footprint covers 10 acres in Yuma County. The project area is administered by the BOR and will be developed by Yuma County for a waste transfer station. A biological evaluation is being conducted in preparation.

Project Type:

Waste Transfer, Treatment, and Disposal, Liquid waste/effluent, New Sewage treatment plant

Contact Person:

Kelsey Hollien

Organization:

Harris Environmental Group

On Behalf Of:

CONSULTING

Project ID:

HGIS-20125

Please review the entire report for project type and/or species recommendations for the location information entered. Please retain a copy for future reference.

Disclaimer:

1. This Environmental Review is based on the project study area that was entered. The report must be updated if the project study area, location, or the type of project changes.
2. This is a preliminary environmental screening tool. It is not a substitute for the potential knowledge gained by having a biologist conduct a field survey of the project area. This review is also not intended to replace environmental consultation (including federal consultation under the Endangered Species Act), land use permitting, or the Departments review of site-specific projects.
3. The Departments Heritage Data Management System (HDMS) data is not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there. HDMS data contains information about species occurrences that have actually been reported to the Department. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity. Such surveys may reveal previously undocumented population of species of special concern.
4. Arizona Wildlife Conservation Strategy (AWCS), specifically Species of Greatest Conservation Need (SGCN), represent potential species distribution models for the State of Arizona which are subject to ongoing change, modification and refinement. The status of a wildlife resource can change quickly, and the availability of new data will necessitate a refined assessment.

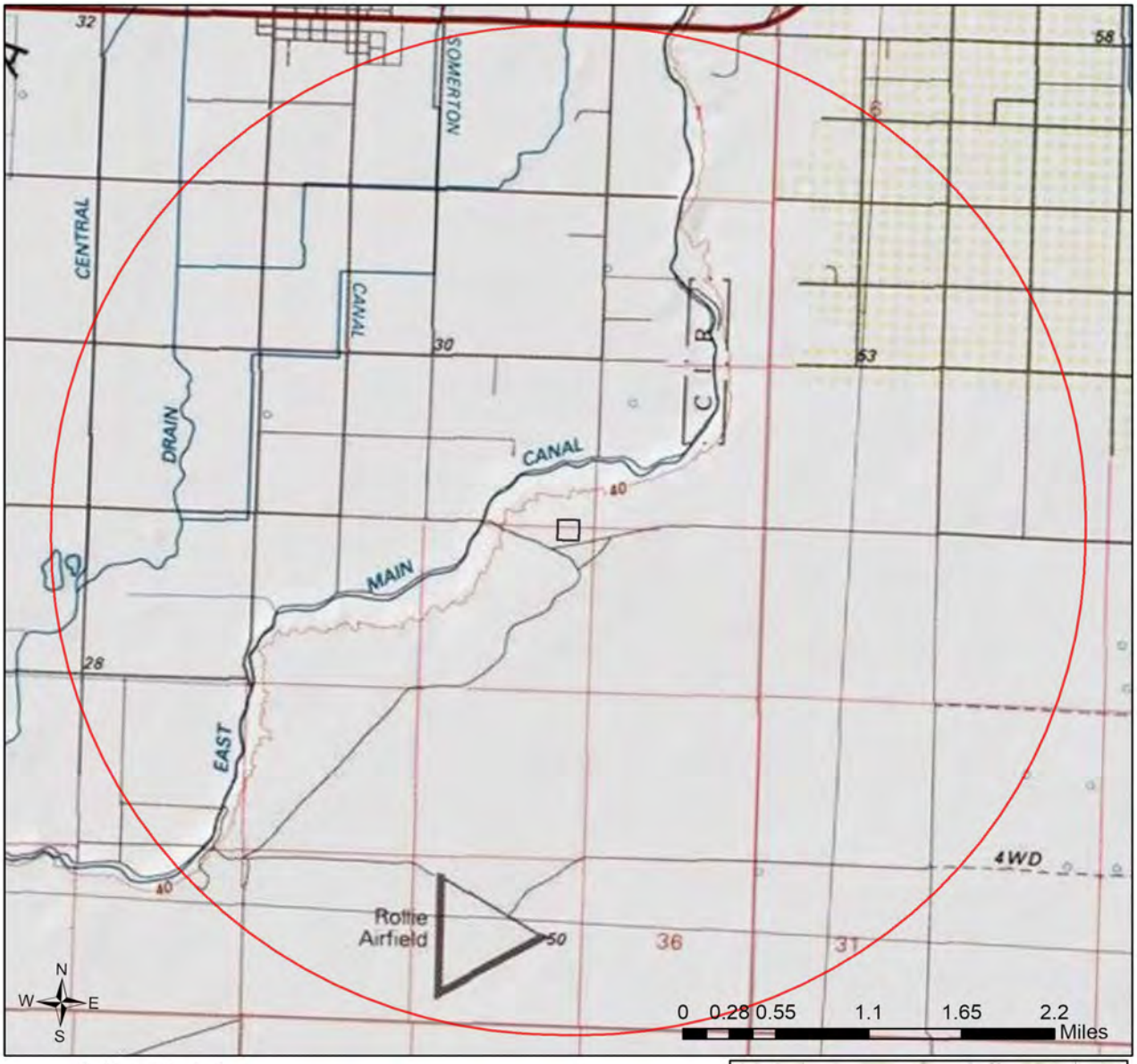
Locations Accuracy Disclaimer:
Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Report is solely responsible for the project location and thus the correctness of the Project Review Report content.

Recommendations Disclaimer:

1. The Department is interested in the conservation of all fish and wildlife resources, including those species listed in this report and those that may have not been documented within the project vicinity as well as other game and nongame wildlife.
2. Recommendations have been made by the Department, under authority of Arizona Revised Statutes Title 5 (Amusements and Sports), 17 (Game and Fish), and 28 (Transportation).
3. Potential impacts to fish and wildlife resources may be minimized or avoided by the recommendations generated from information submitted for your proposed project. These recommendations are preliminary in scope, designed to provide early considerations on all species of wildlife.
4. Making this information directly available does not substitute for the Department's review of project proposals, and should not decrease our opportunity to review and evaluate additional project information and/or new project proposals.
5. Further coordination with the Department requires the submittal of this Environmental Review Report with a cover letter and project plans or documentation that includes project narrative, acreage to be impacted, how construction or project activity(s) are to be accomplished, and project locality information (including site map). Once AGFD had received the information, please allow 30 days for completion of project reviews. Send requests to:
   Project Evaluation Program, Habitat Branch
   Arizona Game and Fish Department
   5000 West Carefree Highway
   Phoenix, Arizona 85086-5000
   Phone Number: (623) 236-7600
   Fax Number: (623) 236-7366
   Or
   PEP@azgfd.gov
6. Coordination may also be necessary under the National Environmental Policy Act (NEPA) and/or Endangered Species Act (ESA). Site specific recommendations may be proposed during further NEPA/ESA analysis or through coordination with affected agencies

Yuma County Waste Transfer Station

USA Topo Basemap With Locator Map



Buffered Project Boundary

Project Boundary

Project Size (acres): 10.10

Lat/Long (DD): 32.5518 / -114.6862

County(s): Yuma

AGFD Region(s): Yuma

Township/Range(s): T10S, R24W

USGS Quad(s): SOMERTON

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

Yuma County Waste Transfer Station

Web Map As Submitted By User

Buffered Project Boundary
Project Boundary

Project Size (acres): 10.10
Lat/Long (DD): 32.5518 / -114.6862
County(s): Yuma
AGFD Region(s): Yuma
Township/Range(s): T10S, R24W
USGS Quad(s): SOMERTON

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

Yuma County Waste Transfer Station

Important Areas

- Buffered Project Boundary
- Project Boundary
- Important Bird Areas
- Critical Habitat
- Pinal County Riparian
- Important Connectivity Zones
- Wildlife Connectivity

Project Size (acres): 10.10

Lat/Long (DD): 32.5518 / -114.6862

County(s): Yuma

AGFD Region(s): Yuma

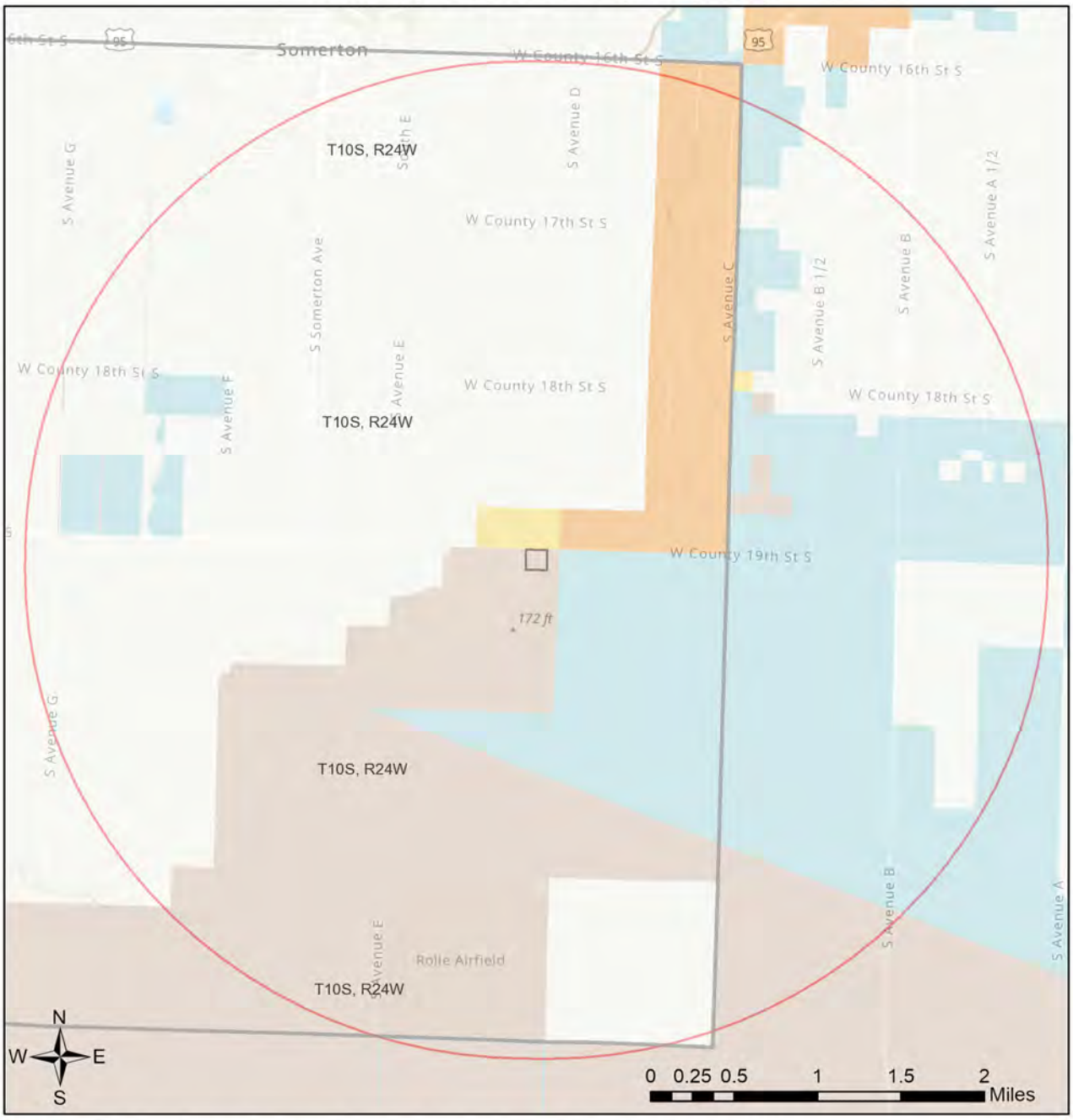
Township/Range(s): T10S, R24W

USGS Quad(s): SOMERTON

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community
Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Yuma County Waste Transfer Station

Township/Ranges and Land Ownership



- Buffered Project Boundary
- Project Boundary
- AZ Game & Fish Dept.
- BLM
- BOR
- Indian Res.
- Military
- Mixed/Other
- National Park/Mon.
- Private
- State & Regional Parks
- State Trust
- US Forest Service
- Wildlife Area/Refuge
- Township/Ranges

Project Size (acres): 10.10

Lat/Long (DD): 32.5518 / -114.6862

County(s): Yuma

AGFD Region(s): Yuma

Township/Range(s): T10S, R24W

USGS Quad(s): SOMERTON

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community
Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Special Status Species Documented within 3 Miles of Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Athene cunicularia hypugaea	Western Burrowing Owl	SC	S	S		2
Phrynosoma mcallii	Flat-tailed Horned Lizard	CCA		S		1

Note: Status code definitions can be found at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/statusdefinitions/
.

No Special Areas Detected
No special areas were detected within the project vicinity.

Species of Greatest Conservation Need Predicted that Intersect with Project Footprint as Drawn, based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Ammospermophilus harrisii	Harris' Antelope Squirrel					
Artemisiospiza nevadensis	Sagebrush Sparrow					
Buteo regalis	Ferruginous Hawk	SC		S		2
Buteo swainsoni	Swainson's Hawk					2
Calypte costae	Costa's Hummingbird					2
Chaetodipus baileyi	Bailey's Pocket Mouse					2
Charadrius montanus	Mountain Plover	SC				2
Coccyzus americanus	Yellow-billed Cuckoo (Western DPS)					
Colaptes chrysoides	Gilded Flicker			S		2
Empidonax wrightii	Gray Flycatcher					2
Falco mexicanus	Prairie Falcon					2
Falco peregrinus anatum	American Peregrine Falcon					
Falco sparverius	American Kestrel					2
Gopherus morafkai	Sonoran Desert Tortoise	CCA	S	S		1
Megascops kennicottii	Western Screech-owl					
Melanerpes uropygialis	Gila Woodpecker					2
Melozone aberti	Abert's Towhee		S			2
Nyctinomops femorosaccus	Pocketed Free-tailed Bat					2
Passerculus sandwichensis	Savannah Sparrow					2
Perognathus amplus	Arizona Pocket Mouse					2
Phrynosoma goodei	Goode's Horned Lizard					2
Phrynosoma mcallii	Flat-tailed Horned Lizard	CCA		S		1
Sigmodon hispidus eremicus	Yuma Hispid Cotton Rat	SC				2
Spizella breweri	Brewer's Sparrow					2
Tadarida brasiliensis	Brazilian Free-tailed Bat					
Toxostoma lecontei	LeConte's Thrasher			S		2

Species of Economic and Recreation Importance Predicted that Intersect with Project Footprint as Drawn

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Callipepla gambelii	Gambel's Quail					
Phasianus colchicus	Ring-necked Pheasant					
Zenaida asiatica	White-winged Dove					
Zenaida macroura	Mourning Dove					

Project Type: Waste Transfer, Treatment, and Disposal, Liquid waste/effluent, New Sewage treatment plant

Project Type Recommendations:
Consider impacts of outdoor lighting on wildlife and develop measures or alternatives that can be taken to increase human safety while minimizing potential impacts to wildlife. Conduct wildlife surveys to determine species within project area, and evaluate proposed activities based on species biology and natural history to determine if artificial lighting may disrupt behavior patterns or habitat use. Use only the minimum amount of light needed for safety. Narrow spectrum bulbs should be used as often as possible to lower the range of species affected by lighting. All lighting should be shielded, canted, or cut to ensure that light reaches only areas needing illumination.

Minimize the potential introduction or spread of exotic invasive species, including aquatic and terrestrial plants, animals, insects and pathogens. Precautions should be taken to wash and/or decontaminate all equipment utilized in the project activities before entering and leaving the site. See the Arizona Department of Agriculture website for a list of prohibited and restricted noxious weeds at https://www.invasivespeciesinfo.gov/unitedstates/az.shtml and the Arizona Native Plant Society https://aznps.com/invas for recommendations on how to control. To view a list of documented invasive species or to report invasive species in or near your project area visit iMapInvasives - a national cloud-based application for tracking and managing invasive species at https://imap.natureserve.org/imap/services/page/map.html.

- To build a list: zoom to your area of interest, use the identify/measure tool to draw a polygon around your area of interest, and select “See What’s Here” for a list of reported species. To export the list, you must have an account and be logged in. You can then use the export tool to draw a boundary and export the records in a csv file.

Minimization and mitigation of impacts to wildlife and fish species due to changes in water quality, quantity, chemistry, temperature, and alteration to flow regimes (timing, magnitude, duration, and frequency of floods) should be evaluated. Minimize impacts to springs, in-stream flow, and consider irrigation improvements to decrease water use. If dredging is a project component, consider timing of the project in order to minimize impacts to spawning fish and other aquatic species (include spawning seasons), and to reduce spread of exotic invasive species. We recommend early direct coordination with Project Evaluation Program for projects that could impact water resources, wetlands, streams, springs, and/or riparian habitats.

The Department recommends that wildlife surveys are conducted to determine if noise-sensitive species occur within the project area. Avoidance or minimization measures could include conducting project activities outside of breeding seasons.

Based on the project type entered, coordination with the Environmental Protection Agency may be required (http://www.epa.gov/).

Based on the project type entered, coordination with State Historic Preservation Office may be required (https://azstateparks.com/).

Trenches should be covered or back-filled as soon as possible. Incorporate escape ramps in ditches or fencing along the perimeter to deter small mammals and herpetofauna (snakes, lizards, tortoise) from entering ditches.

Consider incorporating project components that may allow for the inclusion to promote, enhance, create, or restore wildlife habitat. Contact Project Evaluation Program for further information and opportunities, PEP@azgfd.gov or (623) 236-7600 or https://www.azgfd.com/agency/offices/

Based on the project type entered, coordination with Arizona Department of Environmental Quality may be required (http://www.azdeq.gov/).

Based on the project type entered, coordination with U.S. Army Corps of Engineers may be required (http://www.usace.army.mil/)

Project Location and/or Species Recommendations:
HDMS records indicate that one or more **Listed, Proposed, or Candidate** species or **Critical Habitat** (Designated or Proposed) have been documented in the vicinity of your project. The Endangered Species Act (ESA) gives the US Fish and Wildlife Service (USFWS) regulatory authority over all federally listed species. Please contact USFWS Ecological Services Offices at https://www.fws.gov/office/arizona-ecological-services or:

Phoenix Main Office
9828 North 31st Avenue #C3
Phoenix, AZ 85051-2517
Phone: 602-242-0210
Fax: 602-242-2513

Tucson Sub-Office
201 N. Bonita Suite 141
Tucson, AZ 85745
Phone: 520-670-6144
Fax: 520-670-6155

Flagstaff Sub-Office
SW Forest Science Complex
2500 S. Pine Knoll Dr.
Flagstaff, AZ 86001
Phone: 928-556-2157
Fax: 928-556-2121

HDMS records indicate that **Western Burrowing Owls** have been documented within the vicinity of your project area. Please review the western burrowing owl resource page at: https://www.azgfd.com/wildlife/speciesofgreatestconservneed/burrowingowlmanagement/.

APPENDIX D – AVIAN EVALUATION: MIGRATORY BIRD TREATY ACT AND BIRDS OF CONSERVATION CONCERN

With the exception of domestic pigeons (*Columba livia*), house sparrows (*Passer domesticus*), European starlings (*Sternus vulgaris*), and Gambel's quail (*Callipepla gambelii*) all birds potentially inhabiting the project area are protected under the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. 703-712). The MBTA makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations. The Bald and Golden Eagle Protection Act of 1940 (16 U.S.C. 668-668c) also protects these two birds of prey species. In addition to the provisions of the MBTA, all federal agencies are required to consider in planning documents the effects of actions on all Birds of Conservation Concern (BCC) by Executive Order 13186. Birds of Conservation Concern include some species not protected by the MBTA.

While no formal bird surveys were conducted within the project area, birds observed during the site assessment were noted (see list below). While it is possible that certain protected birds may inhabit the project area, we do not anticipate any protected birds to be injured during construction nor do we believe critical habitat will be affected by construction activities. We recommend that the contractor provide a qualified biological monitor to either 1.) conduct a pre-project nest survey to document active nests observed within trees slated to be removed during project activities; and/or 2.) be available to relocate active nests during project activities.

Bird species observed during the site assessment of the project area include:

Mourning dove (*Zenaida macroura*)

APPENDIX E — FLAT-TAILED HORNED LIZARD RANGEWIDE MANAGEMENT STRATEGY

Flat-tailed Horned Lizard Rangewide Management Strategy

2003 Revision

An Arizona-California Conservation Strategy

Prepared and edited by the

Flat-tailed Horned Lizard Interagency Coordinating Committee

EXECUTIVE SUMMARY

The Flat-tailed Horned Lizard Rangewide Management Strategy has been prepared to provide guidance for the conservation and management of sufficient habitat to maintain extant populations of flat-tailed horned lizards (FTHLS), *Phrynosoma mcallii,* in each of five Management Areas (MAS) in perpetuity. The species is found only in southwestern Arizona, southeastern California, and adjacent portions of Sonora and Baja California Norte, Mexico.

The USFWS proposed the species for listing as a threatened species on November 29, 1993. Human activities have resulted in the conversion of roughly 49% of the historic FTHL habitat to other uses, such as agriculture and urban development. Further evaluation of populations supported by remaining habitat is necessary. While initial evidence suggested that FTHL populations had declined in the Yuha Basin and northern East Mesa (Wright 1993; USFWS 1993), Wright (2002) recently found no significant trends in lizard encounter rates in Yuha Desert, East Mesa, or West Mesa from 1979-2001. The USFWS withdrew its proposed listing on January 3, 2003, based in part on protections offered by this Rangewide Management Strategy (RMS).

The 1997 edition of the RMS established five FTHL MAS — four in California and one in Arizona. Surface disturbing activities are limited in these areas. Although land alterations in FTHL habitat outside of the MAS are not limited, mitigation and compensation measures are applied. One research area (RA) was also established to support research in an active off-highway vehicle (OHV) recreation area. Conservation areas in the Coachella Valley were also established.

A mark-recapture technique has been developed to give wide-scale population estimates, and new techniques to estimate abundance continue to be evaluated. This revised document calls for monitoring changes in distribution and habitat disturbance in addition to population monitoring. The mark-recapture methodology and other monitoring techniques are described, and data sheets are provided.

The RMS was prepared by representatives from federal, state, and local governments. It is designed to be used as the basis for a conservation agreement among the agencies. Signatory agencies will incorporate measures in the RMS into their land management plans. Compliance with the National Environmental Policy Act (NEPA) and other applicable federal and state law will be achieved through these management plans or revisions. The planned actions in the RMS are organized in a step-down format used by the USFWS in recovery plans.

PREFACE

Dr. Larry D. Foreman and members of the Flat-tailed Horned Lizard Interagency Coordinating Committee (ICC) prepared the original *Flat-tailed Horned Lizard Rangewide Management Strategy* in 1997. Kevin V. Young[1] and Ty J. Gardner coordinated the 2003 revision, under the direction of Lin Piest, Arizona Game and Fish Department (contract # QF02-040-S; funds made available by the U.S. Fish and Wildlife Service). The following members of the ICC and MOG (listed by agency) participated in writing and discussion until a consensus was reached:

Agency	ICC Member	MOG Member
Anza-Borrego State Park	Paul Jorgensen	Mark Jorgensen
Arizona Game and Fish, Yuma	Lin Piest	Larry Voyles
California Department of Fish and Game	Eddy Konno	Glenn Black
California State Parks, Ocotillo Wells	Eric Hollenbeck	Curt Itogawa
U.S. Bureau of Land Management, El Centro	Gavin Wright	Greg Thomsen
U.S. Bureau of Land Management, Palm Springs	Rachelle Huddleston-Lorton	Elena Misquez
U.S. Bureau of Land Management, Yuma	Fred Wong	Gail Acheson
U.S. Bureau of Reclamation, Yuma	Andrea Campbell	Cynthia Hoeft
U.S. Fish and Wildlife Service, Carlsbad	Sandy Vissman, Matt McDonald	Pete Sorensen
U.S. Fish and Wildlife Service, Phoenix	Mike Coffeen	Jim Rorabaugh
U.S. Marine Corps Air Station, Yuma	Bryan Morrill	Ron Pearce
U.S. Naval Air Facility, El Centro	Jim Collins	Carl David
U.S. Navy SW Division, San Diego	Trish Griffin	N/A

Cover photo: Flat-tailed horned lizard in Sonora, Mexico. Courtesy of Jim Rorabaugh.

Recommended Citation:

Flat-tailed Horned Lizard Interagency Coordinating Committee. 2003. Flat-tailed horned lizard rangewide management strategy, 2003 revision. 78 pp. plus appendices.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

The following acronyms are used in this document:

ACEC ..... Area of Critical Environmental Concern

AGFD ..... Arizona Game and Fish Department

ABDSP..... Anza-Borrego Desert State Park

BLM..... United States Bureau of Land Management

BMGR ..... Barry M. Goldwater Range

BOR ..... United States Bureau of Reclamation

BP ..... United States Border Patrol

CDFG ..... California Department of Fish and Game

CNLM..... Center for Natural Lands Management

CVMSHCP ..... Coachella Valley Multiple Species Habitat Conservation Plan and Natural Communities Conservation Plan

DOD..... United States Department of Defense

EA ..... Environmental Assessment

FTHL..... Flat-tailed horned lizard

GIS ..... Geographic Information System

ICC ..... Interagency Coordinating Committee

MA ..... Management Area

MCAS..... Marine Corps Air Station, Yuma

MOG ..... Management Oversight Group

MOU ..... Memorandum of Understanding

NAF ..... Naval Air Facility

NEPA ..... National Environmental Policy Act

OHV..... Off-highway vehicle

OWSVRA ..... Ocotillo Wells State Vehicular Recreation Area

RA ..... Research Area

ROW ..... Right of Way

SVL ..... Snout-Vent Length

USFWS ..... United States Fish and Wildlife Service

OVERVIEW

Species Description

Taxonomy

The flat-tailed horned lizard (FTHL), *Phrynosoma mcallii*, was first described by Hallowell in 1852 as *Anota mcallii* after U.S. Army Colonel George A. M'Call who collected the type specimen (Johnson and Spicer 1985). Due to the lack of external ear openings, the FTHL was initially placed in a separate genus (*Anota*) from other horned lizards (Johnson and Spicer 1985). Norris and Lowe (1951) decided that similarities of *mcallii* to other horned lizards were greater than its differences and placed it into the genus *Phrynosoma*. The FTHL is one of 14 currently recognized species of horned lizard (eight of which occur in the U.S.) (Zamudio and Parra Olea 2000). It is believed to be most closely related to the desert horned lizard, *P. platyrhinos* (Reeder and Montanucci 2001). No subspecies of FTHL have been described (Funk 1981).

Field Characters

The FTHL has the typical round, flattened body shape of horned lizards. It is distinguished from other species in its genus by its dark vertebral stripe; lack of external ear openings; long, broad and flattened tail; and comparatively long spines on the head (Funk 1981). The FTHL has two rows of fringed scales on each side of its body. The species is cryptic in color, ranging from pale gray to light rust brown dorsally, and white or cream (unspotted) ventrally with a prominent umbilical scar. The only apparent external difference between males and females is the presence of enlarged postanal scales in males, typical of Phrynosomatids. Maximum snout-vent length (SVL) for the species is 87 mm (Boundy and Balgooyen 1988), but 65-80 mm SVL is typical adult size (Young and Young 2000). Adult weight varies between 10 and 25 g. Hatchlings range from 30 to 38 mm and weigh about 1.5 g (Johnson and Spicer 1985; Young and Young 2000).

The only other horned lizard known to be sympatric with the FTHL is the desert horned lizard. The latter is distinguished from the FTHL by a combination of characters including absence of a dark vertebral stripe, an exposed tympanum, a spotted ventral surface in most individuals, a single row of fringed scales, and a narrower and less-flattened tail (Figure 1). Apparent hybrids between the two species, which exhibit a mix of morphological characteristics, have been observed near Ocotillo, California (Stebbins 2003) and on the BMGR near Yuma, AZ (Morrill, Young, pers. obs.). There has been at least one case of hybridization in captivity (Collet 2002).

Figure 1. Comparative views of adult and hatchling *Phrynosoma mcallii (left)* and *P. platyrhinos* (right).

Distribution and Habitat Status

The FTHL has the most limited distribution of any horned lizard species in the U.S. (Stebbins 2003). It is found in the extreme southwestern corner of Arizona, the southeastern corner of California, and adjoining portions of Sonora and Baja California, Mexico (Figure 2). In Arizona, the FTHL is found in southwestern Yuma County south of the Gila river and west of the Butler and Gila mountains. Estimates of historic habitat in Arizona range from 203,520 to 221,043 acres, and of current habitat from 135,900 to 176,000 acres (Johnson and Spicer 1985; Rorabaugh *et al*. 1987; Hodges 1995, 1997; Piest and Knowles 2002). Suitable habitat is found east and south of the city of Yuma outside of the Colorado and Gila River floodplains and adjoining croplands. Lands within the range of the FTHL in Arizona include federal lands administered by the Department of Defense (DOD) through Marine Corps Air Station at Yuma (MCAS-Yuma), the Bureau of Land Management (BLM), and the Bureau of Reclamation (BOR); state of Arizona lands; and private lands. The majority of the FTHL's range in Arizona is on the western Barry M. Goldwater Range (BMGR), managed by MCAS-Yuma. Records from Mexico Highway 2, just south of the International Boundary, suggest the species might be present in the area of Pinta Sands on the Cabeza Prieta National Wildlife Refuge, but searches in this area have only documented desert horned lizards (Rorabaugh 1996a, 1997).

The historical range of the FTHL in California encompasses approximately 1.8 to 2.2 million acres, primarily in Imperial County, but also in eastern San Diego County and central Riverside County (Turner *et al.* 1980; Rado 1981; Bolster and Nicol 1989; Hodges 1997). However, about 50% of the land within this range is now unsuitable, including the Salton Sea and urban and agricultural areas (Hodges 1997). Areas identified as especially important to the species in California encompass approximately 210,000 acres and are found primarily in four regions (Rado 1981; Turner *et al.* 1980). MAs were established in these areas and have been the focus of FTHL habitat conservation (see Management Areas, p. 47). The El Centro Resource Area (BLM, California Desert District) administers three of these areas: West Mesa MA, East Mesa MA, and Yuha Desert MA (the BLM and the U.S. Navy jointly manage portions of West Mesa and East Mesa). The California Department of Parks and Recreation (CDPR) manages Ocotillo Wells State Off-Highway Vehicle Area (OWSVRA) as a RA and a portion of Anza-Borrego Desert State Park (ABDSP) as the Borrego Badlands MA.

The northern margin of the species' range is in the Coachella Valley, an area where expansive agricultural and urban development has destroyed the vast majority of original FTHL habitat. The largest remaining, unfragmented habitat patch is approximately 3,900-4,200 acres in size, just 3-4% of the original habitat extent within the Coachella Valley (Barrows 2002). The Coachella Valley Multiple Species Habitat Conservation Plan and Natural Communities Conservation Plan (CVMSHCP) will protect approximately 44.5% of the remaining FTHL habitat in the valley.

Based on Figure 2, about half of the historical range of the FTHL is in Mexico, particularly in Sonora. In Baja California Norte, the range extends from the International Border west of Mexicali south to Laguna Salada. A specimen found south of Laguna Salada in 2001 (Rodriguez 2002) extended the known southern range limit in Baja by approximately 40 miles. It is unknown whether this population is connected to those to the north or is disjunctive. In Sonora, the species has been found in the sandy plains immediately south of and contiguous with habitat in Arizona, and east through the Pinacate Region to the sandy plains around Puerto Peñasco and Bahía de San Jorge (Johnson and Spicer 1985; Gonzáles-Romero and Álvarez-Cárdenas 1989; Rodríguez 2002). The FTHL is probably absent from the volcanic areas in the Pinacate Region and rare in the dune fields of the Gran Desierto (Rodríguez 2002).

Map Creation

The current and historical distribution map (Figure 2) is designed to provide graphic representation of the approximate current and historical FTHL range boundaries. This map is not based on a predictive model, with the exception of the current range in the Coachella Valley (see below), and should not be viewed as such. ArcView (ESRI 1998) shape files (.shp) for the current and historical distributions recognized in this document are on file with ICC member agencies.

The historical distribution is based on a 750-foot contour interval across the majority of the range, particularly in the U.S. and the most northern portion of Mexico. There are several departures from this contour: 1) along the eastern boundary of the Algodones dune system the boundary is based on a microphyll/desert dry wash habitat (coverage provided by BLM-El Centro) because the habitats to the east of these are not likely to have been occupied by FTHLs at any time (contra Hodges 1997); 2) the boundary on the eastern side of the Yuma desert MA was defined as the edge of the rocky substrate, estimated as a fixed distance from the western slope of the Gila Mountains, since this habitat is not occupied by FTHLs (Hodges 1995, Young and Young 2000); 3) much of the range in Sonora, Mexico is based on an ArcView coverage (obtained from

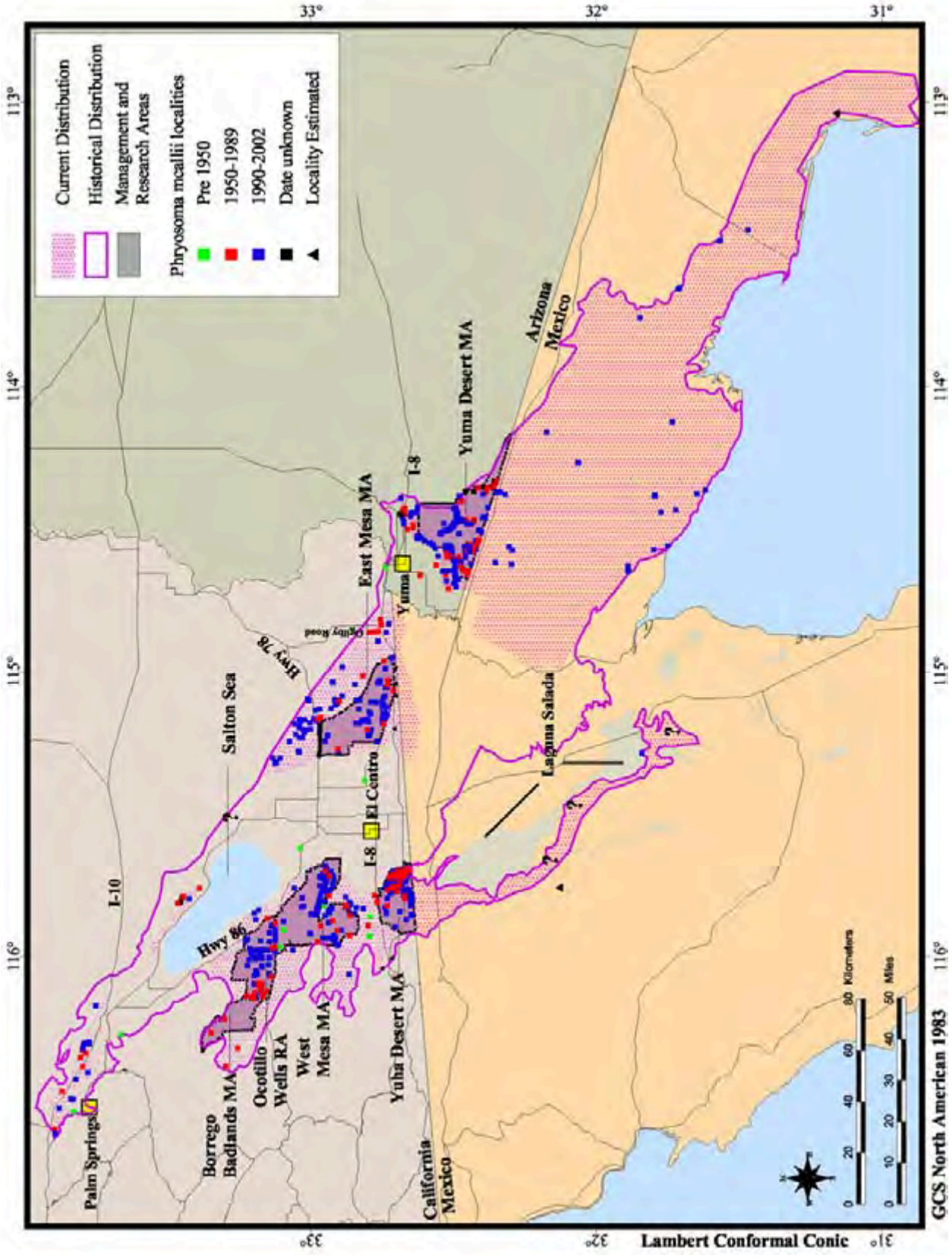
http://data.geocomm.com) that delineates the boundaries between unconsolidated substrates (included) and inundated areas (excluded), but areas outside the unconsolidated substrates were included (e.g. mudhill habitat near El Golfo) where verified locality data were available (Rodríguez 2002); and 4) the distribution around Laguna Salada is based on the range map in Foreman (1997), recent localities (Rodríguez 2002) and sightings on the eastern side where sand accumulates against the Sierra Cucapa (Grismer 2002).

The current distribution (except the Palm Springs area) is a subset of the historical range map from which habitat that has been converted to urban, agricultural, or other such permanent disturbances has been removed. Data used to remove such areas include USGS maps, ArcView coverages of city streets, and aerial photographs of the East Mesa, West Mesa, and Yuha Desert MAs and surrounding areas (provided by BLM-El Centro). Features removed include, but are not limited to: Yuma, AZ; Ocotillo, Borrego Springs, and Salton City, California; the agricultural areas of the Imperial Valley, California and the Mexicali Valley, Baja Norte; and projects recognized on aerial photos in the Yuha Desert MA, north of the Yuha Desert MA, and near the Salton Sea Test Base.

The current distribution in the Coachella Valley area (Riverside Co., California) is the October 2002 draft (provided by the Coachella Valley Association of Governments) of the predicted portion of a FTHL habitat model produced for the CVMSHCP. This model includes habitat below the 700-foot contour interval. The model was refined by looking for vegetation community and soil type associations and deleting developed areas. The model includes habitat patches that are too small to maintain viable populations (Cameron Barrows, Center for Natural Lands Management (CNLM), pers. comm.). Further information is available through the Coachella Valley Association of Governments.

Further work is necessary to solidify the current distribution of the FTHL in the U.S. and Mexico. In particular, work is needed outside the MAs to firmly delineate the boundaries on the exterior portion of the range in the U.S. Such work, in conjunction with surveys within MAs, could help produce a habitat model that may more accurately describe the historical and current FTHL range. Areas of Mexico that remain uncertain and could benefit from further surveys and/or modeling include: 1) the southeast boundary in Sonora; 2) the extent of historical range in the Mexicali valley and the current range surrounding that area (including Mesa Andrade); 3) the extent of the current and historical ranges surrounding Laguna Salada; and 4) the degree of connectivity between portions of the current and historical ranges in Sonora, the Mexicali Valley, and surrounding Laguna Salada.

Figure 2. Approximate current and historical distribution of the flat-tailed horned lizard.



Habitat Use

FTHLs occur entirely within the Lower Colorado River Valley Subdivision of Sonoran Desert Scrub (Turner and Brown 1982), the largest and most arid subdivision of the Sonoran Desert. Annual precipitation varies from 5.8 cm at El Centro, California to 13.5 cm at Palm Springs. Summer daytime temperatures range from 30 to 45^{o}C.

Most records of FTHLs come from the creosote (*Larrea tridentata*)-white bursage (*Ambrosia dumosa*) series of Sonoran Desert Scrub (Turner and Brown 1982). It is this open community in association with sandy flats and valleys that is often described as FTHL habitat (Stebbins 2003; Turner and Medica 1982; Rorabaugh *et al.* 1987). Although most records for the species are from sandy flats or areas with a veneer of fine, windblown sand, the FTHL has also been collected or observed in areas with little or no windblown sand, such as badlands in the Yuha Basin and the Borrego Valley, and on saltbush flats at the northeastern end of the Salton Sea (Turner *et al.* 1980; Wone and Beauchamp 1995a). The species has also been recorded in the mixed scrub series within the Lower Colorado River Valley Subdivision of Sonoran Desert Scrub (Turner and Brown 1982), on gravelly soils in ABDSP, and in association with senita cactus (*Lophocereus schottii*) in Sonora. FTHLs apparently occur at low densities in parts of the Algodones dune fields (Luckenbach and Bury 1983; Wright, pers. obs.) and are probably rare in the unvegetated portions of other major dune systems (Luckenbach and Bury 1983; McCalvin 1993; Rodríguez 2002; Turner *et al.* 1980).

In California, the species has been recorded in a comparatively broad range of habitats, including sandy flats and hills, badlands, salt flats, and gravelly soils. In Arizona, the species is apparently restricted to sandy and hardpan flats. This may be due to habitat availability rather than FTHL habitat preferences. In Arizona, the presence of big galleta grass (*Pleuraphis rigida*) was correlated with FTHL abundance and may be an important vegetation component of its habitat (Rorabaugh *et al.* 1987). However, big galleta grass is not present in many high-density FTHL areas in California (Turner and Medica 1982; Rorabaugh *et al.* 1987). Muth and Fisher (1992) found white bursage (*Ambrosia dumosa*) and indigo bush (*Dalea emoryi*) were correlated with FTHLs in California, presumably because of their ability to trap wind-blown sand and provide shade for thermal cover. In the badlands habitat at OWSVRA, FTHL commonly use rocks as basking sites and for cover, primarily along the ridges of the hills (Setser 2001). In the Coachella Valley, FTHLs are found in high densities in areas with saltbush (*Atriplex canescens* and *A. polycarpa*). The saltbush consistently produces seeds each fall, even in drought conditions, which may account for elevated ant populations and higher FTHL densities in this habitat (Cameron Barrows, CNLM, pers. comm.). A sampling of FTHL habitats is shown in Figure 3.

Although the desert horned lizard occurs sympatrically with the FTHL, subtle differences have been described in preferred microhabitat use by both species in close proximity. Rorabaugh *et al.* (1987) characterized desert horned lizard habitat as gently sloping alluvial terrain dominated by washes vegetated with small trees such as palo verde (*Parkinsonia microphylla*) and ironwood (*Olneya tesota*). FTHL habitat in the near proximity was described as consisting of finer sand, more level and unbroken terrain, and sparser creosotebush-bursage vegetation than the habitat of the desert horned lizard (Hodges 1995; Young and Young 2000).

Figure 3. Typical flat-tailed horned lizard habitat from various parts of its range.

a) Yuma Desert MA

b) Coachella Valley Preserve

c) East Mesa MA

d) Ocotillo Wells RA

Food Habits

Ants constituted 97% of the prey items in FTHL stomachs examined by Pianka and Parker (1975) and scats examined by Turner and Medica (1982). The percentage of ants in their diet is greater than other horned lizards (Pianka and Parker 1975). Harvester ants (in the genera *Messor* and *Pogonomyrmex*) are far more important in the diet than smaller ant species (Turner and Medica 1982), and *Pogonomyrmex* are twice as common as *Messor* in the scats of FTHL on the Yuma Desert MA, AZ (Young and Young 2000). Studies in California (Turner and Medica 1982) and Arizona (Turner and Medica 1982; Rorabaugh *et al.* 1987) showed positive correlations between FTHL scat abundance and number of harvester ant nests.

While FTHLs feed almost exclusively on ants from day to day, occasional outbreaks of other insects may provide important feeding opportunities. For example, Mark Fisher (Boyd Deep Canyon Desert Research Center, pers. comm.) observed FTHLs gorging on sphinx moth larvae. Young (unpubl. data) examined the stomach of one road-killed FTHL and found it full of small beetles, which at the time were very abundant. Piest (pers. obs.) observed several instances in one morning where FTHLs were feeding at termite casings. While such feeding opportunities are short-lived, they may allow for quick building of fat reserves.

Like other carnivorous desert lizards, FTHLs primarily use preformed water (water found in their food) to maintain proper water balance (Schmidt-Nielsen 1964). Freestanding water is not usually available in FTHL habitat. Dew, which is used as a water source by lizards in other climates, is uncommon in southwestern deserts. It normally occurs at cool temperatures and evaporates before lizards become active enough to use it (Schmidt-Nielsen 1964). The use of free water by FTHLs is debatable. Mayhew (1968) states that FTHLs have never been seen drinking water in the wild or in captivity. However, Johnson and Spicer (1985) and Young (pers. obs.) witnessed captive FTHLs drinking water that was sprayed on their heads.

Reproduction

Flat-tailed horned lizards are oviparous (egg-laying) and early maturing, and they can produce multiple clutches (Howard 1974). Under favorable conditions, two cohorts of hatchlings may be produced in late July and in September (Muth and Fisher 1992), but in dry conditions only the late season clutch may be produced (Young and Young 2000). Hatchlings from the first cohort in July may reach sexual maturity after their first winter season, whereas hatchlings born later may require an additional growing season to mature (Howard 1974).

Compared to most other horned lizards, FTHLs produce relatively small clutches, ranging from 3 to 7 eggs with a mean clutch size of about 5 (Howard 1974; Pianka and Parker 1975). Howard (1974) developed a productivity index as a product of the number of egg clutches per year and the average number of eggs per clutch. The FTHL productivity ranked the lowest among the horned lizards studied, followed by the desert horned lizard. Howard (1974) suspected that very high temperatures and high aridity experienced by both species resulted in their lower reproductive potential. High aridity may also pose problems for nest construction. In 2000, two nest sites were found at OWSVRA, at depths of 14 cm and 26 cm, both times a few centimeters deeper than the point at which the substrate became visibly moist (Setser 2001). Two nest sites were also found on the Yuma Desert MA in drier weather conditions. One was at a depth of 90 cm and the other was at a depth of 80 cm. Again, the nest sites were a few centimeters below the level at which the sand became visibly moist (Young and Young 2000). An even sex ratio was documented in populations in California (Turner and Medica 1982; Muth and Fisher 1992).

Behavior

Unlike other iguanid lizards, which often flee when approached, FTHLs generally remain still (Wone and Beauchamp 1995a), or may bury themselves in loose sand (Norris 1949; Young and Young 2000). This reluctance to move when disturbed, together with cryptic coloration and flattening of the body, makes them very difficult to locate in the field and very susceptible to road mortality.

FTHLs studied by Muth and Fisher (1992) spent 54% of the day in some form of movement. Most activity occurred throughout the mid-day in spring and fall. As summer temperatures increase, FTHLs shift to two activity periods, morning and evening (Mayhew 1968).

During the active season, FTHLs most often spend the night exposed on the surface, but occasionally shuffle under the sand or enter a burrow (Klauber 1939; Smith 1946; Muth and Fisher 1992; Young and Young 2000). When daytime surface temperatures approach 120°F (50°C), individuals retreat into burrows, at least some of which are of their own making (Rorabaugh 1994), but do not exhibit summer dormancy, even during drought conditions (Young and Young 2000). In Arizona, these daytime burrows were found to be straight, 70-80 cm long, and 25-30 cm deep (Young and Young 2000). The availability of burrows, or soils friable enough for burrow construction, may be a necessary habitat component for FTHLs (Muth and Fisher 1992; Rorabaugh 1994).

Muth and Fisher (1992) reported winter dormancy for FTHLs from mid-November until mid-February, but Setser (2001) noted some animals becoming dormant in mid-October. Mayhew (1965) found the majority of adult FTHLs hibernated in burrows they had dug within 5 cm of the surface. All winter-dormant FTHLs found by Muth and Fisher (1992) were within 10 cm of the surface. According to Mayhew (1968), adult FTHLs are obligatory hibernators. He suspected that reduced food availability, as well as decreasing photoperiod and lower metabolic rate resulting from reduced temperature, is the hibernation triggering mechanism (Mayhew 1965). In his study of FTHL in the lab, adults ceased eating in the fall regardless of temperature and starved when prevented from hibernating. However, horned lizards are notoriously difficult to keep in captivity, and the starvation may have been unrelated to the need to hibernate. Hollenbeck (pers. obs.) has observed some adult FTHLs at OWSVRA active for several weeks at a time during the winter. Sherbrooke (1987) successfully raised regal horned lizards (*Phrynosoma solare*) without hibernation.

Juveniles have often been found to show winter activity in California (Muth and Fisher 1992; Cameron Barrows, CNLM, pers. comm.). Whereas adults may be able to make metabolic adjustments for hibernation, juveniles may have to remain active so their fat reserves can be supplemented throughout winter (Muth and Fisher 1992). The smaller body size of the juveniles would allow them to reach a preferred body temperature on warm winter days quicker than the larger adults (Schmidt-Nielsen 1964), and winter activity may allow juveniles to reach reproductive maturity at an earlier age (Howard 1974; Smith and Ballinger 1994).

FTHLs have unusually large home ranges for lizards their size. Allometric equations based on lizard mass would predict FTHL home ranges to be less than 0.5 acres. But at Muth and Fisher's West Mesa study site, the mean home range size for all FTHLs with more than 18 recaptures was 6.7 acres. (Muth and Fisher 1992). At a site in the Yuha Desert, Turner and Medica (1982) estimated home ranges of 0.32 and 0.12 acres for male and female FTHLs, respectively. However, the small size of the Yuha Desert study plot (10.1 acres) combined with relatively few recaptures and a relatively short study period likely resulted in an underestimate of home range size. On the

Yuma Desert MA, among 14 FTHLs that were each relocated at least 45 times over the course of the summer, the mean home range of male FTHLs was 8.8 acres. Females had a significantly smaller mean home range of 4.37 acres (Miller 1999). However, using only 10-15 locations of 45 FTHLs over 15-day time periods changed the mean home range estimate to only 0.84 acres (Miller 1999). This suggests that FTHLs in that population may not maintain distinct home ranges, but instead shift their area of use through time, thereby increasing the home range estimate with each additional location. Great variation in home range size was noted among individuals and between years (Miller 1999; Young and Young 2000). Young and Young (2000) found that in the Yuma Desert MA, FTHL home range size decreased in females during a wet year, presumably because they did not have to forage as widely to meet energetic demands. Conversely, males increased their movements in the wet year, presumably because the abundant resources allowed them to increase mate-seeking behavior. At OWSVRA, home ranges appear more stable than in the Yuma Desert MA (Setser 2001).

Population Dynamics

No definitive data exist on population dynamics. However, information from scat surveys (Rorabaugh 1994; Wright 2002) and life history studies (Muth and Fisher 1992; Young and Young 2000) suggest that densities fluctuate greatly between years and that these fluctuations may be associated with winter/spring precipitation and production of annual plants in the spring. This pattern is true for other desert lizards (see Mayhew 1967; Hoddenbach and Turner 1968; Parker and Pianka 1975). Because scat size and scat production are greatly affected by climatic conditions, scat counts may exaggerate true population dynamics (Young and Young 2000).

FTHL populations may fluctuate in response to prey availability. Harvester ant population sizes and activity fluctuate with the availability of seeds, which are correlated with the amount and timing of precipitation (Beatley 1967; Brown *et al.* 1979). Harvester ants rely on seed storage during periods of climatic stress, thus decreasing their availability as a food source for FTHLs during periods of low precipitation (Brown *et al.* 1979). In the Yuma Desert MA, it is uncommon for individual FTHLs to live more than four years, but a lifespan of at least six years has been recorded (Young, unpublished data). Mortality due to predation varies greatly from year to year (Young and Young 2000). Predation rates may also vary between habitat types, with higher yearly survivorship noted at OWSVRA than in the Yuma Desert MA (Setser 2001).

Population Viability Analysis

A FTHL Conservation Team conducted population viability analyses with the simulation models RAMAS and VORTEX (Fisher *et al.* 1998). The Team's work clarified research needs and provided some insight into the mechanisms of FTHL population dynamics. Population variables such as age-specific survivorship, fecundity, and population size; sex ratios; age at first reproduction; density dependence; stochasticity; and other variables were used in the analysis to generate information about population viability, especially extinction risk for specified time intervals.

Ideally, these analyses would define an initial population size and reserve size needed to support a viable population for a specified time interval, such as 100 or 500 years. Unfortunately, population demographics and stochasticity in possible reserves (MAs) are not adequately understood to provide this information. Generally for vertebrates, populations above 5,000 individuals are considered viable (Meffe and Carroll 1994). The goal of estimating minimum viable populations is not to maintain the *minimum* number, but to maintain populations well above that size. Each of the MAs is believed to contain viable FTHL populations.

The simulation models suggested that FTHL population viability is particularly sensitive to changes in mortality rates versus other factors. This likely explains the absence of FTHL near agricultural areas where the habitat appears good but there are increased predator densities (Young pers. obs.). Other important variables are fecundity and the effects of environmental stochasticity, such as drought and years with above average precipitation. Management practices intended to benefit FTHL have little effect on fecundity and precipitation. However, by reducing activities that result in mortality, directly or indirectly, management within reserves could increase the viability of FTHL populations. Thus, the population viability analyses suggest that actions that limit sources of mortality, versus other factors, will especially increase the chances that populations will persist into the future. Results also highlighted the need for accurate estimates of population variables, particularly age-specific clutch size and numbers of clutches produced per female annually; mortality rates, particularly for juvenile lizards; population density; and how population parameters vary over time and with precipitation or annual plant production. Better estimates of population variables would greatly enhance the value of population viability analyses in guiding the management of this species.

Threats

A variety of anthropogenic activities have altered or destroyed the landscape and native vegetation throughout much of the Sonoran Desert (Lovich and Bainbridge 1999). From the estimated historical range in the U.S. (Figure 2), the FTHL has lost approximately 49% of its original habitat (Hodges 1997). The Salton Basin had been subjected to frequent inundation from the Colorado River even prior to the accidental flooding from 1905 through 1907, and it is questionable whether this area can be considered historic habitat. If the 235,520 acres currently occupied by the Salton Sea are not considered historic habitat, the amount of habitat lost is approximately 43%. Rado (1981) estimated that about 315,000 acres of habitat in California had been lost to agricultural development and 83,000 additional acres for urban development (398,000 total acres lost). Hodges (1997) had much higher estimates, with 877,000 total acres lost to agricultural and urban development. She also noted that 24,000 acres in Arizona had been converted to agriculture and urban use. Additional unknown acreage has been degraded due to utility lines, geothermal development, sand and gravel mining, OHV use, waste disposal sites, military activities, U.S. Border Patrol (BP) activities, and roads. While initial evidence suggested that FTHL populations had declined in the Yuha Basin and northern East Mesa (Wright 1993; USFWS 1993), Wright (2002) recently found no significant trends in lizard encounter rates in Yuha Desert, East Mesa, or West Mesa from 1979-2001. Further evaluation of the status of these populations is necessary.

In Sonora, less than 20% of the habitat has been converted to agricultural, urban, or other uses. In Baja California Norte, considerable habitat loss has occurred in the Mexicali Valley where urban and agricultural development extends from Mexicali to the Colorado River (Johnson and Spicer 1985).

Several aspects of FTHL ecology and behavior contribute to the species' sensitivity to habitat loss and degradation. Among these are the following: 1) the FTHL is distributed over a relatively small area (Figure 2); 2) relatively low clutch size may limit the ability of FTHL populations to recover from declines; 3) the large home range of the FTHL means that surface-disturbing activities may affect populations for relatively great distances from project sites; 4) FTHLs often freeze in response to danger, which makes them susceptible to mortality on roads and in other areas of activity; 5) FTHLs are found in valleys and flats where the majority of residential and agricultural development typically occurs; 6) FTHLs are susceptible to a variety of predators, many of which

occur at elevated levels near agriculture or urban areas; and 7) FTHLs inhabit the most arid portions of the Sonoran Desert, in which drought is likely an important factor in population dynamics.

Agricultural Development

Conversion to agriculture eliminates FTHL habitat. Agricultural development has occurred primarily in the Imperial, Coachella, Mexicali, Borrego, and Colorado River valleys and on Yuma Mesa. Portions of the Colorado and Imperial valleys were converted entirely to agriculture many decades ago. Limited new agricultural development is continuing northward in the Imperial Valley along the edges of the Salton Sea and on Yuma Mesa. Similarly, in the Coachella Valley, development of new lands for agriculture is continuing, especially around Indio and southward adjacent to the Salton Sea. The rate of new development is relatively slow due to limitations on irrigation water.

Densities of some predators are elevated at or near agricultural lands. Relatively high densities of predators (e.g., round-tailed ground squirrel, common raven, greater roadrunner, American kestrel, burrowing owl, and loggerhead shrike) appear to result in elevated predation on FTHLs in adjacent undeveloped lands (Piest, Wong, Young, pers. obs.).

Urbanization

Urban development results in a direct loss of habitat and habitat degradation resulting from a variety of human activities. Southeastern California and southwestern Arizona are experiencing dramatic growth in human population. Most of the new urban development is occurring on agricultural lands in the Imperial, Coachella, and Colorado River valleys. However, some urban development is occurring in FTHL habitat in the Coachella Valley and Borrego Valley, California, and on the Yuma Mesa near Yuma and San Luis, Arizona. Growth is also occurring in San Luis, Sonora, including development of an 8,000-acre industrial park in FTHL habitat on the eastern end of the city. Direct impacts on FTHL habitat come from activities such as construction of commercial and residential buildings, landscaping for yards, parks, and golf courses, and road construction. Indirect effects of urbanization on adjacent FTHL habitat include route proliferation, increased OHV use, spread of non-native vegetation, and trash accumulation. Predators, such as common ravens, American kestrels, and domestic dogs and cats, also increase in urban areas, resulting in increased predation rates on FTHLs in adjacent wildlands (Bolster and Nicol 1989; Cameron Barrows, CNLM, pers. comm.).

Off-highway Vehicle Use

Over the past 20 years, there have been numerous bibliographies (e.g., Webb and Wilshire 1983) and literature reviews (e.g., Berry 1996) on the effects of OHV activity. In 1983, Webb and Wilshire (1983) published a comprehensive analysis on the impacts and management of OHVs in arid regions.

Legal OHV use falls into four basic kinds: 1) use of existing routes and trails for access and touring; 2) use of existing routes and trails by motorcycles, four-wheel drive vehicles, and all-terrain cycles as a recreational activity; 3) use of existing routes and trails for competitive vehicle events; and 4) cross-country travel in OHV "open areas."

Illegal OHV activity occurs in some areas but is limited by law enforcement, signing, and public information and education. The BP conducts patrols and rescues near the International Border that sometimes involve cross-country travel. BP OHV activity in FTHL habitat has greatly increased

from 1997 to 2002 (Rorabaugh pers. comm.), but new BP practices, such as reliance on remote cameras, may reduce the amount of OHV traffic in the future (Wright 2002).

Currently, California BLM permits competitive events in the Superstition Mountains Open Area and the Plaster City Open Area on the western side of the FTHL's range. In addition, cross-country travel (or "free-play") is allowed in the BLM's Plaster City Open Area, the BLM's Superstition Hills Open Area, and the OWSVRA. Portions of these open areas support FTHL populations of various densities. However, FTHL encounter rates in BLM open areas have historically been only ¼ of those in the adjacent limited areas, suggesting an OHV related effect (Wright 2002).

The nature and extent of impacts of OHV use depends upon the kind of activity (Webb and Wilshire 1978; Adams *et al.* 1982). Most desert soils are susceptible to compaction from vehicles. Important factors determining the intensity of compaction are soil moisture, vehicle type, and amount of vehicle activity (Davidson and Fox 1974; Webb *et al.* 1978; Adams and Endo 1980). Compaction results in increased water and wind erosion and decreased water infiltration and retention. Important factors in erosion of desert soils are slope, soil particle size, and size of disturbed area (Adams and Endo 1980). Compaction of soils may negatively affect burrowing of FTHLs or the construction of ant nests. Changes in soil characteristics may affect the ability of the soil to support vegetation, resulting in decreased density, diversity, and biomass of plant cover (Davidson and Fox 1974; Webb *et al.* 1978).

OHVs may impact vegetation by physically damaging roots, stems, or whole plants (Hall 1980). The resulting decrease in biomass and/or change in species diversity may result in a reduced or degraded food base for ant prey species. In addition, decreases in plant cover will decrease protection from predators, shelter from solar heating and wind, and may affect sand accumulation and retention.

The current state of knowledge of the impacts of OHV use on the FTHL is both incomplete and inconclusive. The results of work performed by Utah State University (Setser 2001) at the OWSVRA suggest that FTHLs are found less often in areas disturbed by OHVs than in areas that were randomly selected. However, FTHLs were found within 10 m of an impact area at a frequency similar to that of random locations, suggesting that vehicle impacts may be localized. Wright (2002) and Rorabaugh *et al.* (2002) found FTHLs persisting in areas of MAs that had the greatest levels of OHV disturbance observed in California and Arizona. Wright (2002) found no consistent relationship between vehicle impacts and flat-tailed horned lizard detection rates, but Wright and Grant (2002) noted that plots with less than 9% vehicle track coverage (n = 6) had 3.5 times more lizards than plots with greater than 9% track coverage (n= 6, p = 0.05). Substrate differences between plots was a confounding variable. These results must be interpreted cautiously since no well-controlled study has been conducted to determine effects of OHVs on FTHLs. The OWSVRA continues to support research addressing the impacts of OHV use on the FTHL.

In addition to the indirect effects noted above, FTHLs could be killed directly by being run over, either above ground or in burrows. FTHL winter burrows are shallow (average depth of 5.6 cm, range 2.6-10.0, n=6; Muth and Fisher 1992); thus, vehicles may crush burrows and lizards in burrows. Bury *et al.* (1977) found reduced biomass, density, and diversity of reptiles in heavily used areas of OHV open areas.

It has been shown that prolonged noise can adversely affect some lizards (e.g., desert iguana, Mojave fringe-toed lizard) (Bondello 1976; Brattstrom and Bondello 1983). However, it is not known whether or not vehicle noise at levels and durations anticipated in the desert negatively

impact FTHLs. Effects are more likely where prolonged, loud noise occurs. A bibliography of literature on the effects of noise on animals can by found in Brattstrom (1978).

Off-road activity has increased dramatically over the last decade in the Yuma Desert, Yuha Desert, and West Mesa MAs (Wright 1993; Rorabaugh, pers. obs.). In the Yuha and southern half of the West Mesa MAs in 2001, 10.5 and 6%, respectively, of the surface area was covered by vehicle tracks (Wright 2002), which was a significant increase over 1994. Wright could not determine how much of this increase came from BP, smugglers, or recreationalists. Routes in the southern part of the East Mesa MA decreased by 45% from 1994 – 2001. In the Yuma Desert MA, off-road vehicle tracks covered 2.9% of the ground surface in the BMGR portion, and 3.4% of the surface in the 5-Mile Zone portion of the MA (Rorabaugh *et al*. 2002). The authors suspected that much of the off-road traffic was attributable to BP.

Highways, Canals, Railroads

Mobile species are commonly killed by vehicle traffic along well-traveled roads. Road mortality can significantly decrease amphibian and reptile densities along roads (Nicholson 1978a, b; Rosen and Lowe 1994; Carr and Fahrig 2001). Grant *et al.* (2001) found 87% fewer FTHLs within 0.45 mile of Highway 98 in Imperial County, California, as compared to areas farther from the road. Young and Young (2000) suggested FTHL populations would be affected within 0.3 mile of a road, with severe impacts within 0.15 mile. Such mortality could depress local populations and function as a partial barrier to movement. FTHLs are less likely to be run over on railroads, but the tracks may create a significant barrier to movements. Numerous roads and highways bisect remaining FTHL habitat. Within the Coachella Valley, I-10, a busy freeway, separates remaining populations, and smaller well-traveled roads fragment remaining habitat to the north and south of I-10. Further south in California, State Routes 86, 78, and 98, and Interstate 8 divide habitat areas. It is possible that some FTHL movement occurs across these roads, but they likely function as effective barriers to most FTHL movement. Numerous smaller roads exist throughout California that are likely to depress local populations but may allow more movement between populations than these major highways.

The Arizona Department of Transportation is developing a proposal to construct the Area Service Highway linking the Araby Road Exit on Interstate 8 and the planned commercial port of entry just east of San Luis, Arizona. The proposed route would pass through approximately 10 miles of previously undisturbed FTHL habitat and would upgrade and pave approximately 5 miles of an existing dirt road. The new commercial port of entry may facilitate urban and industrial development, which could cause further loss of habitat on both sides of the international border.

Canals probably function as nearly absolute barriers, with FTHLs able to cross only at bridges and siphons. Some may drown in large canals as well as small agricultural drains, but the significance is unknown. Barriers to movement can create small, local populations which are susceptible to stochastic events and extinction, and which cannot be recolonized from adjacent populations (Wilcox and Murphy 1985). For example, the Andrade Mesa, a small strip of FTHL habitat in California north of croplands in Mexico and south of the All-American Canal, is effectively isolated. Highways, canals, and railroads may also facilitate urban and agricultural development, which results in further loss, degradation, and fragmentation of habitat. Within California, the Coachella Canal and the All-American Canal bisect FTHL habitat and separate populations. This likely isolates the population to the east of the Coachella Canal (including

animals found in the Algodones Dunes and to the east of the dunes) from the East Mesa population.

The BOR and cooperating water districts have proposed construction of a new, concrete-lined All-American Canal adjacent to the existing unlined canal, from 1 mile west of Pilot Knob to Drop 3 of the Canal in southeastern Imperial County, California (BOR and Imperial Irrigation District 1990). Construction would destroy a linear strip of desert scrub and dune habitat approximately 400 to 600 feet in width and 23 miles in length. Approximately 725 acres of FTHL habitat would be lost (Bransfield and Rorabaugh 1993). The project currently is postponed, but is likely to occur as water needs escalate in southern California.

Military Activities

The FTHL inhabits two military installations, Naval Air Facility (NAF) near El Centro, and the western BMGR administered by MCAS-Yuma. The FTHL also occurs at the former Salton Sea Test Base. MCAS-Yuma manages 114,800 acres within the Yuma Desert MA, and NAF-El Centro manages 29,800 acres within the West Mesa MA and 8,500 acres in the East Mesa MA.

At NAF-El Centro, Range 2510 intersects the West Mesa MA and Range 2512 intersects the East Mesa MA. The training ranges are used for aircraft familiarization, air-to-air refueling, tactical air control, inert (non-exploding) bombing, inert rocket/small arms firing, air combat maneuvering, air intercept, survey flights, search and rescue flights, and air defense exercises (NAF-El Centro 2001). Three target areas within FTHL habitat are used for high, intermediate, and low altitude inert bombing and inert rocket-firing exercises, and for special weapons and conventional delivery of inert ordnance. Each target has an impact radius of up to 1,500 feet. Other activities include target maintenance, clean up of target sites, road maintenance, mobile target activity, and target and run-in-line grading. Most activity is confined to previously disturbed areas such as existing roadways and designated staging areas, so very little off-road activity is required. However, unauthorized public OHV recreation occurs in these areas.

At the BMGR, the Yuma Desert MA intersects Range 2301W which includes two targets in FTHL habitat. The targets have an impact radius of up to 1,500 feet, and are used for inert air-to-ground rockets, bombs, and strafing. Other activities within FTHL habitat include the use of precision air-to-ground lasers, explosive ordnance disposal, rifle and pistol training, and tactical landing at Auxiliary Airfield 2. Other activities include target maintenance, clean up of target sites, and road maintenance. Most activity is confined to existing roadways and designated staging areas, so very little off-road activity occurs. The BMGR and Yuma Desert MA are immediately adjacent to the Mexican border, so undocumented alien traffic and BP off-road vehicle activity are common in the area. The BMGR portion of the Yuma Desert MA is closed to the public and patrolled by MCAS.

Most military activities result in small amounts of direct habitat disturbance, or occur in previously disturbed habitat, so effects on FTHLs and their habitat are likely to be small except where activities are concentrated. Some incendiary devices could start wildfires (see discussion of Fire as a threat on p. 19), although the Integrated Natural Resource Management Plans include measures for fire suppression. Explosion of ordnance and aircraft noise could potentially cause hearing loss in lizards at or near the noise sources (Brattstrom and Bondello 1983).

Utilities

Harm and harassment of FTHLs as well as direct habitat disturbance may result from installation and maintenance of utilities such as transmission lines, pipelines, and fiber optic cable lines. Habitat disturbance from transmission lines results primarily from installation of towers, construction and use of access routes to the tower sites, use of the tower site, use of line-pulling sites, and maintenance activities. Total direct disturbance is relatively small, usually less than 8 acres per mile. Vasek *et al.* (1975a) found in the Mojave Desert that the overall, long-term effects are a permanently devegetated maintenance road, enhanced vegetation along the road edge and between tower sites, and reduced vegetation cover under the towers, which recovered significantly but not completely in about 33 years. If crushing, rather than blading, is required, time to recovery of spur routes, tower sites, and pulling sites can be reduced. Although new access routes are usually required, sometimes transmission lines are placed along existing maintenance roads. An indirect but potentially large impact is that loggerhead shrikes and other avian predators can use the transmission lines and towers to more effectively prey upon FTHLs (Young and Young 2002).

Direct habitat disturbance from pipelines results from trenching, stockpiling of fill, refilling the trench, and moving vehicles along the corridor during construction and inspections. Total disturbance is also relatively small but greater than transmission lines (i.e., usually less than 16 acres per mile). Natural habitat restoration in the construction zone requires many decades and perhaps centuries (Vasek *et al*. 1975b).

Direct habitat disturbance from burying fiber-optic cable results primarily from the crushing of vegetation where the tracked vehicle lays the cable. The disturbed area is usually narrow (< 4 m), resulting in a small disturbance overall (usually less than 1.5 acres per mile).

Pipelines, transmission lines, or fiber-optic cables are not likely to function as barriers to movements. However, roads constructed to build or maintain these utilities may cause a proliferation of new access roads into previously undisturbed areas, resulting in off-site habitat disturbance.

Predation

Round-tailed ground squirrels (*Spermophilus tereticaudus*) appear to be the chief predator of FTHLs. They were responsible for 50% of known mortalities of transmittered FTHL on West Mesa MA in 1990-1992 (Muth and Fisher 1992), and they killed 30% of all transmittered FTHLs in 1996 and 10% of transmittered FTHLs in 1998 in the Yuma Desert MA (Young and Young 2000). However, at OWSVRA ground squirrels were uncommon and did not prey upon transmittered FTHLs (Setser 2001). Loggerhead shrikes are also important predators of FTHL (Duncan *et al.* 1994; Muth and Fisher 1992; Young and Young 2000). Other documented predators include American kestrel (*Falco sparverius*) (Duncan *et al.* 1994; Cameron Barrows, CNLM, pers. comm.), common raven (*Corvus corax*) (Duncan *et al.* 1994), burrowing owl (*Athene cunicularia*) (Duncan *et al.* 1994), sidewinder (*Crotalus cerastes*) (Funk 1965; Muth and Fisher 1992), coachwhip (*Masticophis flagellum*) (Young and Young 2000), kit fox (*Vulpes macrotis*) (Duncan *et al.* 1994; Muth and Fisher 1992; Young and Young 2000), and leopard lizard (*Gambelia wislizenii*) (Carlson and Mayhew 1988; Young 1999). Other likely predators of FTHLs include the greater roadrunner (*Geococcyx californianus*), thrashers (*Toxostoma* spp.), patch-nosed snakes (*Salvadora hexalepis*), glossy snakes (*Arizona elegans*) (Muth and Fisher 1992), and large scorpions (*Hadrurus arizonensis*) (Turner and Rorabaugh 1998). Muth and Fisher also suspected the leaf-nosed snake (*Phyllorhyncus decurtatus*) was a possible predator, but recent

evidence (S. Gardner 2002) suggests this is unlikely. Predator densities are often elevated near human development (Bryant 1911). For example, data from the Breeding Bird Survey show that populations of common raven have increased 4.7-fold in the Colorado Desert between 1969 and 1988 (BLM *et al.* 1989). Cameron Barrows (CNLM, pers. comm.) documented high predation rates from a kestrel pair nesting in a palm tree just outside the Coachella Valley Preserve. He also noted severely depressed FTHL populations within 0.1 mile of a road in the Coachella Valley, a result of predation by kestrels and shrikes that nested in nearby housing areas and golf courses and hunted from power poles along the roads. Round-tailed ground squirrels and roadrunners occur at elevated densities near agricultural areas and may explain absence of FTHLs in some areas of apparently suitable habitat adjacent to agriculture (Wong & Young, pers. obs.). Elevated predation may contribute to a cumulative set of adverse effects that result in population declines in some areas.

Energy and Mineral Extraction

Mining and Mineral Material Extraction

Mining and mineral extraction activities cause habitat loss and degradation because of long-term loss of vegetation cover and removal of topsoil. Associated activities, such as truck and light vehicle traffic, can result in direct mortality within the project area as well as outside of the project site along access roads. Even though most mineral material sites (e.g., sand and gravel) are small, their cumulative effect can be significant. The acreage of mining and mineral sites within FTHL MAs has not been mapped and quantified.

Geothermal Power Development

Geothermal power development is occurring in the Imperial and Mexicali valleys, particularly in agricultural lands, but also in adjacent desert lands. Much geothermal development has occurred in FTHL habitat in the southwestern portion of East Mesa. Power plant construction, wells, pipelines, transmission lines, and service roads cause habitat loss and degradation. Currently, geothermal energy companies believe that the geothermal resource is exploited at or near capacity (Rob Waiwood, Geologist, BLM California Desert District, pers. comm.). No additional power plants are proposed for East Mesa. Some additional disturbance will occur from replacement wells and associated facilities (e.g., pipelines).

Oil and Gas Development

Extensive leasing by the federal government of oil and gas rights occurred in the early 1980's in the Salton Sea Trough. Some leasing also occurred in the Yuma Desert south of Yuma. These leases were highly speculative. Only one test well was drilled in California, and two test wells were drilled in Arizona. None of these wells were profitable, and no oil or gas resources have been identified. At present there are no active federal leases for oil and gas within the range of the FTHL in the U.S.

Potentially, portions of public land within the range of the FTHL could be offered for lease in the future. Leasing, which is discretionary, would not take place unless interest had been expressed by the oil and gas industry. Any leasing would be required to adhere to regulatory standards (43 CFR 3100 et seq.). Oil and gas leases may be issued with standard stipulations as well as additional stipulations for sensitive areas, including stipulations requiring no surface occupancy.

The development of an oil and gas field would result in loss or degradation of habitat from well pads, pipelines, and service roads. Some direct mortality could occur on roads used by trucks and

other vehicles. Under current regulations the amount and location of disturbance on federal lands would be subject to strong controls.

Wind Turbines

Wind turbines cover about 317 acres of FTHL habitat in the northwestern portion of the Coachella Valley. Some habitat is lost where turbine platforms are built, and there may be some road mortality on the dirt maintenance roads. However, the turbines have mainly been built on gravel floodplains and foothill slopes, where FTHLs are unlikely to occur. Furthermore, there may be an indirect positive effect in that the presence of wind turbines keeps the habitat from being converted to urban use, which is the primary cause of habitat loss in the Coachella Valley. The turbines may also reduce densities of avian predators.

Landfills

In recent years there have been increasing attempts to place large, regional landfills serving distant urban centers in remote areas, such as the Colorado Desert. The proposals range from 2,000 to 20,000 acres in size. Large landfills in FTHL habitat would result in a permanent loss of habitat. Additional degradation of habitat as well as direct mortality and population fragmentation would occur from trash transportation, such as railroads and roads, and ancillary facilities. Although strongly stipulated to limit the effect, landfills may increase populations of predators (e.g., ravens, roadrunners) that potentially could prey on FTHLs many miles from the landfill.

In the past, the federal government issued leases to cities and counties for landfills serving local areas. Currently, federal agencies are disposing of, primarily through exchange or sale, lands proposed for landfills. Local agencies may still develop new sites on private lands in wildland areas. Even though relatively small in size (10-200 acres), these landfills would result in negative effects on FTHLs similar to large, regional landfills.

BOR sold 640 acres of land south of Yuma to the city of Yuma for a regional landfill prior to the Conservation Agreement. The land is located just east of the Arizona state prison along County 23rd Street. It is currently undeveloped and occupied by FTHLs. This landfill will replace the existing Yuma County landfill located east of Somerton, when that landfill reaches capacity.

Exotic Plants

Many species of introduced, non-native plants occur in FTHL habitat. Most are Mediterranean or Asian annual species that germinate in the winter or spring months. Split grass (*Schismus barbatus*) is common throughout the range of the FTHL and locally abundant. Sahara mustard (*Brassica tournefortii*) and Russian thistle (*Salsola tragus*) are locally abundant. Sahara mustard appears to be spreading rapidly in some areas. Many other non-native annual species may be present, especially species in the families Gramineae (grasses), Chenopodiaceae (goosefoots), Cruciferae (mustards), and Compositae (sunflowers), particularly near agricultural areas and near streams or wetlands. Density, diversity, and productivity of both native and non-native annual plants vary greatly from year to year. In years with abundant winter and spring rainfall, densities and diversity of annual plants are often relatively high (Tevis 1958; Inouye 1991; Rorabaugh 1994).

The effects of non-native annual plants on the FTHL are unknown. However, their abundance in FTHL habitat is of concern for several reasons. In portions of East Mesa, the Coachella Valley, and habitat in Sonora, densities of Russian thistle and/or Sahara mustard are very great in some

years, with stem or culm densities perhaps great enough to impede movement by FTHLs, which are relatively wide-bodied and active. As discussed in the following section on fire, high productivity of non-native annuals can fuel fires that destroy native perennial shrubs and facilitate changes in plant composition.

Where non-native annuals have significantly changed plant communities, the types of food available to harvester ants have also been altered. Relationships among species of harvester ants and between ant populations and environmental variables are complex (Ryti and Case 1988; Mackay 1991). Changes in annual plant communities may trigger changes in ant communities that could, in turn, affect predators of ants, including FTHLs.

In addition to non-native annual plants, salt cedar (*Tamarix ramosissima*), a non-native perennial shrub or tree, has invaded areas of shallow groundwater in FTHL habitat on the west side of West Mesa, in the Yuha Basin (Wright 1993), and along portions of the All-American and Coachella Canals. FTHLs have been recorded in salt cedar communities (Kim Nicol and Betsy Bolster, CDFG, pers. comm.), but dense stands of salt cedar are likely unsuitable for them.

Fire

In the summer of 1992, a dense, dried stand of non-native annual plants fueled a fire in northern East Mesa that burned approximately 3,600 acres. Although the effects of the fire have not been quantified, large numbers of perennial shrubs, particularly creosote, were killed. Restoration of perennial cover after the fire has been very slow. Dried, non-native plants in the Coachella Valley have also fueled several small fires of less than ten acres. Habitat in portions of the Coachella Valley, on East Mesa, and in Sonora support dense stands of non-native annuals and, as a result, is particularly susceptible to fire. Presumed ignition sources of fires within habitats occupied by FTHLs include: lightning strikes, campfires, highway and railroad sources, catalytic converters on OHVs, military activities (particularly use of flares and bombing), and other activities. Fires are more frequent near towns and roads (Tracy 1994) and are likely to occur after annual plants cure in the spring and before late summer or winter rains reduce the fire hazard.

The effects of fire on FTHL habitat have not been studied. However, many species of perennial shrubs in desert scrub habitats are generally poorly adapted to fire (Brown and Minnich 1986; Minnich 1994). Fire in desert scrub communities causes vegetational conversion to communities that are more fire tolerant (Minnich 1994). Recovery of pre-fire cover and biomass of desert shrubs is achieved only after several decades (Minnich 1994). Creosote and white bursage, which are often dominant perennial shrubs in FTHL habitat, typically experience high mortality during fires. Big galleta grass, also an important perennial in some areas, resprouts vigorously after fire (Minnich 1994). Although fire suppression activities are needed to control the size of fires, off-highway access during fires and creation of fire lines can result in habitat damage (Duck *et al*. 1994).

If fire occurs when FTHLs are on or near the surface, individuals could be killed directly by the fire. The effects of vegetation community conversion on FTHLs are unknown, but decreased shrub cover could make individuals more susceptible to predation and environmental extremes. Changes in plant community composition could also facilitate changes in substrates and ant populations that could adversely affect FTHLs. Additional study is needed to quantify the effects of fire on this species and its habitat.

Pesticide Use

Agricultural fields in the range of the FTHL are sprayed aerially with insecticides to control various insect pests. These pesticides may drift onto adjacent wildlands and kill ants, the primary prey of FTHLS (BLM 1990). Pesticide drift is less likely to be concentrated sufficiently to kill FTHLS directly, but dosages may become lethal if accumulated in the tissues by consuming contaminated prey. Sublethal effects on lizards are poorly studied and pesticide tolerances of FTHLS are unknown (Johnson 1989). Drift of herbicides from croplands may also injure or kill plants in adjacent FTHL habitat.

Since 1943, the California Department of Food and Agriculture has conducted a control program for the exotic sugar beet leafhopper (*Circulifer tenellus*), a carrier of curly top virus, which damages crops. The program has entailed aerial application of insecticides (DDT from 1956-1965 and malathion since 1965) in areas known to harbor the insect. In the past this has included portions of East Mesa, West Mesa, and Yuha Basin in California (Calif. Dept. of Food and Agric. 1991). Historically, treatments in the Imperial Valley have occurred in about one out of every three years with aerial treatment acreage varying between 3,000 and 27,000 acres. The last two aerial treatments in Imperial County were in 1992 and 1998, with treatment acreages of 7,143 and 5,900 respectively (Calif. Dept. of Food and Agric. 2002).

Effects of malathion on the FTHL have not been studied; however, studies on other lizards have shown no direct effects at applications many times higher than planned here (Peterle and Giles 1964; Giles 1970; Hall and Clark 1982). Harvester ants, which are the primary prey of FTHLS, are killed by the insecticide treatments (Bolster and Nicol 1989). Proposed treatment protocols call for application during night or early morning hours in the winter or spring. Since most ants in a colony are underground during these cool periods, few ants should be killed directly (Calif. Dept. of Food and Agriculture 1995). Monitoring efforts have shown that, although foraging individuals may be killed in significant numbers, ant colonies recover quickly following malathion spraying (Peterson 1991; Calif. Dept. of Food and Agric. 2002). However, no rigorous studies have investigated the effects of malathion spraying on harvester ant populations within the range of the FTHL, therefore the conclusions of these monitoring efforts are as yet unsupported. Spraying, if necessary, typically would occur at or near the time of emergence of hibernating FTHLS. This would likely affect populations in sprayed areas, because food resources (ants) would be temporarily reduced. Therefore, malathion spraying is considered inconsistent with FTHL conservation in FTHL MAS.

Despite mitigation measures, the overall effects of the program are uncertain. Effects of applying broad-spectrum insecticide over many years to desert scrub communities are potentially many and complex. For instance, changes in invertebrate communities may include changes in pollinator and herbivore populations, which may in turn alter plant communities. Changes in plant communities could precipitate further changes in invertebrate communities and create altered conditions for vertebrates, as well. The effects of this program need further study. The USFWS has issued a biological/conference opinion, and a recent update, on the beet leafhopper control program (USFWS 1996b; USFWS 2001). The terms and conditions stipulate that no treatments may occur in FTHL MAS, and that aerial treatments in habitats elsewhere that support high densities of FTHLS should be restricted to the fall and winter months to the extent possible. The most recent decision of the BLM California State Director (March 11, 2002) in authorizing a beet leafhopper malathion control program on public lands in California includes the following terms and conditions:

9. No treatments shall be applied in designated flat-tailed horned lizard management areas, as set forth in the Flat-tailed Horned Lizard Rangewide Management Strategy (Twedt and Wright 2002). Treatments within other flat-tailed horned lizard habitats shall be limited to not more than one application in a given area per year.

10. Harvester ant monitoring shall be conducted in association with any treatments that occur in flat-tailed horned lizard habitat in the Imperial Valley.

Land Disposal

Lands that are removed from federal or state ownership are available for agricultural development, urban development, landfills, or other surface disturbing activities consistent with local zoning regulations. These activities result in varying degrees of habitat loss and adverse effects to FTHL populations.

The Arizona State Land Department is disposing of land occupied by FTHLs in two areas: 1) near Fortuna Road east of Yuma and south of Interstate 8 and 2) near the town of San Luis. The parcels of state lands that are currently being sold are immediately adjacent to residential and commercial development and have reached what the State Land Department feels is their peak value. It is expected that these lands will be developed as housing or commercial property soon after their sale and thus will no longer be useable as habitat for FTHLs. The State Land Department is currently denying land sale applications for other state land parcels in FTHL habitat because these lands have not yet reached their highest potential value. Recently, however, they have leased significant parcels of habitat for agricultural development.

Cattle Grazing

Historically, portions of FTHL habitat in the U.S. were grazed (e.g. East Mesa) as ephemeral pasturelands; however, we are not aware of any grazing currently occurring in the U.S. range of the species. Cattle grazing occurs at least seasonally in some portions of Sonora where FTHLs are found. In dry periods, cattle congregate around water sources and corrals, such as at Pozo Nuevo, Sonora. During wet winters and springs when annual plants are abundant, cattle may stray far from water and ranchers often truck in additional stock to take advantage of abundant forage. Areas in the immediate vicinity of water are often heavily trampled and denuded of vegetation. The effects of livestock grazing on the FTHL are unknown; however, grazing can reduce populations of other lizards (Jones 1981; Bock *et al.* 1990; Mitchell 1999). Heavy grazing is widely recognized as having serious deleterious effects on desert soils, vegetation communities, and fauna; however, effects of light to moderate grazing are not as well documented (see review in Lovich and Bainbridge 1999).

Other Activities

Various specialized projects and facilities have been constructed or proposed for desert areas that provide habitat for the FTHL. As habitat is lost to these projects, populations of FTHLs are reduced accordingly. Examples of such projects are the Arizona state prison in the Yuma Desert, which occupies about 640 acres of former FTHL habitat, and the nearby A-22 site that BOR had developed prior to the Conservation Agreement for disposal of salt sludge produced by the Yuma Desalting Plant. Development at the A-22 site currently occupies about 160 acres but would be expanded to as large as 960 acres if or when the desalting plant began full-scale operation.

Listing History

In California, the FTHL was designated a sensitive species by the BLM in 1980 (BLM 1980). The purpose of the designation was to provide increased management attention to prevent population declines and habitat loss or degradation that might result in federal or state listing as endangered or threatened. The designation raises the level of concern for FTHLs in the environmental review process and in land use planning. No specific habitat or population protection measure or review process is required or prohibited by the sensitive species designation. By present BLM policy, species designated sensitive are, at a minimum, afforded the protection provided candidate species (BLM 1988). This includes direction to 1) determine distribution, abundance, and population status, 2) develop a habitat management program, and 3) coordinate with the USFWS (BLM 1988).

On January 25, 1988, the California Department of Fish and Game (CDFG) Commission received a petition requesting listing of the FTHL as an endangered species. On May 13, 1988, the Commission accepted the petition and designated the FTHL a candidate species (Carlson and Mayhew 1988). The CDFG reviewed the petition and other information and recommended in its review (Bolster and Nicol 1989) that the species be listed as threatened. On June 22, 1989, the Commission voted against the proposed listing.

The Arizona Game and Fish Department (AGFD) currently includes the FTHL on its draft list of wildlife of special concern (AGFD in prep). This designation affords no legal protection to the species, but is used in planning to encourage habitat conservation and management consideration. Collecting or killing FTHLs is prohibited in both Arizona and California, except by special permit.

The USFWS included the FTHL as a Category 2 candidate for listing as a threatened or endangered species in its original "Review of Vertebrate Wildlife" published in the *Federal Register*, December 10, 1982 (USFWS 1982). Category 2 candidate species were those for which data in the USFWS possession indicate that listing may be appropriate, but additional information is needed to support a proposed rule. In a 1985 revision of the candidate list, the species was retained as a Category 2 candidate (USFWS 1985). Due to new data (especially Rorabaugh *et al*. 1987, Carlson and Mayhew 1988, and Olech undated), the USFWS elevated the FTHL to a Category 1 candidate in its revised list issued on January 6, 1989 (USFWS 1989). Category 1 candidate species were those for which the USFWS had sufficient information to support a proposal to list them as threatened or endangered.

On November 29, 1993, the USFWS published a proposed rule to list the FTHL as a threatened species (USFWS 1993). The USFWS cited "documented and anticipated population declines associated with widespread habitat loss, fragmentation, and degradation due to human activities such as agricultural developments, urban expansion, OHV use, energy developments, and military activities" as the primary bases for the proposed listing. The USFWS could not determine critical habitat at that time. A public meeting was held in El Centro on March 22, 1994, to gather public comment. The passage of Public Law No. 104–6, 109 Stat. 73 in April 1995 delayed consideration of listing the FTHL until an executive waiver, signed by President Clinton on April 26, 1996, allowed the Secretary of the Interior to again list species for protection under the Endangered Species Act.

In response to a lawsuit brought by the Defenders of Wildlife and others, the Secretary of the Interior was ordered by the district court in Arizona on May 16, 1997 to, within 60 days, issue a final decision on the listing of the FTHL. On July 15, 1997 the Secretary of the Interior issued

a notice to withdraw the proposal to list the FTHL based on three primary factors: 1) population trend data did not conclusively demonstrate significant population declines; 2) some of the threats to the habitats occupied by FTHLs had become less serious since the proposed rule was issued; and 3) the 1997 Conservation Agreement and RMS would ensure a further decrease in threats to the FTHL and its habitat (USFWS 1997). The Defenders of Wildlife and others again filed suit against the Secretary of the Interior in district court. On June 16, 1999, the district court for the Southern District of California issued a summary judgment upholding the Secretary of the Interior's decision not to list the FTHL.

The Defenders of Wildlife and others appealed the case to the Ninth Circuit Court of Appeals, which on July 31, 2001 reversed the district court's ruling and asserted that the Secretary of Interior's decision to withdraw the FTHL from consideration for listing was "arbitrary and capricious". The primary reasoning for this decision was that the Secretary of the Interior did not adequately address the meaning of the phrase, "in danger of extinction throughout … a significant portion of its range" and how an adequate interpretation of this phrase applies to the status of the FTHL. Furthermore, the court expressed concern about the incomplete implementation of the 1997 Conservation Agreement. On October 24, 2001, the district court ordered the Secretary of the Interior to reinstate the 1993 proposed rule to list the FTHL. The proposed rule was reinstated December 26, 2001 (USFWS 2001).

On January 3, 2003, the USFWS withdrew the proposed rule to list the FTHL as a threatened species (USFWS 2003). They determined that listing was not warranted because threats to the species as identified in the proposed rule were not as significant as earlier believed, and current available data did not indicate that the threats to the species and its habitat are likely to endanger the species in the foreseeable future throughout all or a significant portion of its range.

The Mexican Government has designated the FTHL a threatened species. As such, the species is protected from collection, sale, and commerce, and its habitat is afforded special protection (Secretaría de Medio Ambiente y Recursos Naturales 2002). An international consortium selected the FTHL and portions of its habitat as conservation priorities in an ecosystem-wide analysis (Marshall *et al.* 2000).

MANAGEMENT PROGRAM

Overall Goal

MAINTAIN SELF-SUSTAINING POPULATIONS OF FLAT-TAILED HORNED LIZARDS IN PERPETUITY.

Management Objectives

- Continue to secure and/or manage sufficient habitat to maintain self-sustaining FTHL populations in each of the five designated MAs (Yuma Desert, East Mesa, West Mesa, Yuha Desert, and Borrego Badlands MAs) and in areas designated by the CVMSHCP.
- Maintain a "long-term stable" or increasing population of FTHLs in all MAs. A population that is stable over the long term exhibits no downward population trend after the effects of natural demographic and environmental stochasticity are removed.
- Continue to support research that promotes conservation of the species at OWSVRA and elsewhere throughout the range of the species.
- Within and outside of MAs, limit the loss of habitat and effects on FTHL populations through the application of effective mitigation and compensation.
- Encourage and assist Mexico in the development and implementation of a FTHL conservation program.

Overview and Purpose

In 1994, the USFWS, BLM, BOR, DOD, and several other agencies signed a MOU "...on Implementation of the Endangered Species Act" that established a general framework for cooperation and participation among cooperators in the conservation of species tending toward federal listing as threatened or endangered under the Endangered Species Act. The MOU identified the development of conservation agreements as a valuable process for achieving conservation of species through voluntary cooperation. A conservation agreement is a formal, written document agreed to by the USFWS and other cooperators that identifies specific actions and responsibilities for which each party agrees to be accountable. The objective of a conservation agreement is to reduce threats to a candidate species or its habitat, possibly lowering the listing priority or eliminating the need to list the species.

This strategy formed the basis of a conservation agreement among the cooperators for management of FTHLs (Foreman 1997). The conservation agreement that was signed is included as Appendix 1. Although the USFWS determined that the conservation agreement was effective and that listing the FTHL was unnecessary, it retains the ability to reconsider the effectiveness of the agreement. Lack of compliance among the cooperators, a change of circumstances, or other reasons may alter the expected result of this strategy. If threats to the FTHL or its habitat are not reduced, the USFWS may proceed with another proposed or an emergency listing.

The purpose of this strategy is to provide a framework for securing and managing sufficient habitat to maintain several self-sustaining populations of the FTHL throughout the species' range in the U.S. (see Habitat Management, p. 47). A major step towards that objective was the establishment of five MAs encompassing large blocks of habitat where surface disturbing and

mortality causing activities are minimized. Prior to the RMS, management of federal lands within FTHL habitat was guided by several management plans, as discussed in Appendix 2. These plans cover federal lands both within and outside the MAs. When the MAs were established, this document became the standard for management and conservation of FTHL habitat. Signatory agencies have incorporated measures in the RMS into their land management plans to comply with the NEPA and state counterparts.

Outside of these MAs, FTHL habitat receives a degree of protection through mitigation and compensation and through the previously established habitat management plans that affect public lands outside of MAs (Appendix 2). Specifically, signatories to the conservation agreement ensure that adverse effects of projects they authorize outside of MAs are mitigated and that residual effects are compensated in accordance with a standard formula (see Mitigation and Compensation). The funds obtained through compensation are used to consolidate land ownership within the MAs or to enhance habitat.

As part of its adaptive management approach, programs for monitoring FTHL population, distribution, and habitat disturbance have been established (see Monitoring Program, p. 64 and Appendix 4 and Appendix 5). If population or distribution declines occur, the ICC shall investigate potential causes. If causes are anthropogenic in nature, the ICC shall make recommendations to the MOG for reversing the trend.

This document is the first revision of the 1997 RMS (Foreman 1997). Because the Implementation Schedule will expire in 2008, it is expected that the schedule will be revised at that time. Concurrently, the need for a revision of the entire document will be evaluated.

Planning Actions

The following Planning Actions have been developed as recommendations to signatory agencies to ensure that the goal of maintaining a "long-term stable" population within each MA is achieved. The original Planning Actions from the 1997 RMS are repeated here, though some of these actions have been completed. Actions that have been identified since 1997 have been added. It is understood that implementation of these actions is subject to availability of funds and compliance with all applicable regulations. It is anticipated that specific actions may be modified based on information obtained from future monitoring, research, and evaluations of the effectiveness of this strategy. Annual evaluations and proposed modifications of this strategy shall be coordinated through the FTHL ICC. The MOG will meet as necessary to review recommendations of the ICC and may make corresponding modifications to Planning Actions in the RMS.

1. **Delineate and designate five FTHL MAs and one FTHL RA.** See Table 3 for a summary of land ownership within each MA. Boundary descriptions and geographic information system (GIS) maps are on file with land management agencies.

    1.1. Designate the Yuma Desert FTHL MA as shown in Figure 4. If the proposed Area Service Highway is constructed along a portion of the boundary of the MA, the east and south side of the ROW will be the new western and northern boundary of the MA, as appropriate.

    1.2. Designate and complete NEPA process for the East Mesa FTHL MA as shown in Figure 5.

1.3. Designate and complete NEPA process for the West Mesa FTHL MA as shown in Figure 6.

1.4. Designate and complete NEPA process for the Yuha Desert FTHL MA as shown in Figure 7.

1.5. Designate and complete California Environmental Quality Act process for the Borrego Badlands FTHL MA as shown in Figure 8.

1.6. Designate the OWSVRA as the Ocotillo Wells FTHL RA as shown in Figure 9.

1.7. Continue to manage areas in the Coachella Valley that are capable of maintaining self-sustaining populations of FTHL by working with other agencies and organizations in finalizing a CVMSHCP (see Figure 10).

2. Define and implement management actions necessary to minimize loss or degradation of habitat.

2.1. Mitigate and compensate, as needed (Appendix 6), project impacts on FTHLs and their habitat both within and outside of MAs and the RA through humane and cost-effective measures.

2.1.1 Apply mitigation measures as appropriate, based on the nature of the anticipated impacts (see Mitigation section).

2.1.2 Require compensation for residual impacts remaining after application of other on-site mitigation measures (see Compensation section).

2.2. Limit land use authorizations that would cause surface disturbance within the MAs.

2.2.1 Land use applications will continue to be reviewed on a case-by-case basis for impacts on FTHLs and their habitat. Every attempt shall be made to locate projects outside of MAs. New ROWs may be permitted only along the boundaries of MAs and only if impacts can be mitigated to avoid long-term effects on FTHLs in the MA. Where discretionary, other new authorizations may be permitted if the habitat disturbance does not pose a significant barrier to lizard movements. Disturbance shall be limited to 10 acres or less per authorization, if possible. If individual disturbances over 10 acres are necessary, the ICC and the MOG shall be contacted to provide suggestions for minimizing potential impacts to FTHLs. The cumulative new disturbance per MA since 1997 may not exceed 1% of the total acreage on federal land. The 1% cap on new surface disturbance within MAs will remain in effect for 5 years, after which the 1% cap will be reviewed by the MOG and amended, if necessary, based on more recent information. Each agency may permit disturbances of up to 1% of the land that the agency manages within the MA. Additions to the 242 Well Field by the BOR and existing, on-going activities at DOD facilities (for MCAS-Yuma, these activities are described in the EIS for the Yuma Training Range Complex) do not count towards this 1%. If disturbance greater than the 1% cap is desired, the agency may request use of the 1% disturbance allowance of other signatory agencies in the MA. All authorizations must be conducted in accordance with applicable mitigation and compensation.

2.2.2 All federally owned lands in the MAs shall be retained in federal ownership (except the patenting of mining claims pursuant to the General Mining Law of 1872). Lands in MAs owned by the state of California and managed as preserves, refuges, or parks shall be retained in state ownership.

2.2.3 Maintenance of all existing ROW facilities may continue within MAs.

2.2.4 The proposed Area Service Highway and its ROW are outside of the Yuma Desert MA. This and other new road construction along the boundary of the Yuma Desert MA shall require fencing to reduce access to the MA and lizard exclusion fencing (Appendix 7) to reduce lizard mortality.

2.3. Limit and/or reduce surface disturbance in MAs from discretionary minerals actions.

2.3.1 Allowable activities are the following: 1) leasing under the mineral leasing laws with no surface occupancy; 2) development and production in existing mineral material extraction sites in accordance with local, state, and federal laws and land-use plans, and subject to applicable mitigation; 3) new leases and permits for geothermal energy with stipulations of no surface occupancy (in California MAs only); and other mining and exploration activities authorized under the General Mining Law of 1872. Replacement wells and operation and maintenance of facilities shall be allowed on existing leases. The activities listed above shall be subject to applicable Mitigation (p. 58) and Compensation (p. 60).

2.4. Limit vehicle access and limit route proliferation within MAs.

2.4.1 Reduce new road construction to a minimum by coordinating access needs and avoiding conflicts and replication in road use, development, and management. Allow maintenance of roads on a case-by-case basis, recognizing that maintenance of some roads may be necessary to prevent proliferation of parallel routes. Any new surface disturbance associated with road maintenance shall require mitigation.

2.4.2 All routes shall be designated either "closed" to motorized vehicles, "open" for general public use by all types of vehicles, or "limited" to a specific season, user, or vehicle type or number. Vehicle use shall be restricted to designated open and limited routes. Routes in MAs shall be given a high priority for signing. Routes shall be considered “closed” unless signed as “opened” or “limited”.

2.4.3 Reduce open and limited route density in MAs, particularly in portions of MAs where route density is high.

2.4.4 Participating land managers shall coordinate with the BP to ensure cooperation with and enforcement of vehicle regulations in MAs and the RA to the maximum extent possible. Coordination shall include regularly scheduled meetings among signatory agencies and BP in the Yuma and El Centro Sectors to discuss management issues and ways to resolve those issues.

2.5. Limit the impacts of recreational activities within MAs.

2.5.1 All types of vehicle-oriented recreation in compliance with current regulations may occur within the RA.

2.5.2 Permit no competitive motorized vehicle recreational events within MAs. A competitive event is any event where speed or elements of competition (i.e., winning) are present in any form. Non-competitive events may be allowed on routes designated open for public use during the FTHL season of hibernation. Other types of vehicle-based recreation except camping (see action 2.5.4) in compliance with current regulations may occur within MAs.

2.5.3 Allow currently authorized non-motorized recreational activities, such as rock hounding, hiking, backpacking, non-vehicle based camping, picnicking, bicycling, horseback-riding, hunting, bird watching, and nature study, in all MAs and the RA in accordance with existing regulations. Development of new recreational facilities, such as visitor centers, campgrounds, mountain bike trails, equestrian trails, shall not be allowed within MAs, if these would create new surface disturbance in excess of 1%. Installation of interpretive signing and informational kiosks is allowed.

2.5.4 Allow vehicle-based camping only in developed campgrounds, designated camping areas, or within 50 feet from centerline of a designated open route within MAs. More restrictive measures may apply in certain areas. Non-vehicle camping may occur anywhere.

2.5.5 No long-term camping areas shall be designated or developed in MAs.

2.6. Authorize limited use of plants in MAs.

2.6.1 Make no sales and allow no commercial collecting of native plant products (including whole plants, plant parts, flowers, and seeds) within MAs, except as needed for rehabilitation projects within the MAs.

2.6.2 Authorize no livestock grazing in the MAs.

2.7. Within the MAs, allow off-road military maneuvers and encampments only in designated sites. Allow other military activities on previously disturbed lands managed by DOD agencies consistent with normal operations and functions. Marine Corps activities on the BMGR shall be governed by Conference Opinion 2-21-95-F-114, dated April 17, 1996 (USFWS 1996a), as amended, whether or not the species is listed. This Conference Opinion is consistent with the goal and management objectives set forth in this RMS.

2.8. Suppress fires in MAs and the BLM-administered lands in the RA using a mix of the following methods: 1) aerial attack with fire retardants, 2) crews using hand tools to create fire breaks, and 3) mobile attack engines limited to public roads, designated open routes, and routes authorized for limited-use. Do not allow earth-moving equipment (such as bulldozers) except in critical situations to protect life, property, or resources. Post-suppression mitigation shall include rehabilitation of firebreaks and other ground disturbances using hand tools.

2.9. No pesticide treatments shall be applied within MAs. Use of specifically targeted, hand-applied herbicides (e.g. for tamarisk eradication projects) is allowed.

2.10. Within MAs, other discretionary land uses and activities not consistent or compatible with the above restrictions and the general RMS shall not be approved by the authorizing agency.

3. Within the MAs, rehabilitate damaged and degraded habitat, including closed routes and other small areas of past intense activity. Methods to be used may include, but are not limited to, a) ripping or scarifying compacted soils, b) recontouring the surface, c) pitting or imprinting the surface, d) seeding with native plants, e) planting seedlings, f) irrigating, and g) barricading. See Habitat Rehabilitation on page 67 for additional information.

4. Attempt to acquire through exchange, donation, or purchase from willing sellers all private lands within MAs.

4.1. Establish and maintain with approval of the MOG (see Planning Action 6.1.1) a prioritized list of parcels or screening criteria for acquisition within each MA and habitat corridor.

4.2. Seek funding to acquire key parcels within MAs.

4.3. Using compensation and other funds, acquire land within MAs in accordance with established priorities and/or criteria.

4.4. Participate in exchanges where opportunities arise to acquire key parcels within MAs.

5. Maintain or establish effective habitat corridors between naturally adjacent populations.

5.1. Activities in potential habitat corridors between MAs and the RA shall be regulated or mitigated so that at least occasional interchange of FTHLs occurs among adjacent populations. Potential habitat corridors include lands between West Mesa and Yuha Desert MAs and between West Mesa MA and Ocotillo Wells RA (see Corridors). In addition, activities in the Yuha Desert and Yuma Desert MAs that would prevent interchange of FTHLs across the International Border shall be prohibited.

5.2. Coordinate conservation efforts with Mexico and the Immigration and Naturalization Service to ensure continued movement of FTHLs across the International Border in the Yuha Desert and Yuma Desert MAs.

6. Coordinate activities and funding among the participating agencies and Mexican agencies.

6.1. Maintain information exchange and coordination of monitoring, management activities, and research.

6.1.1 Maintain a FTHL MOG consisting of management representatives from agencies participating in the conservation agreement (see Planning Action 6.2). The FTHL MOG shall provide management-level leadership, coordination, and oversight in the implementation of this RMS. The FTHL MOG shall review progress in implementing the conservation agreement, approve amendments to the RMS, set priorities, and recommend measures to resolve management issues relevant to implementation of the RMS. The

FTHL MOG shall provide overall policy guidance and coordination among the cooperators for the use of compensation funds.

6.1.2 Hold semi-annual meetings of the ICC. Each of the participating agencies shall designate a representative(s) to the ICC. Representatives from other agencies, organizations, and groups with special interests or knowledge of the FTHL may also be invited to ICC meetings. The ICC shall function as a forum for exchange of information on research results and proposals and for discussion of technical and management issues. The ICC may be assigned specific duties and responsibilities by the FTHL MOG.

6.1.3 Develop a forum for discussions with agencies and individual counterparts in Mexico to coordinate activities, provide information exchange, and promote and assist in development of a FTHL conservation program in Mexico.

6.2. Confirm commitment of agencies participating in this RMS through development and signing of a conservation agreement.

6.3. Incorporate management actions from this RMS when developing multi-agency, multi-species ecosystem plans for the ecoregions in the range of the FTHL incorporating management actions from this RMS.

6.3.1 Incorporate actions in the development of the Western Colorado Desert Coordinated Management Plan (including the Yuha Desert, West Mesa, East Mesa, and Borrego Badlands MAs and Ocotillo Wells RA).

6.3.2 Incorporate actions in the development of the CVMSHCP.

6.3.3 Incorporate actions in the development of the Western Colorado Desert Route Designation.

6.4. Coordinate with the BP in developing mutual agreements for the conservation of natural resources.

6.4.1 Encourage use of techniques that minimize BP OHV activity, such as remote cameras and vehicle barriers.

6.4.2 Prepare an educational presentation for briefing BP agents.

7. Promote the purposes of the strategy through law enforcement and public education.

7.1. Provide law enforcement in MAs and the Coachella Valley FTHL conservation areas sufficient to ensure compliance with OHV and other regulations as described in the planned actions.

7.2. Public information and education about the MAs and RA, including but not limited to interpretive signs and brochures, shall be made available to the public at the offices and interpretive centers of the participating agencies. Information provided shall describe the purposes of the MAs, the RA, and conservation areas within the Coachella Valley, and shall list all pertinent regulations.

8. Encourage and support research that will promote the conservation of FTHLs or desert ecosystems and will provide information needed to effectively define and implement necessary management actions. Research should be encouraged both

within and outside of MAs and the RA. Planning actions 8.3 and 8.4 shall be emphasized, as recommended by the ICC.

8.1. All research shall be conducted under permit from the land management agency. Permits from the state game and fish agency may also be required, and from the USFWS if the species is listed.

8.2. The OWSVRA shall continue to budget for research for at least 5 years. A team of scientists and managers will recommend research designs. Results shall be distributed to other land management agencies.

8.3. Continue to refine cost-effective techniques for assessing FTHL abundance.

8.3.1 Test trapping webs and other techniques to enumerate FTHLs directly.

8.3.2 Determine effectiveness of relative enumeration techniques as an index of relative abundance using test plots of known density.

8.4. Determine the following life history and demographic parameters and how they vary with environmental conditions:

- Age-specific mortality
- Longevity
- Clutch size
- Age-specific number of clutches per year
- Hatching success
- Recruitment
- Diet
- Home range size

8.5. Determine effects of the following activities and factors on FTHL demographics and habitat:

- Paved roads and highways
- OHV use and associated activities
- Geothermal development
- Pesticide Use
- Predation
- Non-native plants
- Fire
- Wind turbines

8.6. Determine genetic variation among populations and the effects of barriers on movements.

8.6.1 Determine genetic variation in populations in the different MAs.

8.6.2 Determine effects of human-created barriers such as railroads, canals, paved roads, agricultural fields, and extensively denuded areas.

8.6.3 Determine effects of natural barriers, such as the Colorado River.

8.7. Determine the effectiveness of the proposed mitigation measures.

9. Continue inventory and monitoring.

9.1. Continue to inventory lands within the range of FTHLs to clarify current range and habitat use.

9.2. Monitor habitat quality and population trends in five MAs, and additional MAs as designated, to determine progress toward overall management goal.

9.2.1 The ICC shall monitor implementation of this strategy.

9.2.2 Land management agencies shall monitor regional population trends using standardized techniques (see Appendix 4 and Appendix 5). Each MA shall be monitored using mark-recapture technique to estimate FTHL population size and determine a confidence interval, at least once every three years.

9.2.3 Land management agencies shall document habitat disturbance and loss; recording cumulative totals for percent and acreage of habitat lost. Land management agencies shall document a running total of compensation funds collected to date.

9.2.3.1 Signatory agencies shall conduct aerial reconnaissance and analysis of surface disturbance on the five MAs every five years.

9.2.4 The ICC shall prepare an annual report of monitoring results and progress on implementation of this RMS. The annual report shall be presented to the MOG for review and approval by the end of February each year and shall document implementation of Planning Actions in the previous calendar year. The report shall include:

- A summary of monitoring results
- A schedule of activities to be accomplished in the current calendar year
- Budget needs for the next fiscal year
- Outyear budget needs for major projects
- Amount of agency-authorized surface disturbance in each MA
- A discussion of the likely causes of any noted declines
- Recommendations for reversing anthropogenic declines
- Status of law enforcement efforts in MAs and whether or not sufficient law enforcement is being used
- Information on any new oil and gas leases or geothermal proposals on BLM lands as an early alert for potential future disturbance
- Suggestions for future RMS revisions

9.2.5 New inventory, monitoring, and research data shall be used in evaluations of the RMS and in assessing proposed changes to the RMS.

Summary of Management Strategy Implementation, 1997-2002

This section summarizes the implementation of Planning Actions identified in the 1997 edition of the RMS. It covers the period from May 1997 through December 2002. Details of items listed in this section can be found in the ICC annual reports that were completed during this period.

1. Delineate and designate flat-tailed horned lizard MAs and a RA.

1.1-1.6. Five MAs and one RA were mapped and precise boundary descriptions completed (see Figure 4 through Figure 9 and Appendix 3). Measures identified in the RMS were implemented within areas mapped as MAs. BLM-El Centro and BLM-Yuma drafted a document to implement the RMS: *The Proposed Amendment to the California Desert Conservation Area Plan and the Yuma District Resource Management Plan to Expand the East Mesa ACEC, West Mesa ACEC, and Gran Desierto Dunes ACEC Boundaries and to Implement the Flat-tailed Horned Lizard Rangewide Management Strategy in Imperial County, California and Yuma County, Arizona*. A draft EA is attached to the Proposed Amendment (EA No. CA-067-EA-1998-023). Public scoping meetings concerning this proposed amendment were held. Work is in progress to finalize the EA, complete the NEPA process, and legally designate the MAs.

1.7. Encourage development of a MA in the Coachella Valley. The ICC developed a map with recommended boundaries for a MA in the Coachella Valley. The map was submitted to the Science Advisory Committee to be considered for incorporation into the CVMSHCP (see 6.3.2). Areas designated for management of FTHL in the Coachella Valley would take into account habitat connectivity, current levels of degradation, and manageability. Rather than designate a separate FTHL MA in the Coachella Valley, signatories decided to support creation and management of the CVMSHCP.

2. Define and implement management actions necessary to minimize loss or degradation of habitat.

2.1. Mitigate and compensate project impacts through humane and cost-effective measures.

2.1.1. Apply mitigation measures. Appropriate mitigation measures were enforced for all authorized projects that impacted FTHLs or their habitat.

2.1.2. Require compensation for residual impacts. Compensation funds were required for most projects that had residual impacts to FTHL habitat. Funds collected totaled $9742 in 1997/98, $5262 in 1998/91, $45,372 in 1999/01, and $246,880 in 2001/02 (the last figure is for BLM-Yuma only). Some projects were not charged compensation. This occurred where mitigation measures eliminated residual effects, and in cases of unauthorized BP project impacts on FTHL.

2.2. Limit authorizations that would cause surface disturbance in MAs.

2.2.1. Attempt to locate projects outside MAs; limit discretionary land use authorizations and ROWs to 10 acres and 1% total per MA. Four projects in excess of 10 acres were authorized; these were 75.7, 31.4, 16.1, and 11.6

acres in size. Acreage and percent of the MA authorized for disturbance were 2.7 and 0.002 % in the Yuma Desert, 20.2 and 0.018 % in the East Mesa, 107.1 and 0.079 % in the West Mesa, 20.2 and 0.036 % in the Yuha Desert, and 0.0 and 0.000 % in the Borrego Badlands.

2.2.2. Federally owned lands in the MAs shall be retained in federal ownership. No disposal of federal lands within MAs occurred.

2.2.3. Maintenance in existing ROWs may continue. No action required.

2.2.4. Require fencing along Yuma Desert MA boundary road. Signatory agencies coordinated with Yuma Mesa Irrigation and Drainage District and Yuma County on plans to fence the south side of County 14th Street from Avenue 6E east to Avenue 16E. The fence would be along the northern boundary of the Yuma Desert MA, and is planned to consist of barbed wire and hardware cloth. Fencing will be required along the Area Service Highway.

2.3. Limit surface disturbance in MAs from minerals actions.

2.3.1. Allow approved minerals actions while applying applicable mitigation and compensation. In 1998, 10 acres were adversely affected. In 2001, an additional 8.17 acres were affected by mining in previously existing claims.

2.4. Limit vehicle access and route proliferation in MAs.

2.4.1. Reduce new roads to a minimum in MAs. No new roads were authorized in MAs. However, numerous roads have developed in some MAs through repeated unauthorized use by BP, OHV recreationalists, and/or smugglers.

2.4.2. Designate routes "open", "closed", or "limited". Give route signing a priority. Some closed routes have been signed as such on the boundary of the Yuma Desert MA. The only paved road in the Yuma Desert MA was posted with a 25-mph speed limit to reduce the chance of FTHL mortality. BLM-El Centro signed vehicle routes several times, but overall signing of the route network was incomplete. NAF-El Centro signed routes on their ranges to reduce FTHL mortality. [In January 2003, BLM-El Centro completed route designation for the Western Colorado Desert. All vehicle routes on BLM managed lands in Imperial County were designated as open, closed, or limited. BLM is actively seeking congressional and grant dollars to implement this designation through signing and enforcing open and limited routes and closing and rehabilitating closed routes.]

2.4.3 Reduce route density in MAs. No action. Route densities in some areas increased because of smuggler and BP traffic.

2.4.4. Coordinate with BP to ensure cooperation and enforcement of vehicle regulations. ICC members held several FTHL orientation sessions with BP agents in the Yuma and El Centro sectors to reduce impacts to FTHL habitat along the International Border. These briefings were designed to familiarize BP agents with FTHL natural history, habitat requirements, and the importance of minimizing vehicular traffic off of designated patrol routes/roads. These briefings were well received by BP personnel. BLM-El Centro implemented an aggressive education strategy with BP to reduce impacts to FTHL habitat. This education included Detailer and Post Academy Orientation in which detailers

and new employees assigned to the El Centro sector were given a 1-2 hour presentation on the location of MAs, desert ecology, sensitive species, and how FTHL habitat is affected by off-route travel, including information relating to prey, ecology, and habits of the FTHL. BP representatives attended several MOG meetings, during which the issue of off-road travel was discussed. BLM-El Centro and BP held monthly coordination meetings.

2.5. Limit impacts of recreational activities in MAs.

2.5.1. Allow vehicle-oriented recreation in RA. No action required.

2.5.2. Permit no competitive recreation events in MAs. Competitive races have not been permitted in MAs. Prior to 1997, 6-12 races per year had been held in the West Mesa and Yuha Desert MAs.

2.5.3. Allow non-motorized recreational activities in MAs, but no new recreational facilities. No new recreational facilities were allowed in MAs.

2.5.4. Limit camping in MAs. A camping closure was implemented and enforced as mitigation in the East Mesa MA. This closure was signed and monitored and uses interpretive kiosks to educate the recreational community on FTHL habitat. No camping (or other public access) is allowed in the BMGR portion of the Yuma Desert MA.

2.5.5. No long-term camping areas shall be developed in MAs. None were developed.

2.6. Allow no sales or commercial collecting of plant products in MAs. No plant sales or commercial collecting were allowed.

2.7. Allow military maneuvers and encampments only in designated sites in MAs. Accomplished. A military staging area in the Yuma Desert MA was fenced to identify its location and limits so that adjacent areas would not be impacted.

2.8. Suppress fires in MAs and BLM lands in the RA using allowable methods. No fires occurred.

2.9. No pesticide treatments shall be applied within MAs. No pesticide treatments occurred.

2.10. Within MAs, other activities not consistent with the RMS shall not be approved. None were approved.

3. Rehabilitate damaged and degraded habitat in MAs. BLM-El Centro closed and rehabilitated several unauthorized vehicle tracks. Many of these received further vehicle impacts after being closed.

4. Attempt to acquire all private lands within MAs.

4.1 Maintain prioritized list of parcels for acquisitions. Lists prioritizing parcels for acquisition were maintained by the California OHV Division office headquarters in Sacramento and by BLM-El Centro. BLM-El Centro contacted all landowners within the East Mesa MA to advise them of BLM's desire to acquire their lands through purchase or exchange.

4.2 Seek funding to acquire key parcels in MAs. Compensation funds collected in California were banked for habitat acquisition.

4.3. Using compensation and other funds, acquire key lands in MAs. Acreage of habitat acquired in MAs and the RA is summarized in Table 1. DOD acquired approximately 15,500 acres of Arizona state land within the Yuma Desert MA, with DOD funding. All lands within this MA are now managed by signatory agencies. Private lands totaling 740 acres within and adjacent to the Borrego Badlands MA were acquired. BLM acquired 320 acres in the East Mesa and West Mesa MAs. Acquisitions of private lands totaling 8,936 acres were added to the OWSVRA RA.

4.4. Participate in exchanges to acquire key parcels in MAs. No opportunities for exchange arose.

Table 1. Private and state land acquired in MAs and the RA.

Agency	Acres	Location
Department of Defense	15,500	Yuma Desert Management Area
Ocotillo Wells District	8,936	Ocotillo Wells Research Area
Anza-Borrego State Park	740	Borrego Badlands Management Area
BLM El Centro	240	East Mesa Management Area
BLM El Centro	80	West Mesa Management Area
Total	**25,496**	

5. Maintain or establish effective habitat corridors between naturally adjacent populations.

5.1. Limit or mitigate activities in movement corridors. No projects were considered that would block movement across existing corridors between MAs.

5.2. Coordinate with Mexico and INS to ensure movement across the border. All corridors are currently intact to the best of our knowledge. No projects were considered that would block movement across the International Border.

6. Coordinate activities and funding among the participating agencies and Mexican agencies.

6.1.1. Establish a FTHL MOG. The MOG met three times per year to coordinate implementation of the conservation agreement in response to recommendations from the ICC. Meeting minutes were provided to all MOG and ICC members to facilitate effective coordination.

6.1.2. Hold semi-annual meetings of the ICC. The ICC met quarterly to discuss implementation of Planning Actions under the RMS and issues and challenges regarding implementation of the Planning Actions. In addition to ICC meetings, subgroups of the ICC met on occasion to discuss specific issues.

6.1.3. Develop a forum for discussions with agencies and individuals in Mexico. Directors of the Reserva de la Biósfera Alto Golfo de California y Delta del Río Colorado and the Reserva de la Biósfera el Pinacate y Gran Desierto de Altar cooperated with the ICC in furthering the knowledge and conservation efforts of the FTHL and its habitat. The Alto Golfo director hosted a meeting of the ICC at the Reserve's field station near El Golfo de Santa Clara, Sonora, and participated in one meeting in the U.S. A study, funded by BLM-Yuma and BOR was completed which investigated the status of FTHL in Sonora and Baja California del Norte (Rodríguez 2002), and developed interpretive materials (see 7.2 and 9.1).

6.2 Develop a conservation agreement. The conservation agreement was developed and was signed in June 1997. Signatories were AGFD; California Department of Parks and Recreation; NAF-El Centro; MCAS-Yuma; BLM, California and Arizona state offices; BOR, Lower Colorado Region; and USFWS, Region 1 and Region 2. The CDFG signed in July 1998.

6.3.1. Incorporate actions in Western Colorado Desert ecosystem plan. [BLM-El Centro designated all routes in the Western Colorado Desert as open, closed or limited in January 2003]

6.3.2. Incorporate actions into the CVMSHCP. BLM-Palm Springs participated in the development of the CVMSHCP. [This planning effort was ongoing as of January 2003. In addition, BLM-Palm Springs completed an amendment to the California Desert Conservation Area Plan in December 2002. Actions described in the RMS were incorporated into that planning decision and will be implemented on federal land in the Coachella Valley.]

6.4. Coordinate with BP to develop mutual agreements. In addition to the education efforts described in 2.4.4, coordination with BP occurred at multiple levels, and BP was represented at several MOG meetings.

7. Promote the purposes of the strategy through law enforcement and public education.

7.1. Provide sufficient law enforcement. AGFD, BLM, and MCAS-Yuma participated in off-road vehicle patrols in the Yuma Desert. Two MCAS-Yuma law enforcement positions were filled in April 2001 for the west side of the BMGR to help prevent illegal off-highway activity. ABDSP law enforcement rangers enforced regulations in the Borrego Badlands MA. Insufficient law enforcement was available to prevent illegal OHV traffic and illegal dumping in the West Mesa, Yuha Desert, East Mesa MAs, and the BOR portion of the Yuma Desert MA. [As of January 2003, BLM-El Centro was filling vacant law enforcement positions and applying for grants to add two additional rangers.]

7.2. Provide public information and education about the MAs and RA. FTHL signs were placed along roads within the East Mesa MA as compensation for a pipeline project. FTHL signs were posted at most access points into the Yuma Desert MA; however, most were subsequently stolen. BOR conducted information workshops and survey training for maintenance staff and other interested parties. Information brochures addressing the FTHL were prepared by staff from OWSVRA, printed in both English and Spanish, and were

distributed to other agencies, their staffs, and the public. Funding for these brochures was provided by BOR and BLM. MCAS-Yuma developed a wallet-sized photo information card addressing the FTHL and distributed the card to key personnel working on BMGR. All users of BMGR received a briefing that included information on the FTHL, slides, pictures and/or descriptions. BLM-El Centro completed a range-user brochure and wallet cards to educate all range users of the presence of FTHL and correct procedures to avoid impacting lizards or to report any accidental impacts to lizards. The brochures and wallet cards were distributed to all range users. NAF-El Centro also produced brochures and wallet cards. During the 2001 and 2002 Yuma Birding and Nature Festivals, an ICC member presented one-hour seminars on the biology and conservation of the FTHL and hosted field trips to the Yuma Desert MA. FTHL ecology and habitat, the conservation agreement, and cooperative efforts of the participating agencies were highlighted during the seminars and field trips, all of which were well attended and well received by the public. Rorabaugh *et al.* (2000) presented a paper at a symposium entitled Creative Cooperation in Resource Management in which they described the multi-agency conservation agreement to implement the RMS for the FTHL. AGFD and USFWS met with the Tucson Herpetological Society and other plaintiffs in a suit against USFWS regarding their 1997 decision to not list the FTHL. This meeting provided an opportunity to better explain the position of AGFD and USFWS regarding the status of the FTHL and the decision to not list it. Preservation of FTHL habitat was a priority issue in discussions with the Yuma Mesa Irrigation and Drainage District, BOR, BLM-Yuma, MCAS-Yuma, and the city of Yuma regarding development in the Foothills and the inclusion of this area into the water district. AGFD coordinated with Yuma city and county planners in the Growing Smarter and open spaces initiatives in Arizona. Discussions included the funding of habitat enhancement/acquisition and the potential for creating FTHL reserves outside the MA. With funding provided by BOR and BLM, Centro Intercultural de Estudios de Desiertos y Océanos worked with the education departments of the Alto Golfo and Pinacate Reserves to develop a brochure that informed visitors about the FTHL, biological features of the Gran Desierto de Altar, and the habitats and potential threats to FTHLs in Mexico (Rodríguez 2002). In addition, the brochure included specific information on regulations and recommendations for people to help protect FTHLs. Signs were developed to place in strategic areas in the reserves and along their borders, particularly areas close to railroad routes, roads frequented by locals, and roads accessing ejido lands.

8. Encourage and support research to promote conservation of FTHL and desert ecosystems.

8.1. Require permits for research. AGFD and CDFG continued to require a scientific collecting permit for any person who handled a FTHL. The AGFD issued 21 permits during this reporting period and CDFG issued seven through June 2001.

8.2. OWSVRA shall continue to budget for research. OWSVRA funded four studies (Young 1999; Setser and Young 2000; Setser 2001; T. Gardner 2002) to collect information on demographics, habitat use, and effects of OHV activity

(see 8.4 and 8.5). The Ocotillo Wells District funded genetic and relative abundance studies by Utah State University researchers during the 2002 field season.

8.3. Develop a cost-effective technique for assessing FTHL abundance.

8.3.1. Test trapping and other techniques to enumerate FTHLs directly. ICC members consulted with Dr. David Anderson, a statistician from Colorado State University, regarding the practicality of monitoring FTHL population trends. Colorado State University statisticians developed a proposal for a trapping web design, which uses 97 pit fall traps arranged along 8 lines radiating from a central point. The theory is based on distance sampling, and the statistics of importance are the distances from the center of the web to the traps containing FTHL. Based on capture rates of FTHLs in pit fall traps reported by other studies, the authors recommended establishing 10-15 webs in each MA to achieve desirable sample sizes. ICC members established a trial trapping web in the Yuma Desert MA to test methods and materials, and to help evaluate whether this technique could produce the minimum of five captures per web calculated to be required to estimate densities and trends. The web was operated in May and September of 2000, 2001, and 2002. Total captures were four, five, five, and four, respectively. A proposal to implement a full-scale trapping web was prepared by the ICC for submittal to funding sources. Young and Young (2000) used intensive tracking techniques to estimate densities in the Yuma Desert MA. Their estimates ranged from 0.5 lizards per hectare during drought conditions to 5.1 lizards per hectare in a good year. They believed that this variability, resulting from variable weather patterns, would be problematic for use in trends analysis. They estimated a minimum population of 28,000 FTHLs on the BMGR in 1996. A proposal to evaluate detection by dogs was drafted and is being finalized. A survey that uses mark/recapture methodology to estimate populations was developed and implemented by BLM-El Centro (Grant *et al.* 2001). It yielded a crude abundance estimate of 1.9 lizards per hectare (95% CI: 1.08 to 3.91 lizards/ha). [In the summer of 2002, the protocol was modified to provide a more robust estimate. This effort resulted in the best MA population estimate to date. The population of FTHLs in the Yuha Basin MA was estimated at 18,494 adults (95% CI = 14,596-22,391) and 8,685 juveniles (95% CI =6,860-10,510). "Adults" included all individuals over 60 mm SVL, while juveniles included all individuals less than 60 mm SVL (Wright and Grant 2002, 2003). This method is presented in Appendix 4.]. A presence/absence survey protocol was developed for determining distribution in Mexico (Gardner *et al.* 2001), and a modified version of that protocol is proposed for monitoring distribution in MAs (Appendix 5).

8.3.2. Determine effectiveness of direct enumeration techniques and scat counts as an index of relative abundance. Young and Young (2000) tested pitfall traps, walking surveys, driving surveys, and tracking for their effectiveness in surveying FTHL. Tracking and driving were the most successful.

8.4. Determine life history and demographic data. Young and Young (2000) captured 499 individual FTHLs in Arizona, and fitted 80 with radio transmitters to track movements and habitat use. They made comparisons

between FTHLs and desert horned lizards, and between drought years and a wet year. Growth, longevity, predation, home range, habitat use, and behavior were investigated. Setser and Young (2000) caught, measured and marked 95 FTHLs at OWSVRA. They compared growth rates between years and with FTHLs captured in Arizona. They attached transmitters to 58 FTHLs to obtain home range and microhabitat use data. Comparisons were made between males, females, juveniles, and with Arizona FTHLs. They analyzed associations between FTHL habitat use and habitat features. Setser (2001) caught, measured and marked 121 FTHLs at OWSVRA. He compared the length, weight, and condition index between areas and between FTHLs caught in 1999 and 1998. He attached transmitters to 65 FTHLs to obtain home range and microhabitat use data. Comparisons were made between males and females. Gardner *et al.* (2001) x-rayed several gravid FTHLs for reproductive analysis. Gardner and Foley (2001) conducted a research study at NAF-El Centro to quantify availability and use of FTHL habitat at target areas. Weights were tracked through the course of the season and thread bobbins were used to evaluate use of different substrates by FTHLs and desert horned lizards. T. Gardner (2002) captured a total of 82 individual FTHLs at OWSVRA in 2001 and placed transmitters on 49. Body condition and movements were monitored.

8.5. Determine effects of conflicting activities. A study at the Coachella Valley Preserve compared the invertebrate and reptile communities in an old vineyard and an undisturbed area (Cameron Barrows, CNLM, pers. comm.). Four FTHLs were caught in a regenerating vineyard, indicating their ability to use rehabilitated habitats. Nicolai and Lovich (2000) found that FTHL movements declined after an OHV race in the Yuha Desert. Setser and Young (2000) and Setser (2001) found a negative association between OHV disturbance and FTHL habitat use at OWSVRA. Based on qualitative observations, T. Gardner (2002) did not suggest that any differences in OHV activity had influenced the FTHLs at his study sites at OWSVRA. He did, however, recognize that some habitat factors (vegetation, sand availability) that appeared to differ between the sites may have been influenced by OHV activity. In addition, at OWSVRA, the district ecologist outfitted some individual lizards with radio-telemetry as part of a limited, ongoing study of the effects of OHVs on movement and home ranges. Wright and Grant (2002) determined that neither vehicle track coverage nor number of vehicle routes or roads were significantly correlated with FTHL numbers. However, plots with less than 9% vehicle track coverage had 3.5 times more FTHLs than plots with greater than 9% track coverage. Plots with a route or road on them did not have a significantly different number of FTHLs than plots without a route or road. They suggested that substrate characteristics played a greater role in affecting numbers of FTHLs than did vehicle traffic.

8.6. Determine genetic variation among populations and effects of barriers.

8.6.1. Determine genetic variation in MAs. Tissue samples (toe clips from live animals, plus liver and muscle from sacrificed animals) were obtained from FTHLs in the Yuma Desert MA in Arizona (Gardner *et al.* 2001) and several populations in California, including OWSVRA (Setser 2001; T. Gardner 2002), Yuha Desert (Dan Mulcahy, Utah State University, unpubl. data), East Mesa

MA (Dan Mulcahy, unpubl. data; Gardner & Foley 2001), West Mesa MA (Gardner & Foley 2001), and Coachella Valley (Tanya Trepanier, unpubl. data). Tissues from scattered localities in Baja California del Norte and Sonora, Mexico were also obtained (Rodríguez 2002). Dan Mulcahy is conducting the analyses and anticipates completion of the findings in 2003 (pers. comm.)

8.6.2. Determine effects of human-created barriers. This was not investigated.

8.6.3. Determine effects of natural barriers. The genetic analyses described under 8.6.1 will allow an evaluation of the effects of the Colorado River and the Salton Sea Trough as potential natural barriers.

8.7. Determine effectiveness of mitigation measures. BLM-Yuma tested ¼- and ½-inch mesh fencing to determine its durability for potential use in excluding FTHLs from roads. They found that both sizes withstood burial from drifting sand, but the ½-inch mesh resulted in ensnarement and mortality of zebra-tailed lizards. Utah State University researchers installed test enclosures and found that FTHL are not likely to climb fences of either size mesh. Gardner *et al.* (2001) found that ¼-inch mesh barrier fences were effective in reducing the number of FTHL entering the Auxiliary 2 road in the Yuma Desert MA. These findings were incorporated into a fencing protocol (Appendix 7).

9. Continue Inventory and Monitoring

9.1. Continue inventories. The area between I-10 and Dos Palmas was surveyed to determine if a corridor for FTHL existed there. Only desert horned lizards were found. The substrate was apparently too rocky and coarse for FTHL. Historic FTHL habitat in this area appeared to have been lost to agriculture. BLM-Yuma and AGFD completed a project to test Landsat imagery to predict FTHL occurrence. They found that the imagery could be used to predict with moderate accuracy areas of high to moderate lizard density. Areas with few or no FTHL could not be predicted with any accuracy, however. BLM-Palm Springs surveyed the area between the east end of Indio Hills and the Coachella Valley Preserve for FTHL and found none. These two populations were probably genetically isolated from one another. Due to the small area the Indio Hills population occupies (1,800 acres), its heavily impacted nature, and low population density, it is not believed to be viable in the long term. Surveys were conducted along fringe areas of the Borrego Badlands MA in the area of Clark Dry Lake, Font's Wash, and the western Borrego Badlands. These surveys added to our knowledge of documented FTHL range. FTHL were monitored for presence/absence on a provisional basis (pending the establishment of an effective protocol) at OWSVRA. With funding from BOR and BLM, an important study to investigate the distribution of FTHL in Sonora and Baja California del Norte was conducted. The Centro Intercultural de Estudios de Desiertos y Océanos, a binational non-governmental organization in Puerto Peñasco, Sonora, was contracted to conduct this study. The principal investigator worked closely with ICC members to develop a survey protocol, conduct surveys, and analyze the results. Cooperators in this project included the Reserva de la Biósfera Alto Golfo de California y Delta del Río Colorado, the Reserva de la Biósfera el Pinacate y Gran Desierto de Altar,

and several ICC agencies. ICC members made several trips, totaling 43 person-days of effort, to assist with this project. New distributional records were obtained in Baja California, the Gran Desierto, and Alto Golfo. A database was developed in conjunction with these surveys for storing locality records of FTHL in Mexico, morphometric and habitat data, and time and date of encounters. An interim report was completed during this reporting period, and a final report was completed in July 2002 (Rodríguez 2002).

9.2. Monitor habitat quality and population trends in the MAs.

9.2.1. Monitor implementation of the RMs. Implementation has been monitored through the compilation of annual reports as required by 9.2.4 (ICC 1998; Henry 1999; Twedt and Wright 2002).

9.2.2. Monitor population trends. Trends in encounter rates for FTHL and their scat were analyzed using data collected from 1979 to 2001 on three MAs in California (Wright 2002). Each year from 1979 to 2001 (except 1981), sample sites were drawn at random or systematically from three areas in the eastern Yuha Desert, West Mesa, and southern East Mesa MAs. Analysis of these data showed no significant trends in encounter rates of FTHL or their scat. However, given the potential observer and sampling biases, a minor trend (upward or downward) could not be ruled out. Extension of this work into 2002 in the eastern Yuha Desert showed a similar non-significant trend (Wright and Grant 2002). Observations of FTHL during the course of biannual reptile surveys at OWSVRA were recorded as part of regular monitoring. FTHL observations by staff during archeology surveys, ranger patrol, or in the course of maintenance duties were noted. MCAS-Yuma continued its long-term surveys of the Auxiliary 2 road to assess the number of road kills and to monitor population trends.

9.2.3. Document habitat disturbance and loss. Data forms were developed to facilitate standardized assessment and documentation of habitat disturbance and loss. The habitat impacts that were authorized are shown in Table 2. Narratives describing these impacts and significant impacts on state or private lands may be found within the ICC annual reports. The Navy contracted Tierra Data Systems to aerial photograph and digitally map the 5 MAs and the RA to document habitat loss and disturbance. This effort provided a baseline with which to compare future analyses of habitat condition. BLM-El Centro began to quantify the level of vehicular impacts to FTHL habitat in their resource area using a step-point method. This consisted of walking 2.5-mile triangular transects within randomly chosen sections and tabulating what was found at the point of the surveyor's toe every 20th step along the transect. Variables measured included plants, vehicular tracks, organic litter, human footprints, water bottles, piles of clothes, and campfires. These surveys were conducted in 2001 in southeastern and southern portions of the Yuha and East Mesa MAs, respectively. Approximately 10.5% of the southeastern portion of the Yuha Desert MA was found to be covered with vehicle tracks. About 4.8% of the southern half of the East Mesa MA was covered with vehicle tracks (Wright 2002). The number of vehicle routes crossed by 12 transects in the Yuha Desert MA declined by 45% from 2001 to 2002, probably due to unusually strong spring sandstorms and changes in BP practices (Wright and

Grant 2002). A similar effort was conducted in the Yuma Desert MA, where vehicle tracks were found to cover 2.9% of the ground surface in the BMGR portion of the MA and 3.4% of the surface in the 5-Mile Zone portion (Rorabaugh *et al.* 2002). Piest and Knowles (2002) used high-altitude photographs to document the amount of FTHL habitat that existed in Arizona, and the amount that was lost prior to and after 1996. They estimated that 6,134 acres of habitat were lost during 1996-2002, representing a 3.7% decline in available habitat.

9.2.4. Prepare an annual report of monitoring results and implementation progress. Two annual reports (ICC 1998; Henry 1999) and a biannual report (Twedt and Wright 2002) were produced that summarized monitoring and RMS implementation from July 1997 through June 2001. The 2001/2002 report was in preparation.

9.2.5. New data shall be used in evaluations of the RMS and in assessing proposed changes. The new information described in the planning actions above was relied upon heavily during the revision of this RMS.

Table 2. Acres of FTHL habitat authorized for impact on lands managed by signatory agencies.

Agency	Inside MA	Outside MA	Total[1]
Palm Springs BLM	0	40.6	40.6[2]
El Centro BLM	146.5	240.8	387.3
Yuma BLM	0	81.3	81.3
Naval Air Facility - El Centro	1	0	1
Marine Corps Air Station-Yuma	2.5	0	2.5
Anza-Borrego Desert State Park	0	0	0
Ocotillo Wells SVRA	0	0	0
Bureau of Reclamation	0.2	391	391.2
Total Acres	150.3	753.7	904.0

[1]Figures exclude impacts from casual OHV use, BP activity, and OHV racing.

[2]Disturbance was considered temporary on 38.6 acres and permanent on 2 acres.

Management Implementation Schedule, 2003-2007

Table Description

The following table displays the priority, responsible agency, estimated cost, and schedule for completing each Planning Action. Initiation of these actions is subject to availability of funds. Actions in the table are explained further in the corresponding Planning Actions. For certain Planning Actions the five year total cost estimate is not broken down into yearly amounts because the actions are not carried out on a yearly or predictable basis. Several Planning Actions have no specific funds allocated because they are part of normal operations.

The priorities indicated in the table are assigned the following definitions:

Priority 1: An action that must be taken in the near term to conserve the species and prevent irreversible population declines.

Priority 2: An action that must be taken to prevent significant declines in population or habitat quality.

Priority 3: All other actions necessary to meet the goals and objectives of this Strategy.

The following abbreviations and symbols are used in the implementation schedule:

ABDSP .....Anza-Borrego Desert State Park

AGFD .....Arizona Game and Fish Department

BLM .....Bureau of Land Management

BOR .....Bureau of Reclamation

ICC.....Interagency Coordinating Committee

CDFG.....California Department of Fish and Game

OWSVRA.....Ocotillo Wells State Vehicular Recreation Area

USFWS.....U.S. Fish and Wildlife Service

USMC.....U.S. Marine Corps

USN .....U.S. Navy

☑ .....Task completed since 1997

.....Task not completed

⇨,↻.....Task ongoing

Management Strategy Implementation Schedule, 2003-2007

Status	Priority	Action number	Planned action	Duration (yrs)	Resp agency	Total cost ($000)	Cost estimates ($000) FY 2003	FY 2004	FY 2005	FY 2006	FY 2007
		1.	**Delineate and designate FTHL MAs**								
⇨	1	1.1	Designate Yuma Desert MA	2	BLM BOR USMC	0					
⇨	1	1.2	Designate East Mesa MA	2	BLM USN	0					
⇨	1	1.3	Designate West Mesa MA	2	BLM USN	0					
⇨	1	1.4	Designate Yuha Desert MA	2	BLM	0					
⇨	1	1.5	Designate Borrego Badlands MA	2	ABDSP	0					
⇨	3	1.6	Designate Ocotillo Wells RA	1	BLM OWSVRA ABDSP	0					
⇨	1	1.7	Designate conservation areas in Coachella Valley	2	BLM USFWS CDFG	0					
		2.	**Define and implement actions necessary to minimize loss or degradation of habitat**								
⇨	1	2.1.1	Apply mitigation measures	↻	ALL	0					
⇨	1	2.1.2	Require compensation	↻	ALL	25	5	5	5	5	5
⇨	1	2.2.1	Limit discretionary land uses authorizations and rows to 10 acres and 1% total per MA	↻	ALL	0					
⇨	1	2.2.2	Do not dispose of lands in MAs	↻	ALL	0					
⇨	3	2.2.3	Continue maintenance in existing ROWs	↻	ALL	0					
⇨	2	2.2.4	Require fencing along Yuma Desert MA boundary road	↻	ALL	0					
⇨	2	2.3.1	Limit surface disturbance from mineral activities in MAs	↻	ALL	0					
☑	2	2.4.1	Reduce new roads to a minimum in MA s	2	ALL	0					
☐	1	2.4.2	Designate routes "open," "closed, or limited." Give route signing a priority	2	BLM	200	50	90	20	20	20
☐	1	2.4.3	Reduce route density in MAs		See 2.4.2						
⇨	1	2.4.4	Coordinate with BP	↻	ALL	20	4	4	4	4	4
⇨	3	2.5.1	Allow OHV recreation in RA	↻	OWSVRA	0					
⇨	1	2.5.2	No competitive recreational events in MAs	↻	ALL	0					
⇨	2	2.5.3	Allow non-motorized recreational activities in MAs, but no new recreational facilities	↻	ALL	0					
⇨	2	2.5.4	Limit camping in MAs	↻	BLM	20	10	10			
⇨	2	2.5.5	No new long-term visitor areas in MAs	↻	ALL	0					
⇨	3	2.6	Authorize limited use of flora in MAs	↻	ALL	0					
⇨	1	2.7	Allow military maneuvers and encampments only in designated sites in MAS	↻	USN USMC	0					
⇨	3	2.8	Suppress fires in MAS using limited fire suppression methods in MAs	↻	ALL	0					
⇨	1	2.9	Prohibit pesticide treatments in MAs	↻	ALL	0					

Management Strategy Implementation Schedule, 2003-2007

Status	Priority	Action number	Planned action	Duration (yrs)	Resp agency	Total cost ($000)	Cost estimates ($000) FY 2003	FY 2004	FY 2005	FY 2006	FY 2007
⇨	3	2.10	Limit other activities consistent with above	↻	ALL	0					
		3.	**Rehabilitate damaged and degraded habitat**								
⇨	2	3	Rehabilitate damaged and degraded habitat in MAs	↻	BLM BOR ABDSP USMC USN	200	40	40	40	40	40
		4.	**Bring all lands within MAs into public management**								
☑	3	4.1	Maintain prioritized list of parcels for acquisitions; and respect private rights	1	ALL	0					
☐	3	4.2	Procure funds for land acquisitions in MA s (37,600 acres of private lands acres in California MAs at $250 per acre)	↻	BLM CDFG ABDSP OWSVRA	9,400					
⇨	3	4.3	Use compensation funds to acquire key lands in MAs	↻	BLM CDFG ABDSP OWSVRA	20	4	4	4	4	4
⇨	3	4.4	Exchange lands opportunistically	↻	BLM	20	4	4	4	4	4
		5.	**Maintain or establish effective habitat corridors between naturally adjacent populations**								
⇨	2	5.1	Limit or mitigate activities in movement corridors	↻	ALL	25	5	5	5	5	5
⇨	3	5.2	Coordinate with Mexico and INS	↻	ALL	10	2	2	2	2	2
		6.	**Coordinate activities and funding among the participating agencies and Mexican agencies**								
☑	2	6.1.1	Establish FTHLMOG	↻	ALL	5	1	1	1	1	1
⇨	2	6.1.2	Hold semi-annual ICC meetings	↻	ALL	5	1	1	1	1	1
⇨	3	6.1.3	Establish forum for discussions with agencies and individuals in Mexico	↻	ALL	5	1	1	1	1	1
☑	1	6.2	Develop Conservation Agreement	1	ALL	0					
☐	2	6.3.1	Incorporate actions in Western Colorado Desert ecosystem plan (Note: other state and local agencies will fill key roles)	3	ALL	750	20	300	250	200	
☑	2	6.3.2	Incorporate actions in CVMSHCP (Note: other state and local agencies will fill key roles)	3	BLM CDFG USFWS	600	300	200	100		
☐	2	6.3.3	Incorporate actions in Western Colorado Desert Route Designation	3	BLM						
⇨	1	6.4	Coordinate with BP and develop mutual agreements	2	BLM BOR	6	3	3			
⇨	2	6.4.1	Encourage use of techniques to minimize BP OHV activity	↻	BLM BOR	5	1	1	1	1	1
☐	2	6.4.2	Prepare educational briefing for BP agents	1	BLM BOR	5					
		7.	**Promote the purposes of the strategy through law enforcement and public education**								
☐	1	7.1	Provide adequate law enforcement	↻	BLM CDFG AGFD	750	150	150	150	150	150

Management Strategy Implementation Schedule, 2003-2007

Status	Priority	Action number	Planned action	Duration (yrs)	Resp agency	Total cost ($000)	Cost estimates ($000) FY 2003	FY 2004	FY 2005	FY 2006	FY 2007
⇨	3	7.2	Provide public information and education	↻	ALL	25	5	5	5	5	5
		8.	**Conduct research necessary to effectively define and implement necessary management actions**								
⇨	3	8.1	Require permits for research	↻	ALL	5	1	1	1	1	1
⇨	2	8.2	OWSVRA shall continue to fund research	↻	OWSVRA	200	40	40	40	40	40
☐	2	8.3.1	Test trapping as a population census technique	2	ALL	170					
☐	2	8.3.2	Test direct counting methods	2	ALL		Included in 8.2 and 8.3.1				
☐	2	8.4	Determine life history and demographic data	2	ALL		Also included in 8.2 and 8.3.1				
☐	2	8.5	Determine effects of conflicting activities	5	ALL	300					
☐	3	8.6.1	Determine genetic variation in population	5	ALL	30					
☐	3	8.6.2	Determine effects of non-natural barriers	5	ALL	30					
☐	3	8.6.3	Determine effects of natural barriers	5	ALL	15					
☐	3	8.7	Determine effectiveness of mitigation measures	5	ALL	20					
		9.	**Continue inventory and monitoring**								
⇨	2	9.1	Continue inventories	↻	ALL	125	25	25	25	25	25
⇨	2	9.2.1	Monitor implementation	↻	ICC	40	8	8	8	8	8
⇨	2	9.2.2	Monitor population trends	↻	ALL (MCAS)	320 (70)	70	105 (35)	70	105 (35)	70
⇨	1	9.2.3	Document habitat disturbance and loss	↻	ALL	40	8	8	8	8	8
⇨	1	9.2.3.1	Conduct aerial reconnaissance and analysis of surface disturbance on the five MAs every five years	↻	ALL	50					
⇨	2	9.2.4	Prepare annual monitoring/implementation report	↻	ICC	20	4	4	4	4	4
⇨	1	9.2.5	Use new inventory, monitoring, and research data in evaluations and proposed changes	↻	ALL	0					

Habitat Management

Management Areas

Each MA is controlled by multiple agencies and may include private inholdings (Table 3). MAs were designed to include most FTHL habitat identified as key areas in previous studies, even though the absolute densities of FTHLs within the MAs were not known. MAs were proposed based upon accepted principles of good preserve design, utilizing the best information available at the time. MAs included as large an area as possible, but avoided extensive, existing and predicted management conflicts (e.g., OHV open areas). Conflicts that are localized in nature (e.g., sand and gravel mines, military bombing targets) were accepted within some of the MAs. The MAs are the

core areas for maintaining self-sustaining populations of FTHLs in perpetuity. Legal descriptions of the MAs and the RA are provided in Appendix 3, and maps (Figure 4 to Figure 10) are provided below. Maps do not show existing OHV trails, which are extensive in some MAs, except for major trails at OWSVRA.

The prescriptions that guide the management of lands within the MAs (see Planning Action 2, pg 26) were designed primarily to reduce surface disturbance and to promote reclamation of areas, such as duplicate roads that are no longer needed.

Table 3. Overview of acreage and ownership of Management Areas.

Management Area[1]	Federal Non-military[2]	Federal Military	State[3]	Private	Total
Yuma Desert[4] (Figure 4)	16,200	114,800[5]	0	0	131,000
East Mesa (Figure 5)	99,900	8,500	0	6,900	115,300
West Mesa (Figure 6)	83,200	29,800	1,300	21,800	136,100
Yuha Basin (Figure 7)	57,200	0	0	3,000	60,200
Borrego Badlands (Figure 8)	0	0	36,500	5,900	42,400
Total	256,500	153,100	37,800	37,600	**485,000**

1 The existing Coachella Valley Preserve and Dos Palmas ACEC (not included in table) includes about 17,076 and 14,400 acres, respectively, administered by federal and state agencies and private organizations.

2 Includes lands administered by the BLM and BOR.

3 Includes lands administered by California Department of Parks and Recreation and California State Lands Commission

4 Pending designation of the proposed Area Service Highway. A portion of the Yuma Desert MA boundary will be formed by the Area Service Highway, if and when constructed (see Figure 4).

5 Lands administered by MCAS-Yuma

Other Lands

Ocotillo Wells State Vehicular Recreation Area

A RA was established in California (Figure 9) where FTHL research is encouraged and funded by the California Department of Parks and Recreation's Division of Off-Highway Motor Vehicle Recreation (Foreman 1997). The RA is about 77,000 acres in size. About 47,000 acres of the RA are owned by the state and 22,000 acres are owned by BLM, all of which are managed as OWSVRA. The State has applied to BLM under the Recreation and Public Purposes Act for transfer and patenting of all 22,000 acres of BLM land to OWSVRA. The State is also actively acquiring the remaining private lands (8,000 acres) within the RA.

OWSVRA is mandated to provide OHV recreation (free-play, racing, and touring) in a manner to sustain long-term use. Soil removal, artifact collecting, hunting, and shooting are prohibited within OWSVRA. No collecting of reptiles is allowed except under a scientific collecting permit issued by CDFG and approved by OWSVRA.

In 1991, an extensive wildlife survey and habitat protection plan (Kutilek *et al.* 1991; Wone *et al.* 1991) was completed in OWSVRA. The presence of FTHLs and the possibility of listing precipitated a study in 1994 (Wone *et al.* 1994) to develop methods for monitoring population trends in OWSVRA. In these studies, methods of monitoring FTHL population trends on permanent plots in OWSVRA and on control plots were assessed (Wone and Beauchamp 1995b; Wone *et al.* 1997). OWSVRA has since funded several studies (Young 1999; Setser and Young 2000; Setser

2001; T. Gardner 2002; Gardner in prep) investigating topics such as: demographics, habitat use (including investigation of the mud hills habitat type), movement patterns, and the effects of OHV activity on FTHLS and their habitat. OWSVRA has made a commitment to continue to support FTHL research through 2007.

Anza-Borrego Desert State Park

Lands within ABDSP are managed to conserve native plant and animal communities. Mining, soil removal, grazing, rock hounding, artifact collection, hunting, shooting, and other activities that could cause surface disturbances are prohibited in the park. FTHLS occur on an estimated 30,000 to 40,000 acres of the Park.

Within the 600,000-acre park, there is a system of primitive roadways about 500 miles in length. No vehicular activity is allowed off these roadways. Patrol rangers cite violators; the park's patrol aircraft provides backup. Designated roads that might impact sensitive natural or cultural resources can be closed seasonally or permanently by order of the District Superintendent. OHVS are prohibited from park roads unless they are licensed for use on highways. This rule essentially excludes use of all-terrain vehicles, quad-runners, high performance two-cycle motorcycles, and most dune buggies.

All animal and plant life within ABDSP is protected. No collection of reptiles is allowed, with the exception of those taken under a scientific collecting permit issued by the park office. Reptile poaching takes place on paved roadways, but usually does not include FTHLS (ABDSP files; Mark Jorgensen, pers. comm.)

Coachella Valley

Upon completion, the CVMSHCP will protect approximately 44.5% of the remaining FTHL habitat in the valley. This plan has been in preparation approximately 7-8 years, and will likely be signed in 2003. The FTHL is a covered species in this plan. An earlier HCP, implemented in 1986 to provide protection for the Coachella Valley fringe-toed lizard, also provides protection for FTHL habitat in the valley. Several hundred acres of privately owned and currently occupied habitat remains adjacent and connected to protected habitat. These lands are currently at risk for development, but will be protected if there are willing sellers and funds available to purchase through the CVMSHCP (Barrows 2002). In addition to protections via the CVMSHCP, habitat for FTHL within Dos Palmas ACEC and other BLM-managed public lands in eastern Riverside County, are already in conservation status and will remain so.

In the mid 1980's, the Coachella Valley Preserve System was established primarily for conservation of the Coachella Valley fringe-toed lizard (*Uma inornata*). The BLM, USFWS, CDFG, California Department of Parks and Recreation, and The Nature Conservancy acquired major portions of the preserve system. The System consists of three units totaling about 20,114 acres (Coachella Valley Preserve - 17,076 acres; Willow Hole-Edom Hill Preserve - 1,863; and Indian Avenue Preserve - 1,175 acres). About 6,000 acres of the System contain suitable FTHL habitat (Figure 10). The USFWS holdings were designated the Coachella Valley National Wildlife Refuge System. BLM-administered lands were designated an ACEC in 1993. The CDFG lands were designated an Ecological Reserve. The CDPR manages the adjacent Indio Hills State Park in a manner consistent with the Preserve goals. An interim plan was prepared in 1986 by The Nature Conservancy; it was replaced by an updated, interagency management plan in 1995 (BLM *et al*. 1995). A preserve management team meets quarterly to discuss management activities. No vehicular traffic is allowed.

Dos Palmas ACEC

The Dos Palmas ACEC is located north of the Salton Sea community of North Shore and encompasses about 14,400 acres of federal, state, and private lands. Surveys for FTHL in the southern part of the ACEC in the late 1970's resulted in the discovery of FTHL near Bat Cave Buttes. No additional surveys have been conducted since the 1970's. The ACEC is managed cooperatively by an interagency management committee, consisting of representatives from BLM, CDFG, California Department of Parks and Recreation, CNLM, and USFWS, which meets quarterly to discuss management issues and directions. In 1998, BLM prepared an Ecosystem Management Plan for the ACEC and continues to implement that today. Vehicular traffic is limited to existing, designated routes. BLM-Palm Springs has requested funding in Fiscal Years 2004 and 2005 to conduct surveys at Dos Palmas and east toward the East Mesa MA in Imperial County.

Arizona Lands outside the Yuma Desert MA

On BLM and BOR FTHL habitat outside BMGR, OHV use is limited to existing roads and trails. Because BLM and BOR are signatories to this document, surface-disturbing projects are subject to mitigation and compensation as described in this document. The Arizona State Land Department has not developed a plan for the management of state of Arizona lands within FTHL habitat. The State Land Department is processing land purchase applications for state of Arizona lands east of Yuma and near San Luis.

Mexican Habitat

Although this strategy currently addresses habitat in the U.S. only, there are objectives and planned actions for establishing and maintaining contacts with appropriate agencies and personnel in Mexico to promote the conservation of FTHL habitat within Mexico. Agencies that have the authority to work with Mexico, including the AGFD, CDFG, USFWS, BOR, and BLM, have developed partnerships with agencies, researchers, and non-governmental organizations in Sonora, and will work to develop similar contacts in Baja California Norte. It is hoped that through these contacts and exchanges of ideas a similar management strategy will be adopted in Mexico. This program may include corridors between MAs in the U.S. and Mexico.

Lands in El Parque Nacional del Pinacate Cerro Pinto and the Sierra del Rosario in Sonora and near the delta of the Colorado River in Sonora and Baja California are in core protection zones of biosphere reserves (Reserva de la Biósfera de El Pinacate y Gran Desierto de Altar and Reserva de la Biósfera del Alto Golfo de California y Delta del Río Colorado). El Parque Nacional del Pinacate is an area administered by the Mexican government with use restrictions similar to a national park in the U.S. However, the boundaries are not well established, and enforcement of regulations is minimal. The Pinacate area is primarily a volcanic zone within which FTHL habitat is probably limited to the sandy perimeters of Volcán Pinacate. Reserva de la Biósfera Alto Golfo includes FTHL habitat in Sonora in the vicinity of the Colorado River Delta and the Gran Desierto.

Figure 4. Yuma Desert Management Area.

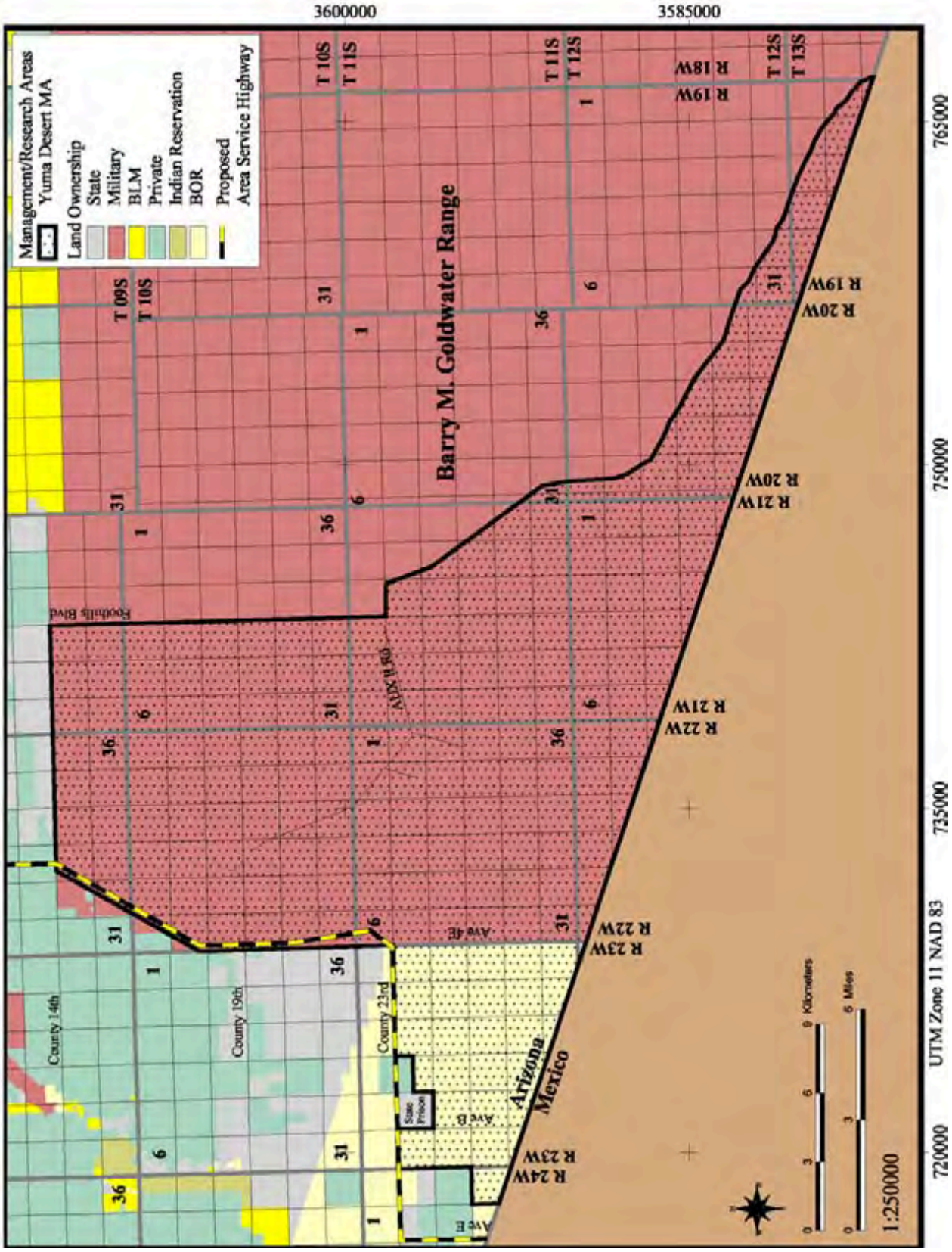


Figure 5. East Mesa Management Area.

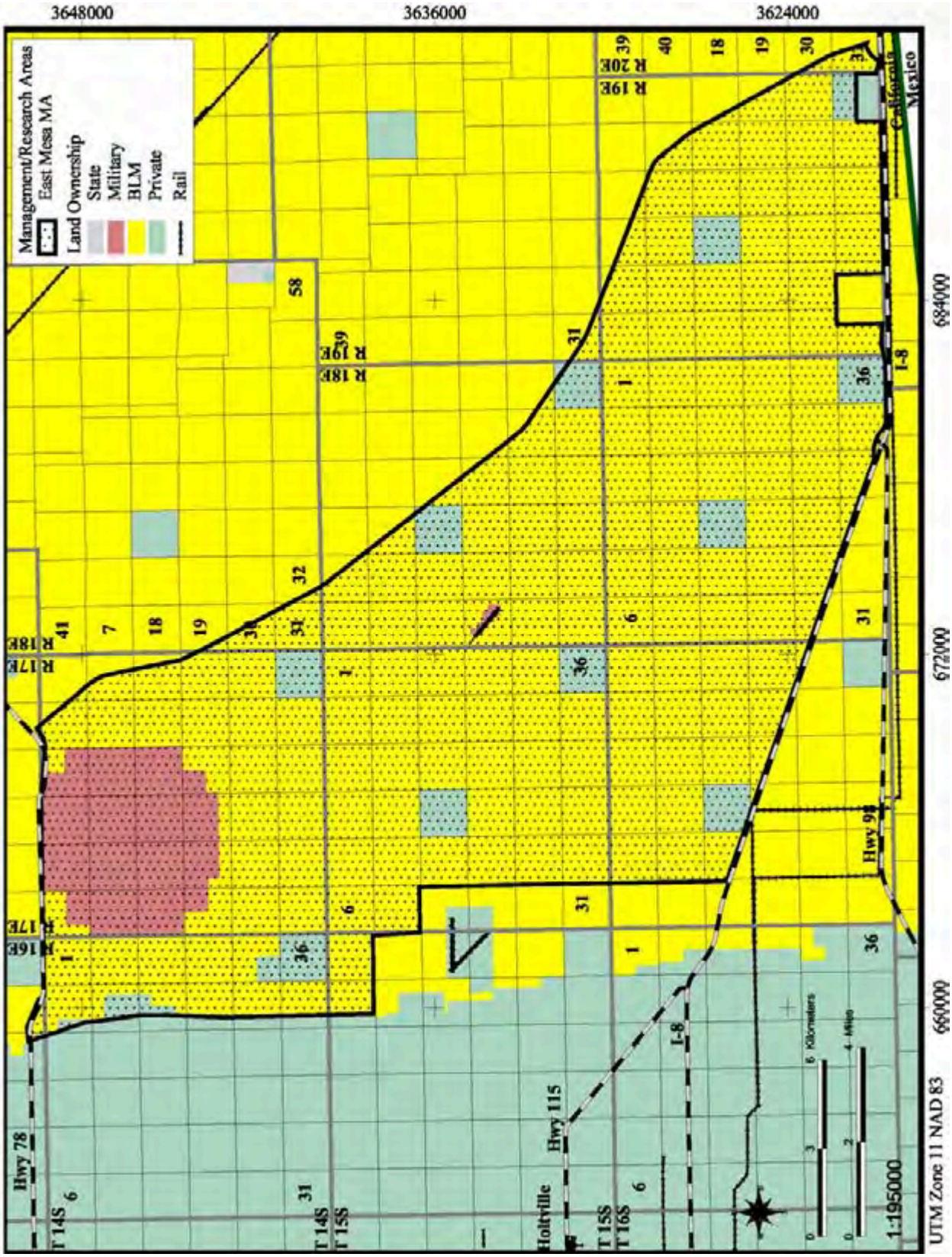


Figure 6. West Mesa Management Area.

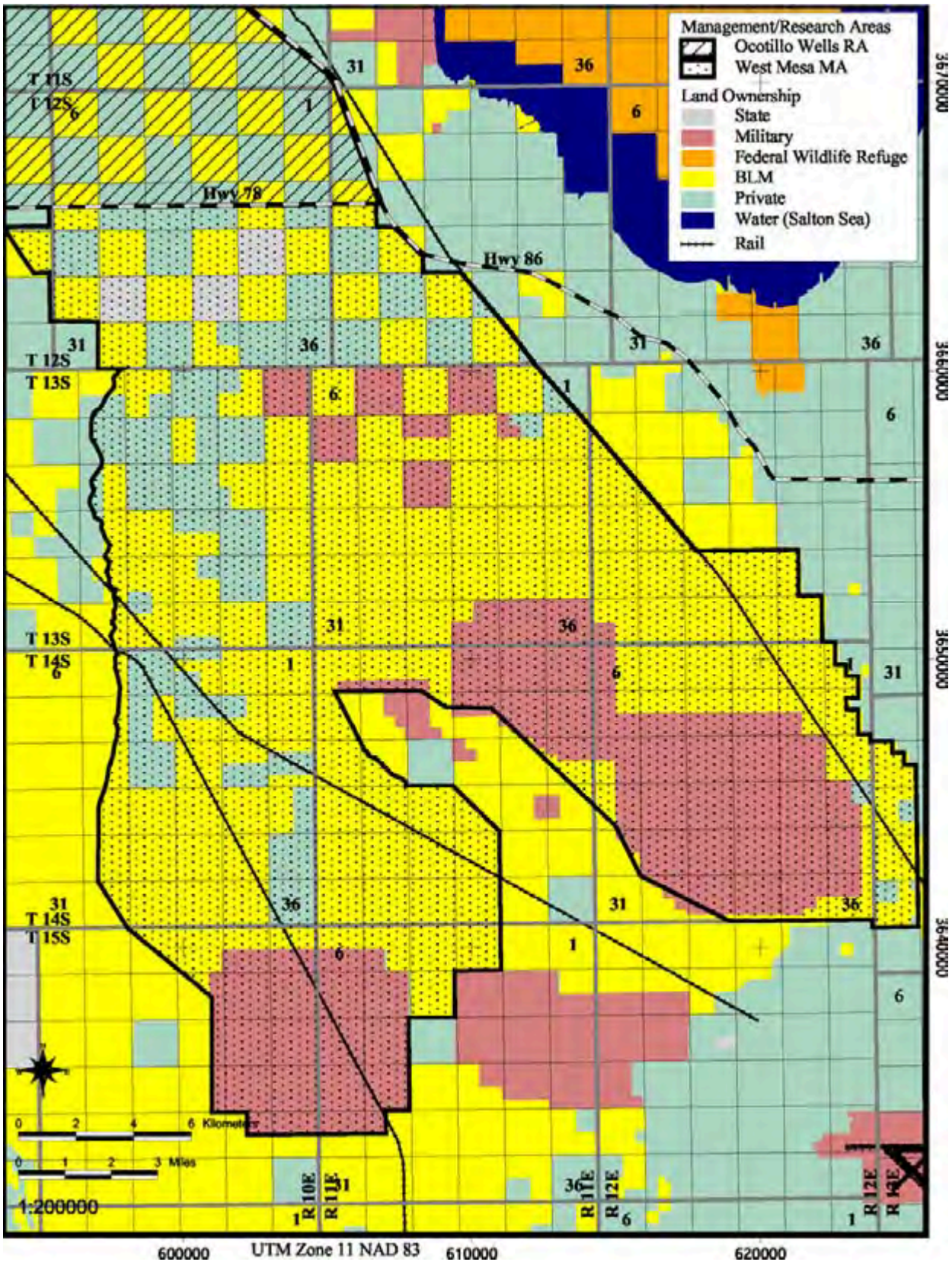


Figure 7. Yuha Desert Management Area.

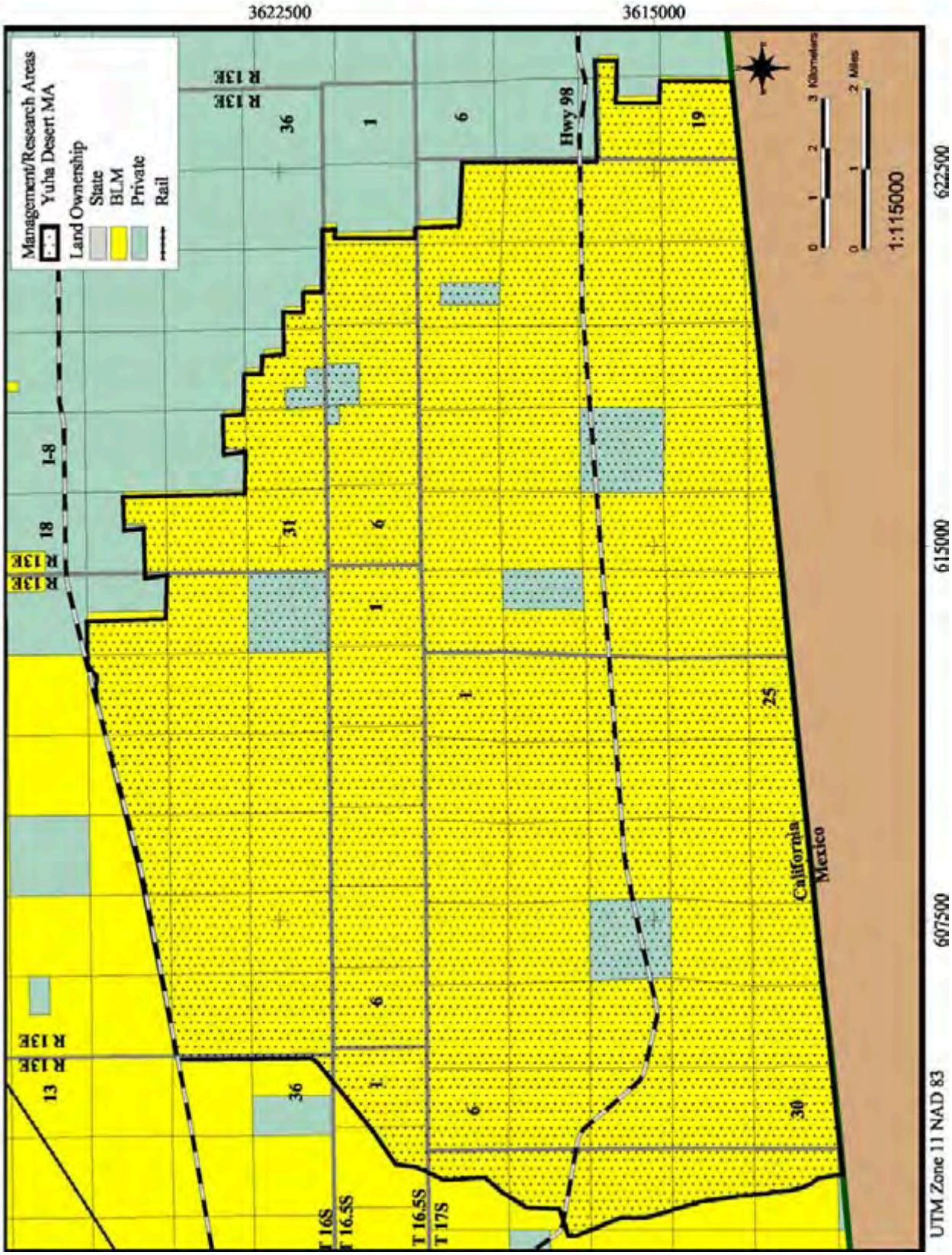


Figure 8. Borrego Badlands Management Area.

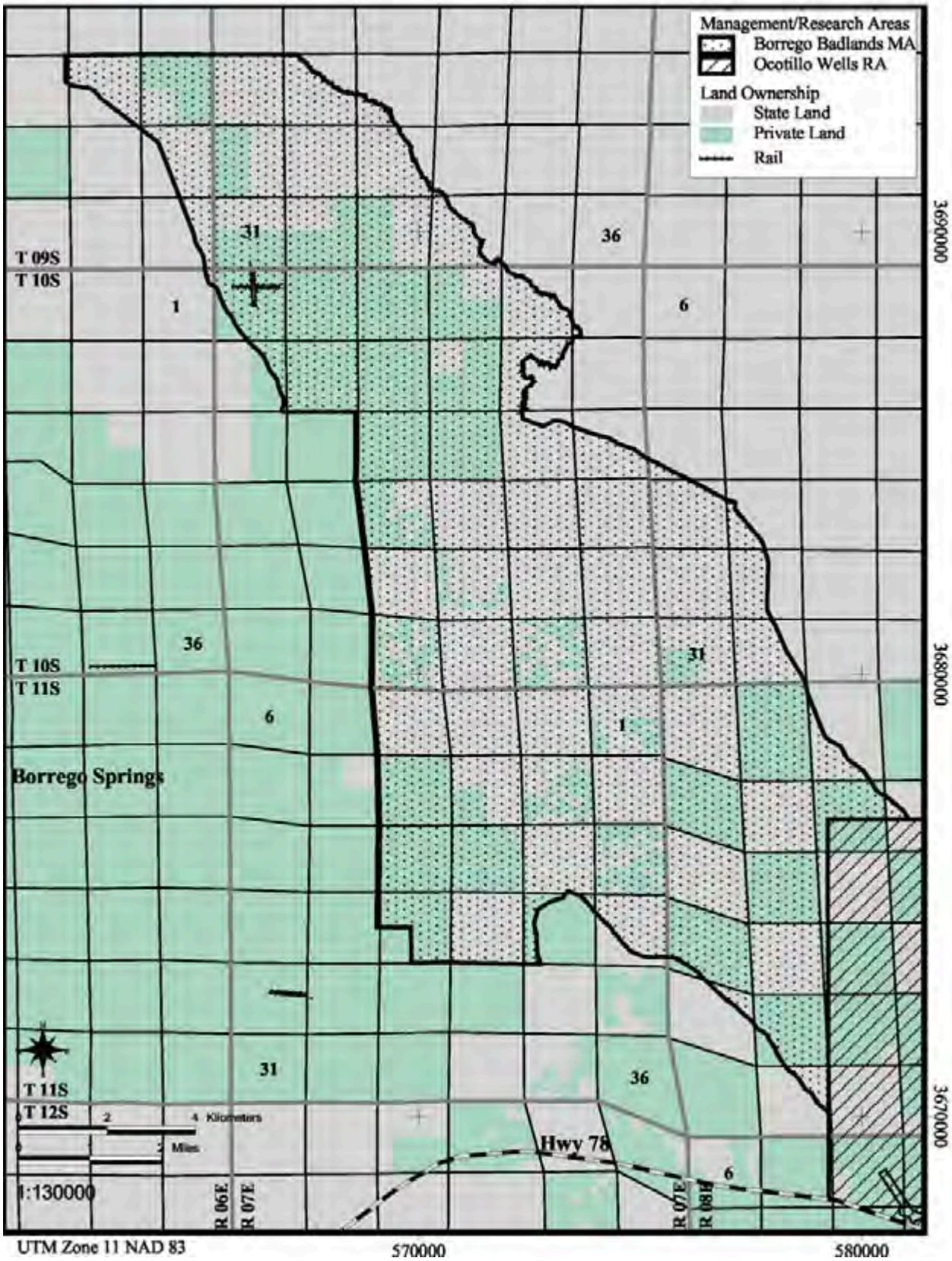


Figure 9. Ocotillo Wells State Vehicular Recreation Area Research Area.

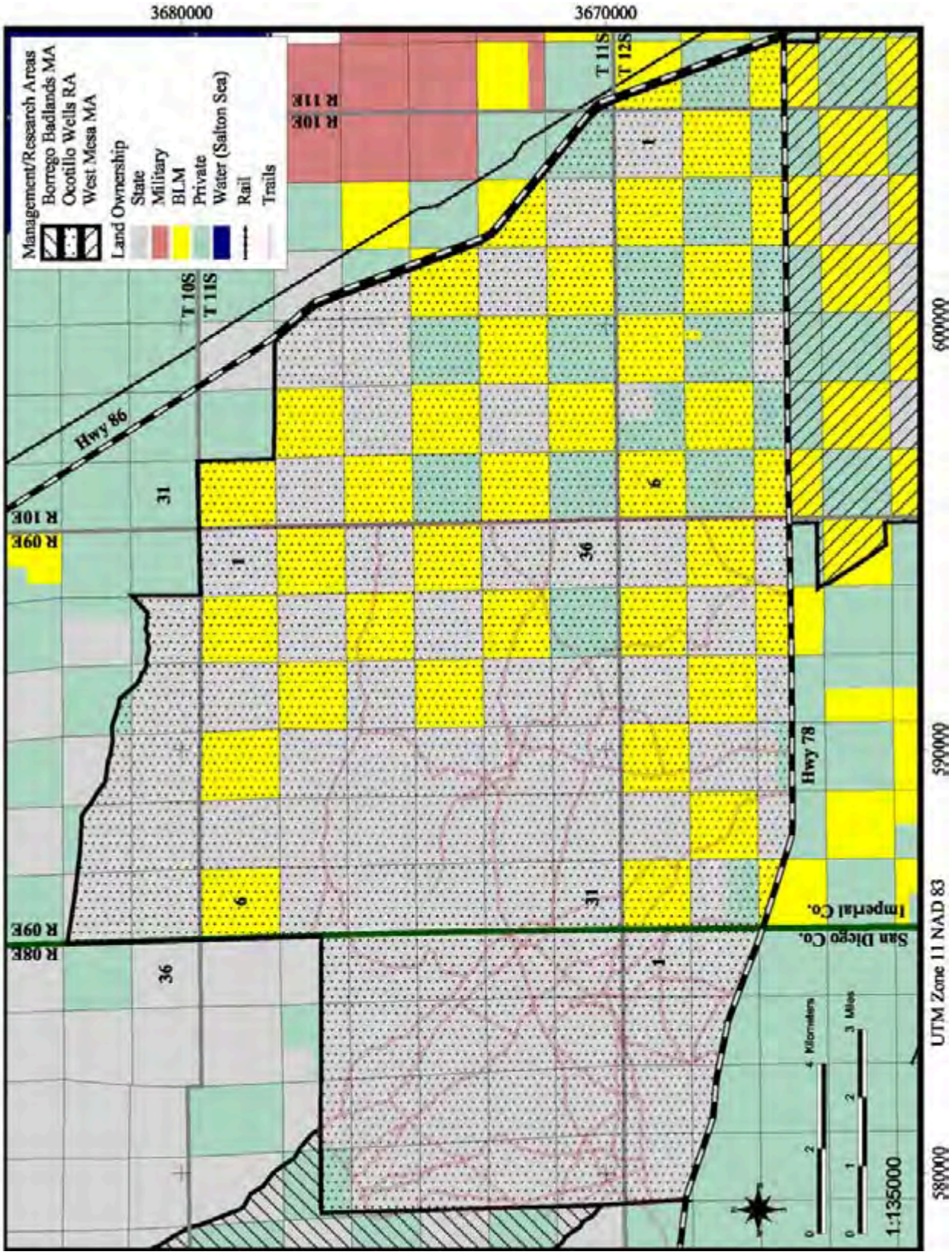
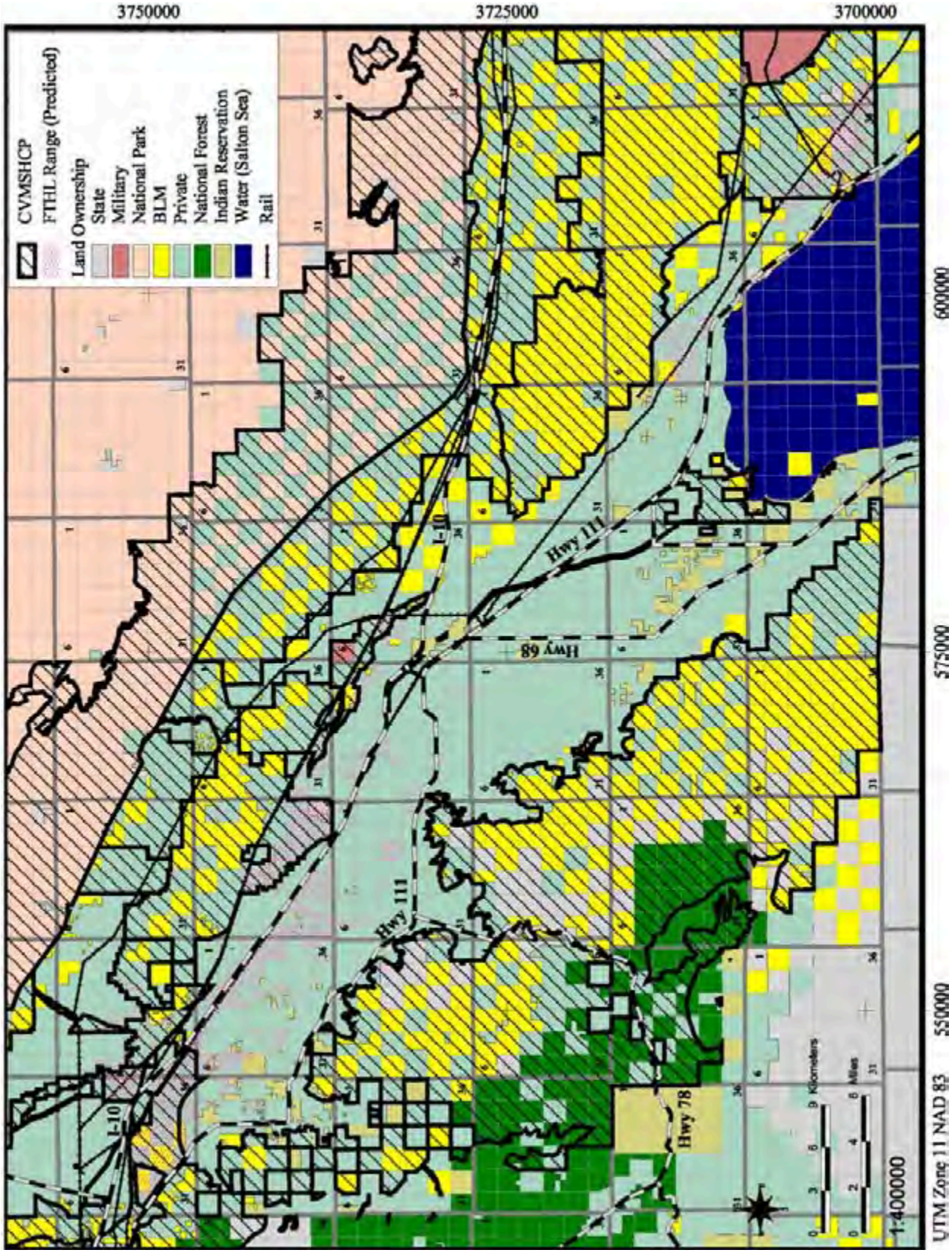


Figure 10. Coachella Valley Preserve System.



Mitigation

In accordance with Planning Action 2.1.1, the following mitigation measures shall be incorporated into all projects where applicable based on the Project Evaluation Protocol in Appendix 6. The measures are to be modified to conform to the nature of the project.

1. To the extent possible, surface-disturbing projects shall be located outside of FTHL MAs and the RA, and shall be timed to minimize mortality. If a project must be located within a MA or RA, effort shall be made to locate the project in a previously disturbed area or in an area where habitat quality is poor. A survey of the project site shall be conducted prior to construction in order to assist in locating the project.

2. Prior to project initiation, an individual shall be designated as a field contact representative. The field contact representative shall have the authority to ensure compliance with protective measures for the FTHL and will be the primary agency contact dealing with these measures. The field contact representative shall have the authority and responsibility to halt activities that are in violation of these terms and conditions.

3. All project work areas shall be clearly flagged or similarly marked at the outer boundaries to define the limit of work activities. All construction and restoration workers shall restrict their activities and vehicles to areas that have been flagged to eliminate adverse impacts to the FTHL and its habitat. All workers shall be instructed that their activities are restricted to flagged and cleared areas.

4. Within FTHL habitat, the area of disturbance of vegetation and soils shall be the minimum required for the project. [If possible, specify a maximum disturbance allowable based on the specifics of the project.] Clearing of vegetation and grading shall be minimized. Wherever possible, rather than clearing vegetation and grading the ROW, equipment and vehicles shall use existing surfaces or previously disturbed areas. Where grading is necessary, surface soils shall be stockpiled and replaced following construction to facilitate habitat restoration. To the extent possible, disturbance of shrubs and surface soils due to stockpiling shall be minimized.

5. Existing roads shall be used for travel and equipment storage whenever possible.

6. Where feasible and desirable, in the judgment of the lead agency, newly created access routes shall be restricted by constructing barricades, erecting fences with locked gates at road intersections, and/or by posting signs. In these cases, the project proponent shall maintain, including monitoring, all control structures and facilities for the life of the project and until habitat restoration is completed.

7. A biological monitor shall be present in each area of active surface disturbance throughout the work day from initial clearing through habitat restoration, except where the project is completely fenced and cleared of FTHLs by a biologist (see Measure 8). The biological monitors shall meet the requirements set in Appendix 6. The monitor(s) shall perform the following functions:

    a) Develop and implement a worker education program. Wallet-cards summarizing this information shall be provided to all construction and maintenance personnel. The education program shall include the following aspects at a minimum:

- biology and status of the FTHL,
- protection measures designed to reduce potential impacts to the species,
- function of flagging designating authorized work areas,
- reporting procedures to be used if a FTHL is encountered in the field, and
- importance of exercising care when commuting to and from the project area to reduce mortality of FTHLs on roads.

b) Ensure that all project-related activities comply with these measures. The biological monitor shall have the authority and responsibility to halt activities that are in violation of these terms and conditions.

c) Examine areas of active surface disturbance periodically (at least hourly when surface temperatures exceed 85ºF) for the presence of FTHLs. In addition, all hazardous sites (e.g., open pipeline trenches, holes, or other deep excavations) shall be inspected for the presence of FTHLs prior to backfilling.

d) Work with the project supervisor to take steps, as necessary, to avoid disturbance to FTHLs and their habitat. If avoiding disturbance to a FTHL is not possible or if a FTHL is found trapped in an excavation, the affected lizard shall be captured by hand and relocated.

8. Sites of permanent or long-term (greater than one year) projects in MAs where continuing activities are planned and where FTHL mortality could occur, may be enclosed with FTHL barrier fencing to prevent lizards from wandering onto the project site where they may be subject to collection, death, or injury. Barrier fencing should be in accordance with the standards outlined in Appendix 7. After clearing the area of FTHLs (also see Appendix 7), no on-site monitor is required (see Measure 7).

9. The project proponent shall develop a project-specific habitat restoration plan under approval by the lead agency. The plan shall consider and include as appropriate the following methods: replacement of topsoil, seedbed preparation, fertilization, seeding of species native to the project area, noxious weed control, and additional erosion control (see Habitat Rehabilitation, p. 67). Generally, the restoration objective shall be to return the disturbed area to a condition that will perpetuate previous land use. The project proponent shall conduct periodic inspection of the restored area. Restoration shall include eliminating any hazards to FTHLs created by construction, such as holes and trenches in which lizards might become entrapped. Disturbance of existing perennial shrubs during restoration shall be minimized, even if such shrubs have been crushed by construction activities.

10. Construction of new paved roads shall include a lizard barrier fence on each side of the road that is exposed to occupied FTHL habitat. Exceptions may occur in accordance with the following evaluation, to be applied separately to each side of the road. This prescription may also be applied to canals or other fragmenting projects.

Side is made nonviable for FTHLs even if connected to the other side:

- Compensate for the entirety of the fragmented parcel.

Side is viable only if connected to the other side:

- Compensate for the entirety of the fragmented parcel, or

- Provide fencing and effective culverts or underpasses that will maintain connectivity.

Side is viable even if not connected to the other side:

- Provide fencing (no culverts).

Specifications for barrier fences are provided in Appendix 7. The FTHL ICC will make the determination of FTHL population viability based on the size, configuration, and habitat condition of the isolated parcel, threats from adjacent lands, and existing scientific evidence of edge effects on FTHL. Culvert design will be provided by the FTHL ICC.

Compensation

Pursuant to Title 43 Code of Federal Regulations and the Federal Land Policy and Management Act of 1976, federal land management agencies may permit actions that result in FTHL habitat loss on their lands. To mitigate such losses both within and outside MAs, compensation is charged if residual effects would occur after all reasonable on-site mitigation has been applied. Signatories may use compensation funds to acquire, protect, or restore FTHL habitat both within and contiguous with MAs (with MOG approval). These actions will help ensure the existence of FTHLs and their habitat in the future.

Determining Whether Compensation Is Required

When compensation is required

If adverse effects remain after the project proponent has taken all reasonable on-site mitigation measures, a project proponent must compensate for the remaining (residual) on-site effects. To evaluate whether it is appropriate to collect compensation, agency biologists must consider whether the impacted area can potentially support FTHLs based on habitat factors favorable to FTHLs (Appendix 6). If agency biologists determine that the project area can potentially support FTHLs, then compensation shall be required. Negative FTHL survey results in the project area shall be irrelevant in the determination of whether to charge compensation because FTHLs can re-occupy the suitable FTHL habitat in the future, or FTHLs were present but not detected due to their cryptic nature.

When compensation is not required

Situations when compensation is not required include the following. First, a project proponent does not need to compensate if the proposed disturbance would not occur in suitable FTHL habitat (e.g., compacted ground, small lots surrounded by urban development, or riparian areas). However, if the project area contains both suitable and unsuitable habitat, agency biologists may base compensation on the entire project area because FTHLs may use unsuitable habitat (e.g., paved or dirt roads or fringes of agricultural fields) adjacent to suitable habitat.

Second, a project proponent does not need to compensate if the agency biologist has determined that mitigation measures have eliminated all adverse, on-site effects (i.e., there are no residual effects).

Third, a project proponent does not need to compensate for disturbances if the signatory authorized the project (e.g., a lease or ROW) before June 1997 (when the signatory signed the conservation agreement), and no longer maintains regulatory discretion to impose compensation. For example, if a signatory granted a ROW to a proponent before June 1997, and the proponent disturbs land within their ROW, the proponent does not need to pay compensation. However, if

the signatory renews a permit or ROW authorization, the signatory should require proponents to follow the RMS under the renewed agreement.

Last, signatories to the RMS do not need to compensate for their own disturbances because they are already contributing significant resources towards FTHL conservation. However, if a signatory disturbs over 1% of a FTHL MA (see Planning Action 2.2.1 for details), the signatory must pay compensation based on the compensation formula described below for that exceeded disturbance.

Compensation Determination

Compensation basis

The goal of compensation is to prevent the net loss of FTHL habitat and make the net effect of a project neutral or positive to FTHLs by maintaining a habitat base for FTHLs. To achieve this goal, compensation will be based on the acreage of FTHL habitat lost to a project proponent's impacts on signatory land after all reasonable on-site mitigation has been applied. Compensation for habitat lost outside a FTHL MA will be charged at a 1:1 ratio. When a project proponent's impacts are inside a FTHL MA, a multiplying factor ranging from three to six will be applied to the affected acreage to obtain an adjusted compensation acreage.

This multiplying factor **(M)** for disturbances inside FTHL MAs will be determined by the following formula:

M = 3 + A + G + E + D

where the factors are evaluated as shown below:

A Adjacent habitat impacts:

a) Adjacent lands will not be affected. 0
b) Adjacent habitat will receive direct or indirect deleterious impacts..... 0.5

G Growth inducing effects within flat-tailed horned lizard habitat:

a) The project will have no growth inducing effects. 0
b) The project will have growth inducing effects. 0.5

E Existing disturbance on site:

a) There is moderate to heavy existing habitat disturbance..... 0
b) There is little or no existing habitat disturbance. 1

D Duration of effect:

a) The effects of the project are expected to be short term (< 10 years). 0
b) The effects of the project are expected to be long term (> 10 years). 1

Signatories should require project proponents to replace the acreage or adjusted acreage lost to the project proponent's impacts. However, signatories may convert either the compensation acreage or adjusted compensation acreage to a monetary equivalent (including administrative

costs) that is required to replace the acreage or adjusted acreage. The per acre dollar figure for compensation fees shall be based on the cost of acquiring lands prioritized for acquisition by signatory agencies.

If signatories cannot replace the land disturbed by proponents because lands within FTHL MAs haven't been appraised or there are no more lands available for acquisition (Yuma Desert MA), signatories can charge fair market value of the impacted land and any costs associated with appraising the impacted land. Minimum compensation shall be $200.

Unique Compensation Circumstances

Some land actions have unique circumstances or impacts to FTHLs, and therefore determining the acreage of impact often will depend on the circumstance. Some examples of unique circumstances in common land actions are listed below.

Land disposal

Federal regulation provides for public lands to be made available for disposal via the Recreation and Public Purposes Act. Such land leases and patents are discretionary actions that require both NEPA and Endangered Species Act compliance. Federal land management agencies endeavor to retain ownership of land that provides habitat for sensitive species. However, if a case arises where public lands within FTHL habitat are to be disposed, the signatory disposing the land will collect compensation for the entire acreage regardless if the proponent intends to disturb only a portion of the land because there is no guarantee that the undisturbed portion will remain habitat for FTHLs.

Indirect effects

A project's indirect effects on FTHLs should be considered when determining compensation. For example, ROW grants for aboveground structures such as roads, pipelines, towers, or similar facilities can have adverse impacts to FTHLs beyond the areas that are proposed to be disturbed. First, such disturbances have been shown to attract FTHL predators. For example, roads may attract round-tailed ground squirrels (Garland and Bradley 1984), and towers can provide perching areas for loggerhead shrikes and American kestrels. Second, construction vehicles can introduce invasive weeds that degrade FTHL habitat. Last, vehicles from increased authorized and unauthorized traffic on maintenance roads can cause FTHL mortality. If these and other adverse indirect effects (e.g., habitat fragmentation, decreased FTHL density near roads) cannot be mitigated (with FTHL barriers or corridors, for e.g.), compensation for indirect effects will be required.

Boundaries of MAs

In areas where a MA boundary is defined by a road, the road ROW (not the road itself) will be considered to be the boundary for the MA. Consequently, compensation for residual effects within the ROW will be 1:1.

Recovered FTHL Habitat

Over time, disturbed habitat may recover from a project's residual effects and again become suitable FTHL habitat. If a subsequent project disturbs the recovered area again, the proponent (regardless of whether they were the original proponent) will still be required to pay compensation for residual effects.

Reopening of Mines along the East Highline Canal

For sites that have previously been mined along the East Highline Canal, either inside or outside of the East Mesa MA, compensation shall be charged at a 1:1 ratio if the applicant is not intending to fully mine and complete final reclamation of the site. Compensation shall not be charged if the applicant will be reclaiming the site and no further mining would occur.

Compensation Fund Accounts

Each of the signatories shall maintain an accounting of all compensation funds paid and collected. These accountings shall be incorporated into the annual monitoring report. The BLM shall act as a clearinghouse for all compensation funds and accounting data. Project proponents will pay the BLM through the signatory that authorizes the project. The signatory should give the check to the BLM field office (El Centro or Yuma) that manages the nearest FTHL MA. In addition, the signatory should also provide the secretary of the ICC a completed pre-project and post-project (if appropriate) reporting form for projects/activities that disturb FTHL habitat. The forms are provided in Appendix 8.

Use Of Funds

The agency to receive the compensation land or fee shall be determined through coordination among the permitting agencies. Typically, the compensation fee or land will go to the agency that predominantly manages the nearest MA. Pre-authorized and unauthorized uses are listed below. This list is not exclusive, and the MOG, in consultation with the ICC, will ultimately decide how to use compensation funds for unlisted uses.

Pre-authorized uses of funds

Signatories can fund a variety of actions with compensation funds, but funds must directly benefit FTHLs or their habitat within or contiguous with FTHL MAs.

There are several approved uses of compensation funds, but the top priority shall be acquisition of inholdings within the nearest MA (see Planning Action 4). If opportunities for acquisition have been exhausted, examples of activities that could be carried-out with compensation funds include the following:

- Transfer funds to other MAs to purchase FTHL habitat, especially FTHL habitat within or contiguous with MAs that are threatened with imminent impacts.
- Construct and maintain fences and signs around MAs to prevent OHVs from entering and degrading FTHL habitat (see Planning Action 2.4.2). In addition, these fences could be designed to physically prevent FTHLs from leaving the MAs and encountering nearby roads (Appendix 7).
- Educate people and organizations about the effects of OHV use (see Planning Action 7.2). Educators should target those audiences most likely to travel off-road, such as the public, BP, and utility companies.
- Restore degraded FTHL habitat within or contiguous with MAs (see Planning Action 3).
- Fund other management actions deemed necessary by the ICC and MOG.

Essentially, funds that cannot be used to purchase FTHL habitat within or contiguous with MAs can be used to accelerate implementation of actions identified in the implementation schedule

(e.g., expending $100,000 in FY03 for habitat rehabilitation, instead of $40,000 as currently scheduled).

Unauthorized uses of funds

Funds should not be used in place of other agency funding that is obligated or programmed to carryout planning actions listed in the implementation schedule. For example, signatories shall not fund law enforcement and FTHL research/monitoring with compensation funds because signatories to this document have agreed to implement monitoring and law enforcement activities with their own funds.

Monitoring Program

In accordance with the first objective of this RMS (to "maintain a 'long-term stable' or increasing population of FTHLs in all MAs"), a population monitoring program has been implemented to learn how FTHL populations are changing over time. Determining whether there is a trend means obtaining accurate measurements of the populations over time, then removing "the effects of natural demographic and environmental stochasticity." Such effects are currently unknown; hence the monitoring also has a goal to document the variability in FTHL populations in response to natural processes (such as drought cycles).

Monitoring cannot reveal the actual causes of a population trend (Elzinga *et al.* 1998). However, by monitoring habitat disturbance in addition to population and distribution, correlations can be made between population change and one potential cause for decline. Even without conclusive proof of its cause, if a population or distribution decline of >30% is noted within any MA, and factors other than climate are the potential cause, the ICC will draft management prescriptions to reverse the trend. If declines are correlated with increased habitat disturbance from OHV use (documented either through ground surveys or aerial monitoring), signatory agencies will take measures to limit OHV traffic. If statistical proof of causal relationships is deemed necessary, the costs of implementing a research program with replicated controls and treatments will be evaluated.

The foundation for an inventory and monitoring program was laid in 1978 with surveys conducted on East Mesa, West Mesa, and Yuha Basin (Turner *et al.* 1978). Some monitoring has been conducted every year since then except 1980, 1982, and 1983. Distribution and relative abundance of FTHLs were estimated through much of the range of the species in California and Arizona by use of standardized 3-mile triangular transects in which numbers of FTHLs and their scat were counted and used as an index to relative abundance (Turner and Medica 1982; Rorabaugh *et al*. 1987; Olech undated; BLM and CDFG 1990; Wright 1993). Scat transect methods were standardized in 1990 (BLM and CDFG 1990). Trends on BLM-administered lands have been analyzed periodically (Olech 1986; Wright 1993, 2002). In addition to BLM-administered lands, inventories of the Navy target areas (Dames & Moore 1995; Rorabaugh 1996b), Salton Sea Naval Base (Muth and Fisher 1989; Rorabaugh 1996c) and OWSVRA (Wone *et al*. 1994; Wone *et al*. 1995; Wone and Beauchamp 1995a, 1995b) have been conducted.

Two critical assumptions of the scat transect survey method are 1) FTHL scat is readily distinguishable from other lizard's scat, and 2) scat and lizard counts are correlated with FTHL density.

The first assumption is largely met by not counting scat less than 5.5 mm in diameter (Muth and Fisher 1992) and not using scat counts to estimate relative density in areas where desert horned

lizards occur (desert horned lizard scat is indistinguishable from FTHL scat) (Turner and Medica 1982).

The second assumption has been problematic. The relationship between scat counts and horned lizard density has been difficult to examine due to the problems associated with obtaining true FTHL density estimates. But several reports suggest that if scat is correlated with lizard density, the relationship may be weak (Muth and Fisher 1992; Rorabaugh 1994; Beauchamp *et al.* 1998). Wright (1993) found a correlation between FTHL counts and scat; however, the relationship between lizard counts and relative abundance is unknown. Use of lizard count data to estimate relative density is suspect due to the infrequency with which FTHLs are observed on triangular scat transects (on average less than one animal per 10 hours of searching) (Turner and Medica 1982; Rorabaugh *et al*. 1987) and because environmental conditions are likely to influence FTHL activity and detectability. Scat counts in the same area may fluctuate greatly from year to year (Wright 1993; Rorabaugh 1994), but there are factors other than lizard density that affect numbers of scat that are produced and visible (Muth and Fisher 1992; Rorabaugh 1994; Young 2002). Beauchamp *et al.* (1998) note that the presence of several scat in an area suggests two indistinguishable alternatives: either a single individual used the area repeatedly and the scat persisted, or multiple individuals have used the area over a shorter time span.

Due to the animal's cryptic nature, monitoring efforts typically yield highly variable, low encounter rates, making analysis of monitoring data problematic. In a recent analysis of 1979-2001 FTHL monitoring data, no population trends were detected despite increases in habitat disturbance (Wright 2002). It was noted that inconsistencies between observers and changes in monitoring protocols added to the difficulties of detecting trends. Because of known problems with scat surveys and lizards encountered on line transects, new monitoring methods were called for (Foreman 1997).

Two new monitoring techniques are being implemented as part of this first revision. Implementation of these revised monitoring methods should increase sensitivity to detecting future trends. The first is an improved mark/recapture population monitoring technique developed by Wright and Grant (2002, 2003) (see Appendix 4). Using this technique, they estimated a population of about 30,000 FTHLs (95% CI: 21,500 – 33,000) in the Yuha Desert MA during the summer of 2002, with an average density of 1.3 lizards per hectare (0.5 per acre). Percent sand coverage was the only variable significantly correlated with population size. This technique has yielded the best wide-scale population estimate to date.

Pronounced natural fluctuations and potentially large confidence intervals may still mask detection of long-term population trends. Additionally, the small number of mark/recapture plots may be insufficient for detecting localized population declines, such as on the edges of MAs. In addressing these problems, the ICC felt that monitoring changes in FTHL distribution and changes in habitat disturbance could supplement monitoring population trends, to provide a more sensitive indicator of unnatural population declines. Distribution may be monitored by gathering presence/absence data (Appendix 5). These data, in conjunction with GIS overlays, can be used to create a predictive spatial model using StatMod (Garrard 2002), which will aid in detecting declines in distribution and may serve to tighten the population estimates obtained from the mark/recapture surveys.

The protocols for monitoring population and distribution both include measuring disturbance at the sample sites. In addition to those measures, wide-scale (aerial) monitoring of surface disturbance will occur every five years (see Planning Action 9.2.3.1).

It is anticipated that a population estimate from mark/recapture will be obtained from each MA during the next three years (in accordance with9.2.2), which will allow for evaluation of this technique as a long-term monitoring tool. The distribution monitoring protocol is yet untested. It is recommended that it be implemented on a trial basis (e.g. in one MA for two years) and evaluated by the ICC to determine whether to expand the sampling. Following these new protocols over the next five years will establish baseline estimates against which future comparisons can be made. It is anticipated that during the 2007 revision of this document, the baseline data will be carefully reviewed and the ICC will determine whether or not they can set population and distribution thresholds which, if reached, would act as a stimulus for more drastic management efforts.

Restorative Measures

The following restorative measures are prescribed in the Planning Actions and are explained in more detail in this section. A discussion of how these measures were implemented can be found in the Summary of Management Strategy Implementation, 1997-2002, under actions 2, 3, and 5.

Route Closures

To reduce direct mortality from vehicles and to limit the increase in surface disturbance from the proliferation of routes, each discretionary, designated route in a MA shall require justification for the necessity of the route. Designated routes shall be prioritized in terms of importance to FTHLs and to the OHV community and other public and private route users. Redundant, low priority, and non-essential routes in MAs shall be closed and restored.

The following process will be utilized to reduce route density in MAs:

Step 1 - A small, interdisciplinary team shall be formed. The team should include, at a minimum, biological and recreation staff from the land management agency and representatives of USFWS, the state wildlife agency, the state OHV recreation agency, and important user groups. Other management agency staff, such as surface protection specialist or realty specialist, may be added as desirable.

Step 2 - The team shall identify non-discretionary routes (e.g., routes with existing ROWs) and discretionary routes (i.e., routes that can be closed at the discretion of the land management agency).

Step 3 - Representatives of users of routes shall assign an importance priority to each discretionary route. A written justification for each desired open route shall be prepared.

The team shall evaluate route densities and priorities, FTHL population density and trend data, FTHL home range size, and habitat disturbance attributed to routes to determine the level of route closures needed to ensure viable populations of FTHLs. Areas within MAs that support high levels of vehicular use and that are particularly important for the FTHL shall be identified as high priority areas for route closure.

Step 4 - Within areas identified for route closure, the team shall identify discretionary routes needing closure. Any discretionary route that serves no identifiable purpose, parallel routes, routes with no identifiable destination, and routes with high resource damage shall also be recommended for closure. Routes along

utility corridors and canals and routes used by agencies (e.g., BP access) shall be evaluated for closure except to specific, authorized users.

Step 5 - All necessary federal and state environmental reviews shall be completed.

Step 6 - Closed routes shall be signed, as necessary, and restored.

Habitat Rehabilitation

Damaged and degraded areas in the desert may take centuries to recover their original appearance and ecosystem function without intervention. Preparation of the ground surface and replanting of vegetation may speed the restoration of the native flora, the rebuilding of the soil structure, and the reestablishment of native wildlife. Available techniques are reviewed in Lovich (1993).

Lovich and Bainbridge (1999) estimate restoration efforts can cost $30,000 to $62,000 per acre. Besides being expensive, plants often die after re-vegetation efforts because of unknown, unpredictable, or uncontrollable environmental factors (e.g., drought or unsuitable soil conditions). Given the cost, recovery time, and the low to moderate probability of long-term success of restoration efforts, it is more effective to limit the extent and intensity of the initial impacts to the land (Lovich and Bainbridge 1999). Nonetheless, there are times when habitat rehabilitation is worthwhile. When a decision has been reached to restore a degraded area within an MA, and the underlying causes of habitat degradation have been removed (such as closing routes of travel), the most effective rehabilitation techniques known must be used. Since little is known about the habitat factors that benefit FTHL, initial rehabilitation efforts should be planned in an experimental fashion and the results of various treatments should be well documented so they can be improved upon over time.

Corridors

It is recognized that the Colorado River has been a long-term, natural barrier between populations in Arizona and California, and that this may have resulted in genetic divergence (see Figure 2). During the past century, the populations in East Mesa were effectively isolated from those to the west and south by the Salton Sea, extensive agricultural development, canals, and highways. However, managed areas to the west (i.e., Yuha Desert, West Mesa, Ocotillo Wells, and Borrego Badlands) lie relatively close to one another, and some movement between MAS may occur. Populations in the Coachella Valley are probably currently disjunct from those in the Imperial and Borrego valleys. Planned actions provide guidance for managers to maintain sufficient habitat to provide for interchange of FTHLS between MAS, where habitat corridors persist. In this way, those naturally adjoining populations of FTHLS will be able to interbreed, helping to maintain genetic vigor, and natural recolonization could occur in the case of extirpation from local populations.

LITERATURE CITED

Adams, J.A., and A.S. Endo. 1980. Soil impacts from off-road vehicles. Chapt. 1, pp. 1-45 in P.G. Rowlands (Ed.), Effects of disturbance on desert soils, vegetation, and community processes with emphasis on off-road vehicles - a critical review. Unpubl. BLM Rept., Riverside, Calif.

Adams, J.A., A.S. Endo, L.H. Stozy, P.G. Rowlands, and H.B. Johnson. 1982. Controlled experiments on soil compaction produced by off-road vehicles in the Mojave Desert, California. Journ. of Applied Ecol. 19:167-175.

Arizona Game and Fish Department. In prep. Wildlife of special concern in Arizona. Ariz. Game and Fish Dept. Publication. Phoenix, Arizona.

Barrows, C. 2002. Peer Review Comments: The Proposal to List the Flat-tailed Horned Lizard as Threatened and Withdrawal of that Proposal. Letter to USFWS, Carlsbad, Calif.

Bauder, E.T., and A. Larigauderie. 1991. Rehabilitation success and potential of Mojave and Colorado Desert sites. Rept. to Calif. Dept. of Parks and Rec., Off-Highway Motor Veh. Rec. Div., Sacramento, Calif.

Beatley, J.C. 1967. Survival of winter annuals in the northern Mohave Desert. Ecology 48(5):745-750.

Beauchamp, B., B. Wone, S. Bros, and M. Kutilek. 1998. Habitat use of the flat-tailed horned lizard (*Phrynosoma mcallii*) in a disturbed environment. Journal of Herpetology 32:210-216.

Berry, K.H. 1996. The effects of off-road vehicles on animal populations and habitats: a review of the literature. USGS, Biological Resources Division, Riverside Field Station, Riverside, Calif.

Bock, C.E., H.M. Smith, J.H. Bock. 1990. The effect of livestock grazing upon abundance of the lizard, *Sceloporus scalaris*, in southeastern Arizona. Journal of Herpetology 24(4):445-446.

Bolster, B., and K. Nicol. 1989. The status of the flat-tailed horned lizard (*Phrynosoma mcallii*) in California. Rept. to CDFG, Sacramento, Calif.

Bondello, M.C. 1976. The effects of high-intensity motorcycle sounds on the acoustical sensitivity of the desert iguana, *Dipsosaurus dorsalis*. Thesis submitted Calif. St. Univ., Fullerton. 39pp.

Boundy, J., and T.G. Balgooyen. 1988. Record lengths for some amphibians and reptiles from the western United States. Herpetological Review 19(2):26-27.

Bransfield, R., and J. Rorabaugh. 1993. Final fish and wildlife coordination act report, All-American Canal lining project, Imperial County, California. Rept. to Bur. of Reclamation, Boulder City, Nev.

Brattstrom, B.H. 1978. Bibliography on the effect of noise on non-human vertebrates. Contr. Rpt. CA-060-CT7-2737 from BLM, Riverside, Calif.

Brattstrom, B.H., and M.C. Bondello. 1983. Effects of off-road vehicle noise on desert vertebrates. Chapt. 9, pp. 167-221 in R.H. Webb and H.G. Wilshire (eds.) Environmental Effects of Off-road Vehicles: Impacts and Management on Arid Regions. Springer-Verlag, New York.

Brown, D.E., and R.A. Minnich. 1986. Fire and changes in creosote bush scrub of the western Sonoran Desert, California. Amer. Midland Naturalist 116:411-422.

Brown, J.H., O.J. Reichman, and D.W. Davidson. 1979. Granivory in desert ecosystems. Ann. Rev. Ecol. Syst. 10:201-27.

Bureau of Land Management. 1980. California Desert Conservation Area Plan. BLM, Riverside, Calif.

Bureau of Land Management. 1981. Yuha Basin ACEC Management Plan. BLM, El Centro, Calif.

Bureau of Land Management. 1982a. Southern East Mesa Area of Critical Environmental Concern (ACEC) Management Plan. BLM, El Centro, Calif.

Bureau of Land Management. 1982b. East Mesa Wildlife Habitat Management Plan. BLM, El Centro, Calif.

Bureau of Land Management. 1983. Yuha Desert Wildlife Habitat Management Plan. BLM, El Centro, Calif.

Bureau of Land Management. 1985. Yuha Desert Management Plan. BLM, El Centro, Calif.

Bureau of Land Management. 1986a. San Sebastian Marsh/San Felipe Creek Management Plan. BLM, El Centro, Calif.

Bureau of Land Management. 1986b. Proposed 1985 Plan Amendments. Vol. 2. BLM Riverside, Calif.

Bureau of Land Management. 1987a. Yuma District Resource Management Plan. BLM Yuma, Ariz.

Bureau of Land Management. 1987b. Algodones Dunes Wildlife Habitat Management Plan. BLM El Centro, Calif.

Bureau of Land Management. 1988. BLM Manual 6840 - Special status species management. Release 6-116, Sept 16, 1988.

Bureau of Land Management. 1990. Lower Gila South Resource Management Plan (Goldwater Amendment). BLM Phoenix, Ariz.

Bureau of Land Management. 1992. Yuma District Resource Management Plan Amendment. BLM Yuma, Ariz.

Bureau of Land Management. 1994a. Yuma District (Bill Williams) Resource Management Plan Amendment. BLM, Yuma, Ariz.

Bureau of Land Management. 1994b. Yuma District (Havasu) Resource Management Plan Amendment. BLM, Yuma, Ariz.

Bureau of Land Management. No date. Yuma District (Lands) Resource Management Plan Amendment. BLM, Yuma, Ariz.

Bureau of Land Management. 1997. Lechuguilla Mohawk Habitat Management Plan. BLM, Yuma, AZ.

Bureau of Land Management. 1998. Lower Gila South Resource Management Plan. BLM, Yuma, AZ.

Bureau of Land Management, U.S. Fish and Wildlife Service, California Department of Fish and Game, California Department of Parks and Recreation, and The Nature Conservancy. 1995. The Coachella Valley Preserve System Management Plan and Decision Record. Interagency Rept.

Bureau of Land Management and California Department of Fish and Game. 1990. Flat-tailed horned lizard management plan. Rept. to BLM and CDFG, Riverside, Calif.

Bureau of Land Management, U.S. Fish and Wildlife Service, and California Department of Fish and Game. 1989. Environmental assessment for selected control of the common raven to reduce desert tortoise predation in the Mojave Desert, California. BLM, Riverside, Calif.

Bureau of Reclamation and Imperial Irrigation District. 1990. Draft environmental impact statement/environmental impact report, All American Canal Lining Project, Imperial County, California. Lower Colorado Reg. Off., Boulder City, Nev., and Imperial Irrigation Dist., Imperial, Calif.

Bury, R.B., R.A. Luckenbach, and S.D. Busack. 1977. Effects of off-road vehicles on vertebrates in the California desert. Fish and Wildlife Service, Wildl. Res. Rept. 8, Washington, D.C.

Bryant, H.C. 1911. The horned lizards of California and Nevada of the genera *Phrynosoma* and *Anota*. Univ. California Publ. Zool. 9(1):1-84.

California Department of Food and Agriculture. 1991. Environmental assessment of curly top virus control in California, 1991-1995. Calif. Dept. of Food and Agric., Sacramento, Calif.

California Department of Food and Agriculture. 1995. (Preliminary Draft) Joint environmental assessment 1997-2001 of the California Department of Food and Agriculture Curly Top Virus Control Program for the Bureau of Land Management and Department of Energy. Calif. Dept. of Food and Agric., Sacramento, Calif.

California Department of Food and Agriculture. 2002. Joint environmental assessment 2002-2006 of the California Department of Food and Agriculture Curly Top Virus Control Program for the Bureau of Land Management and Department of Energy. Calif. Dept. of Food and Agric., Sacramento, Calif. DOE/EA# 1363.

Carlson, B.A., and W.W. Mayhew. 1988. A petition to the State of California Fish and Game Commission (*Phrynosoma mcallii*). Univ. of Calif., Riverside, Calif.

Carr, L.W., and L. Fahrig. 2001. Effect of road traffic on two amphibian species of differing vagility. Conservation Biology 15(4):1071-1078.

Collet, R.J. 2002. *Phrynosoma mcallii* hybrids. Unpubl. presentation *in* 5th Horned Lizard Symposium, Portal, Ariz.

Dames & Moore. 1995. Results of flat-tailed horned lizard surveys for target areas on Naval Air Facility El Centro Ranges 2510 & 2512. Contract Rept. N68711-91-C-0059. 8pp.

Davidson, E., and M. Fox. 1974. Effects of off-road motorcycle activity on Mojave Desert vegetation and soil. Madrono 22(8):381-412.

Duck, T.A., T.C. Esque, and T.J. Hughes. 1994. Fighting wildfire in desert tortoise habitat: considerations for land managers. Pp. 48-67 In Ann Fletcher-Jones (ed.), Desert Tortoise Council, Proceedings of the 1994 Symposium.

Duncan, R.B., T.C. Esque, and K.I.Inserra-Echols. 1994. *Phrynosoma mcallii* (flat-tailed horned lizard) predation. Herp. Review 25(2):68

Elzinga, C.L., D.W. Salzer, and J.W. Willoughby. 1998. Measuring and Monitoring Plant Populations. Final BLM Technical Reference 1730-1, Bur. of Land Mgmt.

ESRI. 1998. ArcView GIS Version 3.1. Environmental Systems Research Institute, Redlands, Calif.

Fisher, M.W. Hodges, A. Holycross, J. Howland, J. Lovich, P. Medica, A. Muth, J. Rorabaugh, F. Turner, B. Wone, and L. Vitt. 1998. Flat-tailed horned lizard, *Phrynosoma mcallii*, population viability analysis: implications for conservation strategies and research priorities. Unpubl. 20 pp. + Appendices.

Foreman, L.D. (Ed.). 1997. Flat-tailed horned lizard rangewide management strategy. Report of interagency working group. 61 pp. plus appendices.

Funk, R.S. 1965. Food of *Crotalus cerastes laterorepens* in Yuma County, Arizona. Herpetologica 21(1):15-17.

Funk, R.S. 1981. *Phrynosoma mcallii*. cat. American Amphib. and Reptiles. 281:1-2.

Gardner, S.A. 2002. Analyses of diet and geographic variation in leaf-nosed snakes, *Phyllorhynchus.* M.S. Thesis. Utah State University, Logan, Utah.

Gardner, T.J. 2002. A Scientific Study of the Flat-tailed Horned Lizard (*Phrynosoma mcallii*) at the OWSVRA: Final Report-01 March 2002. California State Department of Parks and Recreation, Off-Highway Motor Vehicle Division, Sacramento, Calif.

Gardner, T.J., and D.H. Foley III. 2001. Final report: Survey for flat-tailed horned lizards, *Phrynosoma mcallii*, at the Naval Air Facility. U.S. Navy Agreement No. N68711-98-LT-80030, El Centro, Calif.

Gardner, T.J., K.V. Young, and D. H. F. III. 2001. Final report: management-based study of the flat-tailed horned lizard, *Phrynosoma mcallii*. U.S. Bureau of Reclamation Grant Agreement No. 00FG340008.

Garland, T.J., and W.G. Bradley. 1984. Effects of a highway on Mojave Desert rodent populations. American Midland Naturalist 111:47-56.

Garrard, C.M. 2002. StatMod: A tool for interfacing ArcView® GIS with statistical software to facilitate predictive ecological modeling. M.S. Thesis. Utah State University, Logan, Utah. (software available at http://bioweb.usu.edu/gistools/statmod/)

Giles, R.H., Jr. 1970. The ecology of a small forested watershed treated with the insecticide Malathion-s35. Wildl. Monograph No. 24.

Gonzáles-Romero, A., and S. Álvarez-Cárdenas. 1989. Herpetofauna de la region del Pinacate, Sonora, Mexico: un inventario. Southwestern Naturalist 34(4):519-526.

Grant, T., M. McGrann, J. Neilans, and G. Wright. 2001. A mark-recapture pilot study of the flat-tailed horned lizard, *Phrynosoma mcallii*, in the Yuha Basin of southeastern California. BLM Rept., El Centro Resource Area, Calif. 12 pp.

Grismer, L.L. 2002. Amphibians and reptiles of Baja California, including its Pacific Islands and the Islands of the Sea of Cortes. University of California Press, Berkeley.

Hall, J.A. 1980. Direct impacts of off-road vehicles on vegetation. Chapt. 3, pp. 63-74 in P.G. Rowlands (Ed.), Effects of disturbance on desert soils, vegetation, and community processes with emphasis on off-road vehicles - a critical review. Unpubl. Bur. of Land Mgmt. Rept., Riverside, Calif.

Hall, R.J., and D.R. Clark. 1982. Responses of the Iguanid lizard *Anolis carolinensis* to four organophosphorus pesticides. Environ. Pollution (Series A) 28:45-52.

Henry, S. (ed.). 1999. Flat-tailed horned lizard Rangewide Management Strategy annual report. Bur. of Land Mgmt., Yuma, Ariz. 12 pp.

Hoddenbach, G.A., and F.B. Turner. 1968. Clutch size of lizard *Uta stansburiana* in southern Nevada. Amer. Midland Naturalist 80:262-265.

Hodges, W. L. 1995. *Phrynosoma mcallii* occurrence in Arizona. Contract Rept. No. Q95-15-K to Ariz. Game and Fish Dept., Phoenix, Ariz.

Hodges, W.L. 1997. Assessing *Phrynosoma mcallii* (flat-tailed horned lizard) habitat loss in Arizona and California. University of Texas, Austin, Tex.

Howard, C.W. 1974. Comparative reproductive ecology of horned lizards (Genus *Phrynosoma*) in southwestern United States and northern Mexico. J. Ariz. Acad. of Sciences 9:108-116.

Inouye, R.S. 1991. Population biology of desert annual plants. Pp. 27-54 In G.A. Polis (ed.), The Ecology of Desert Communities. Univ. of Ariz. Press, Tucson, Ariz.

Interagency Coordinating Committee. 1998. Annual report on flat-tailed horned lizard Rangewide Management Strategy. Unpubl. report. 11 pp.

Johnson, T.B. 1989. Flat-tailed horned lizard. Wildl. Views 89:15.

Johnson, T.B., and R.B. Spicer. 1985. *Phrynosoma mcallii* (Hallowell 1852) Flat-tailed horned lizard. Contr. Rept. No. 14-16-002-81-224 to USFWS, Albuquerque, N. Mex.

Jones, K.B. Effects of grazing on lizard abundance and diversity in western Arizona. The Southwestern Naturalist 26(2):107-115.

Klauber, L.M. 1939. Studies of reptile life in the arid southwest. Bull. Zool. Soc. San Diego 14:1-100.

Kutilek, M., H. Shellhammer, and W. Bros. 1991. Inventory, wildlife habitat protection program, and monitoring program for Ocotillo Wells State Vehicular Recreation Area, California. Contract Rept. No. 4-500-9035, Calif. Dept. of Parks and Recreation, Off-highway Motor Vehicle Recreation Division, Sacramento, Calif.

Lovich, J. E. 1993. Restoration and revegetation of degraded habitat as a management tool in recovery of the threatened desert tortoise. Unpubl. Rept. of Bur. of Land Mgmt., Riverside, Calif., for Calif. Dept. of Parks and Rec., Off-highway Motor Veh. Rec. Div.

Lovich, J.E. and D. Bainbridge 1999. Anthropogenic degradation of the southern California desert ecosystem and prospects for natural recovery and restoration. Environmental Management (24). 309-326.

Luckenbach, R.A., and R.B. Bury. 1983. Effects of off-road vehicles on the biota of the Algodones Dunes, Imperial County, California. J. Applied Ecology 20:265-286.

MacKay, W.P. 1991. The role of ants and termites in desert communities. Pp. 113-150 In G.A. Polis (ed.), The Ecology of Desert Communities. Univ. of Arizona Press, Tucson, Ariz.

Marshall, R.M., S. Anderson, M. Batcher, P. Comer, S. Cornelius, R. Cox, A. Gondor, D. Gori, J. Humke, R. P. Aguilar, I. E. Parra, and S. Schwartz. 2000. *An Ecological Analysis of Conservation Priorities in the Sonoran Desert Ecoregion*. Prepared by The Nature Conservancy Arizona Chapter, Sonoran Institute, and Instituto del Medio Ambiente y el Desarrollo Sustentable del Estado de Sonora with support from Department of Defense Legacy Program, Agency and Institutional partners. 146 pp.

Mayhew, W.W. 1965. Hibernation in the horned lizard, *Phrynosoma M'callii*. Comp. Biochem. Physiol. 16:103-119.

Mayhew, W.W. 1967. Comparative reproduction in three species of the genus *Uma*. Pp. 45-65 In W. W. Milstead (ed.), Lizard Ecology: A Symposium. Univ. of Missouri Press.

Mayhew, W.W. 1968. Biology of desert amphibians and reptiles. Pp. 195-356 In G.W. Brown, Jr. (ed.), Desert Biology. Academic Press, New York. Vol. 1, 635pp.

Meffe, G.K. and C.R. Carroll. 1994. Principles of Conservation Biology. Sinauer Associates, Inc., Sunderland, Mass.

McCalvin, C. 1993. Surveys for seven rare plant species, the flat-tailed horned lizard, and the Colorado desert fringe-toed lizard. Rept. to Bur. of Reclamation, Boulder City, Nev.

Miller, P.A. 1999. Home range (?) of the flat-tailed horned lizard *Phrynosoma mcallii*. MS Thesis. Utah State University, Logan, Utah.

Minnich, R.A. 1994. Post-fire succession in desertscrub communities of Southern California. Pp. 93-112 In Ann Fletcher-Jones (ed.), Desert Tortoise Council, Proceedings of the 1994 Symposium.

Mitchell, N.C. 1999. Effect of introduced ungulates on density, dietary prefences, home range, and physical condition of the iguana (*Cyclura pinguis*) on Anegada. Herpetologica 55(1):7-17.

Muth, A., and M. Fisher. 1989. A report on the status of native lizards on the Salton Sea Naval Base, Imperial County, California. USFWS Contract Rept. PO-10120-87-350. 36pp.

Muth, A., and M. Fisher. 1992. Development of baseline data and procedures for monitoring populations of the flat-tailed horned lizard, *Phrynosoma mcallii*. Contr. Rept. No. FG9268 to Calif. Dept. of Fish and Game, Sacramento, Calif.

NAF El Centro. 2001. Integrated Natural Resources Management Plan for Naval Air Facility El Centro and Target Areas.

Nicolai, N.C. and J.E. Lovich. 2000. Preliminary observations of the behavior of male, flat-tailed horned lizards before and after an off-highway vehicle race in California. Cal. Fish and Game 86:208-212.

Nicholson, L. 1978a. The effects of roads on tortoise populations. Report to the Bureau of Land Management, Riverside, Calif. Contract No. CA-060-CT8-000024.

Nicholson, L. 1978b. The effects of roads on desert tortoise populations. Pages 127-129 *in* Proceedings of the 1978 Desert Tortoise Council Symposium.

Norris, K.S. 1949. Observations on the habits of the horned lizard *Phrynosoma mcallii*. Copeia 1949:176-180.

Norris, K.S., and C.H. Lowe, Jr. 1951. A study of the osteology and musculature of *Phrynosoma m'callii* pertinent to its systematic status. Bull. Chicago Acad. Sci. 9(7):117-125.

Olech, L.A. Undated. Status of the flat-tailed horned lizard (*Phrynosoma mcallii*) on Bureau of Land Management administered land in California. BLM Rept., El Centro, Calif.

Olech, L.A. 1986. 1986 monitoring report: flat-tailed horned lizard relative abundance, routes Y1851 and Y1955, Yuha Basin ACEC. BLM Rept., El Centro Resource Area. 4pp.

Otis, D.L., K.P. Burnham, G.C. White, D.R. Anderson. 1978. Statistical inference from capture data on closed animal populations. Wildlife Monographs No. 62.

Parker, W.S., and E.R. Pianka. 1975. Comparative ecology of populations of the lizard *Uta stansburiana*. Copeia 1975:615-632.

Peterson, R.L. 1991. Letter from Robert L. Peterson, Entomologist-Project Leader, Curly Top Virus Control Program, Calif. Dept. of Food and Agric., Fresno, Calif. to Gavin Wright, Wildlife Biologist, BLM, El Centro. Subject: Harvester ant survey April 22-29, 1991.

Pianka, E.R., and W.S. Parker. 1975. Ecology of horned lizards: A review with special reference to *Phrynosoma platyrhinos*. Copeia 1975(1):141-162.

Piest, L. and B. Knowles. 2002. An analysis of the status and land ownership of flat-tailed horned lizard habitat in Arizona. Unpubl. AGFD Rept., Yuma, AZ.

Rado, T. 1981. Analysis of actual and potential loss of flat-tailed horned lizard (*Phrynosoma mcallii*) habitat. Rept. to Bur. of Land Mgmt., Sacramento, Calif.

Reeder, T.W., and R.R. Montanucci. 2001. Phylogenetic analysis of the horned lizards (Phrynosomatidae: *Phrynosoma*): Evidence from mitochondrial DNA and morphology. Copeia 1975(2):309-323.

Rodríguez, R. 2002. Evaluation of the status, distribution, and development of education/interpretation materials of the flat-tailed horned lizard, *Phrynosoma mcallii* (Hallowell) in Mexico. Final Report. Centro Intercultural de Estudios de Desiertos y Océanos, A.C. Puerto Peñasco, Sonora, Mexico.

Rorabaugh, J. 1994. An analysis of scat counts as a survey method for the flat-tailed horned lizard (*Phrynosoma mcallii*). USFWS, Phoenix, Ariz.

Rorabaugh, J. 1996a. Surveys for flat-tailed horned lizard at Pinta Sands, Cabeza Prieta National Wildlife Refuge, Arizona, 3-5 May 1996. Memorandum. USFWS, Phoenix, Ariz.

Rorabaugh, J. 1996b. Surveys for the flat-tailed horned lizard, *Phyrnosoma mcallii*, at the Carrizo Impact Area, Imperial County, California. Rept. to Dept. of the Navy, Southwest Div., San Diego, Calif.

Rorabaugh, J. 1996c. Surveys for the flat-tailed horned lizard, *Phyrnosoma mcallii*, at the Salton Sea Test Base, Imperial County, California. Rept. to Dept. of the Navy, Southwest Div., San Diego, Calif.

Rorabaugh, J. 1997. Surveys for flat-tailed horned lizard at Pinta Sands, Cabeza Prieta National Wildlife Refuge, Arizona, 5-7 May 1997. Memorandum. US Fish and Wildlife Service, Phoenix, Ariz.

Rorabaugh, J., M. Coffeen, and L. Piest. 2002. Human disturbance in the Flat-tailed Horned Lizard Yuma Desert Management Area. Unpubl. report. 14pp.

Rorabaugh, J.C., C.L. Palermo, and S.C. Dunn. 1987. Distribution and relative abundance of the flat-tailed horned lizard (*Phrynosoma mcallii*) in Arizona. Southwest. Natural. 32(1):103-109.

Rorabaugh, J.C., S. Vissman, and B.L. Morrill. 2000. A multi-agency conservation agreement for the flat-tailed horned lizard in the Sonoran Desert of southwestern Arizona and southeastern California. Pages 75-76 *in* W.L. Halvorson and B.S. Gebow (eds.), Creative Cooperation in Resource Management, extended abstracts. U.S. Geological Survey, Western Ecological Research Center, Sonoran Desert Field Station, University of Ariz., Tucson.

Rosen, P.C., and C.H. Lowe. 1994. Highway mortality of snakes in the Sonoran Desert of southern Arizona. Biological Conservation 68(1994):143-148.

Ryti, R.T., and T.J. Case. 1988. Field experiments on desert ants: testing for competition between colonies. Ecology: 69:1993-2003.

Schmidt-Nielsen, K. 1964. Desert Animals: Physiological Problems of Heat and Water. 230 pp. Dover Public., Inc. N.Y.

Secretaría de Medio Ambiente y Recursos Naturales. 2002. Protección ambiental – Especies natives de México de flora y fauna silvestres – Categoriás de riesgo y especificaciones para su inclusión o cambio – Lista de especies en riesgo. Diario Oficial de la Federación, 6 de Marzo de 2002.

Setser, K. 2001. Final Report. Scientific study of the flat-tailed horned lizard, *Phrynosoma mcallii*, at OWSVRA: 2000 Field Season. California Department of Parks and Recreation, Off-Highway Motor Vehicle Division, Ocotillo Wells District.

Setser, K. and K.V. Young, 2000. Final Report. Scientific Study of the Flat-tailed Horned Lizard, Phrynosoma mcallii, at OWSVRA, 1999 Field Season. California Department of Parks and Recreation, Off-Highway Motor Vehicle Recreation Division, Ocotillo Wells District.

Sherbrooke, W.C. 1987. Captive *Phrynosoma solare* raised without ants or hibernation. Herp Review 18:11-13.

Smith, G.R., and R.E. Ballinger. 1994. Temperature relationships in the high altitude viviparous lizard, *Sceloporus jarrovi*. Amer. Midland Nat. 131:181-189.

Smith, H.M. 1946. Handbook of Lizards: Lizards of the United States and Canada. Comstock Publishing, Ithaca, N. Y.

Stebbins, R.C. 2003. A Field Guide to Western Reptiles and Amphibians. Houghton Mifflin Co., Boston, Mass.

Tevis, L. 1958. Germination and growth of ephemerals induced by sprinkling a sandy desert. Ecology 39:681-688.

Tracy, C.R. 1994. Patterns of fire incidence and implications for management of desert wildlife management areas. Pp. 93-112 In Ann Fletcher-Jones (ed.), Desert Tortoise Council, Proceedings of the 1994 Symposium.

Turner, D.S., and J.C. Rorabaugh. 1998. *Phrynosoma platyrhinos* (Desert horned lizard). Predation. Herpetological Review 29(2):101.

Turner, F.B., and P.A. Medica. 1982. The distribution and abundance of the flat-tailed horned lizard (*Phrynosoma mcallii*). Copeia 1982(4):815-823.

Turner, F.B., P.A. Medica, and H.O. Hill. 1978. The status of the flat-tailed horned lizard *(Phrynosoma mcallii)* at nine sites in Imperial and Riverside Counties, California. Rept. to Bur. of Land Mgmt., El Centro, Calif.

Turner, F.B., J.C. Rorabaugh, E.C. Nelson, and M.C. Jorgensen. 1980. A survey of the occurrence and abundance of the flat-tailed horned lizard (*Phrynosoma mcallii*) in California. Lab. of Nuclear Med. and Radiation Biol., Univ. of Calif., Riverside, Calif.

Turner, R.M., and D.E. Brown. 1982. Sonoran desert scrub. In Biotic Communities of the American Southwest-United States and Mexico. Desert Plants 4(1-4):181-221.

Twedt, B. and G. Wright (eds.). 2002. Flat-tailed horned lizard Rangewide Management Strategy biannual report. Bureau of Land Mgmt. 24 pp.

U.S. Fish and Wildlife Service. 1982. Endangered and threatened wildlife and plants; review of vertebrate wildlife for listing as endangered or threatened species. Federal Register 47(521):58454-58460.

U.S. Fish and Wildlife Service. 1985. Endangered and threatened wildlife and plants; review of vertebrate wildlife; notice of review. Federal Register 50(181):37958-37967.

U.S. Fish and Wildlife Service. 1989. Endangered and threatened wildlife and plants; animal notice of review. Federal Register 54(4):554-579.

U.S. Fish and Wildlife Service. 1991. Endangered and threatened wildlife and plants; animal candidate review for listing as endangered or threatened species, proposed rule, 50 CFR Part 17, Federal Register 58(225).

U.S. Fish and Wildlife Service. 1993. Endangered and threatened wildlife and plants: Proposed rule to list the flat-tailed horned lizard as threatened. Federal Register 58(227):62624-62629.

U.S. Fish and Wildlife Service. 1996a. Memorandum from Sam F. Spiller, USFWS, Ariz. Ecological Services Field Off., to Maj. J. D. Cox, Dir. of Range Mgmt., Marine Corps Air Stn., Yuma. April 17, 1996. Subject: Biological opinion and conference opinion for existing and proposed activities by the Marine Corps Air Station - Yuma in the Arizona portion of the Yuma Training Range Complex.

U.S. Fish and Wildlife Service. 1996b. Memorandum from Field Supervisor, Carlsbad Field Office, USFWS, to BLM State Director, California. July 9, 1996. Subject: Formal endangered species consultation/conference on renewal of the five-year pesticide use permit to the California Department of Food and Agriculture for use of malathion to control curly to virus in California. Biological Opinion No. 1-06-96-F-32.

U.S. Fish and Wildlife Service. 1997. Endangered and threatened wildlife and plants; withdrawal of the proposed rule to list the flat-tailed horned lizard as threatened. Federal Register 62(135):37852-37860.

U.S. Fish and Wildlife Service. 2001. Memorandum from Acting Field Supervisor, USFWS, Sacramento Office, to State Director, BLM, Sacramento, California. Nov. 21, 2001. Subject: Formal Section 7 Consultation on Renewal of a Five Year Pesticide Use Permit to the California Department of Food and Agriculture for use of malathion to control curly-top virus in Fresno, Kings, Kern, Los Angeles, Merced, Monterey, San Luis Obispo, San Joaquin, Santa Barbara, Stanislaus, Imperial, and Ventura Counties, California [6840(P); CA 930.6].

U.S. Fish and Wildlife Service. 2001. Endangered and threatened wildlife and plants; notice of reinstatement of the 1993 proposed listing of the flat-tailed horned lizard as a threatened species and the reopening of the comment period on the proposed rule. Federal Register 66(247):66384-66385.

U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; withdrawal of the proposed rule to list the flat-tailed horned lizard as threatened. Federal Register 68(2):331-348.

Vasek, F.C., H.B. Johnson, and G.D. Brum. 1975a. Effects of power transmission lines on vegetation of the Mojave Desert. Madrono 23(3):114-130.

Vasek, F.C., H.B. Johnson, and D.H. Eslinger. 1975b. Effects of pipeline construction on creosote bush scrub vegetation of the Mojave Desert. Madrono 23(1):1-13.

Webb, R.H., H.C. Ragland, W.H. Godwin, and D. Jenkins. 1978. Environmental effects of soil property changes with off-road vehicle use. Environ. Manage. 2(3):219-233.

Webb, R.H., and H.G. Wilshire. 1978. An annotated bibliography of the effects of off-road vehicles on the environment. Unpubl. rept. U.S. Geol. Survey Open File Rept 78-149. 28pp.

Webb, R.H., and H.G. Wilshire (Ed.) 1983. Environmental Effects of Off-Road Vehicles: Impacts and Management in Arid Regions. Springer-Verlag, N. Y.

White, G.C. and K. P. Burnham. 1999. Program MARK: Survival estimation from populations of marked animals. Bird Study 46 Supplement, 120-138. (Available online from http://www.cnr.colostate.edu/~gwhite/mark/euring.PDF)

Wilcox, B.A., and D.D. Murphy. 1985. Conservation strategy: the effects of fragmentation on extinction. Amer. Naturalist 125:879-887.

Wilson, K.R., and D.R. Anderson. 1985. Evaluation of two density estimators of small mammal population size. Journal of Mammalogy 66:13-21.

Wone, B., and B. Beauchamp. 1995a. Observations on the escape behavior of the horned lizard *Phrynosoma mcallii*. Herpetological Review 26(3): 132.

Wone, B., and B. Beauchamp. 1995b. Baseline population size estimation of the horned lizard *Phyrnosoma mcallii* at Ocotillo Wells State Vehicular Recreation Area, San Diego and Imperial Counties, California. Rept. to Calif. Dept. of Parks and Rec., Off-Highway motor Veh. Div.

Wone, B., B. Beauchamp, and M. Kutilek. 1994. Development of methods for monitoring population trends of *Phrynosoma mcallii* at Ocotillo Wells State Vehicular Recreation Area, Calif. Rept. to Calif. Dept. of Parks and Rec., Contract No. C9314012. 21pp.

Wone, B., B. Beauchamp, and M. Kutilek. 1997. Annual monitoring of *Phrynosoma mcallii* at Ocotillo Wells State Vehicular Recreation Area, San Diego and Imperial Counties, California. Final Report Contract no. C9754004, California State Parks Off-Highway Motor Vehicle Division, Sacramento, Calif.

Wone, B., B. Beauchamp, E.G. Olson, and B.O. Wolf. 1991. Occurrence and distribution of the flat-tailed horned lizard, *Phrynosoma mcallii*, at Ocotillo Wells State Vehicular Recreation Area and the acquisition area, California, based upon a survey of their scats. Contract Rept. No. SG-0514 to the Calif. Dept. of Fish and Game.

Wright, G.R. 1993. Flat-tailed horned lizard status report - September 1993. BLM Rept., El Centro Resource Area, California. 59 pp. + appendices and maps.

Wright, G.R. 2002. Flat-tailed horned lizard monitoring report. BLM Rept., El Centro Resource Area, Calif. 55 pp.

Wright, G. and T. Grant. 2002. Mark-recapture estimates of the flat-tailed horned lizard (*Phrynosoma mcallii)* in the Yuha Basin of California. Draft report, Bureau of Land Mgmt., El Centro, Calif. 13 pp.

Wright, G. and T. Grant. 2003. Flat-tailed horned lizard monitoring report. BLM Rept., El Centro Resource Area, Calif. 57 pp.

Young, K.V. 1999. Scientific study of the flat-tailed horned lizard, *Phrynosoma mcallii,* at OWSVRA: 1998 field season. California State Parks Off-Highway Motor Vehicle Division, Sacramento, Calif.

Young, K.V., and A.T. Young. 2000. Final report. Scientific study of the flat-tailed horned lizard, *Phrynosoma mcallii*. U.S. Dep. of Navy Contracts N68711-95-LT-C0032, N68711-95-LT-C0035. 72 pp.

APPENDICES

Appendix 1. 1997 Conservation Agreement

CONSERVATION AGREEMENT
PHRYNOSOMA MCALLII, FLAT-TAILED HORNED LIZARD

I. PURPOSE AND NEED

The flat-tailed horned lizard is a small, phrynosomatid lizard inhabiting sandy flats and valleys from the Coachella Valley, California, south and east through the Borrego and Imperial valleys, California, Southwestern Yuma County, Arizona, and adjacent portions of Baja California Norte and Sonora, Mexico. Approximately 34 percent of flat-tailed horned lizard habitat has been converted to urban or agricultural uses, or was inundated by the Salton Sea early in this century and is no longer occupied by the species. Six key habitat areas remain in the United States, including the Ocotillo Wells area, Borrego Badlands, West Mesa, Yuha Desert, and East Mesa in California, and the Yuma Desert in Arizona. These areas are subject to a variety of activities that degrade habitat, including agricultural, residential, and industrial development, off-highway vehicle use, geothermal development, sand and gravel operations, military activities, fire, and construction of roads, canals, and utilities. Although population trends are difficult to monitor, evidence suggests populations may have declined in two key areas, including northern East Mesa and the Yuha Desert. The Fish and Wildlife Service proposed the flat-tailed horned lizard as a threatened species in a November 29, 1993 Federal Register Notice. Collection of the species is prohibited by state law in Arizona and California. Further information on the status, distribution, taxonomy, and threats facing this species can be found in the Rangewide Management Strategy (Appendix 1), which serves as a Conservation Assessment and Conservation Strategy.

Occupied habitat is under the jurisdiction of a variety of federal, state, local government, and private entities. The primary land owners or managers of flat-tailed horned lizard habitat in California include; the Bureau of Land Management, Department of the Navy, California Department of Parks and Recreation (Ocotillo Wells State Recreational Vehicle Area and Anza Borrego Desert State Park), Bureau of Reclamation, and private individuals. In Arizona, the primary land owners or managers are; Marine Corps Air Station Yuma, Bureau of Reclamation, Bureau of Land Management, Arizona State Land Department, and private individuals. In both states, the U.S. Border Patrol is empowered with broad law enforcement authority and conducts many activities in flat-tailed horned lizard habitat, particularly within 25 miles of the international boundary. Local governments, including cities and counties, affect location and types of development, and may affect rates of growth within their jurisdiction. The six key habitat areas are managed primarily by the parties to this agreement.

This Conservation Agreement has been initiated to conserve the flat-tailed horned lizard by reducing threats to the species, stabilizing the species' populations, and maintaining its ecosystem. The document's primary purpose is to conserve the flat-tailed horned lizard through conservation measures under the Endangered Species Act of 1973, as amended.

The Conservation Agreement establishes a general framework for cooperation and participation among signatories. The signatories will provide support to the program as needed, and will provide input on current and future program needs. The Agreement is made and entered into to meet the following objective: 1) Implement the Flat-tailed Horned Lizard Rangewide Management Strategy (Appendix 1), thus establishing an open process by which to identify and carry out such actions as will conserve the species through voluntary participation of public and private partners.

II. INVOLVED PARTIES

In order to meet the present and/or future needs of this conservation effort, this Agreement may be modified or amended at any time by mutual written concurrence of the cooperating agencies to facilitate additional cooperators. The parties below are currently involved in this agreement.

Ecological Services - Carlsbad Field Office
U.S. Fish and Wildlife Service
2730 Loker Avenue West
Carlsbad, California 92008

Ecological Services Phoenix Field Office
U.S. Fish and Wildlife Service
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951

U.S. Bureau of Land Management
California Desert District
6221 Box Springs Boulevard
Riverside, California 92507

U. S. Bureau of Land Management
Yuma District
2555 Gila Ridge Road
Yuma, Arizona 85365

U.S. Bureau of Reclamation
Yuma Area Office
P.O. Box D
Yuma, Arizona 85356

Marine Corps Air Station - Yuma
Box 99220
Yuma, Arizona 85369-9220

U.S. Navy
El Centro Naval Air Facility
El Centro, California 92243-5001

Arizona Game and Fish Department
2221 West Greenway Road
Phoenix, Arizona 85023-4399

California Department of Fish and Game
330 Golden Shore, Suite 50
Long Beach, California 90802

California Department of Parks and Recreation
Off-Highway Motor Vehicle Division
Ocotillo Wells State Recreational Vehicle Area
P.O. Box 360
Borrego Springs, California 92004

California Department of Parks and Recreation
Anza Borrego Desert State Park
P.O. Box 299
Borrego Springs, California 92004

III. AUTHORITIES

The authorities for the involved parties to participate in this Conservation Agreement are derived from the following legislation:

U.S. FISH AND WILDLIFE SERVICE:

Endangered Species Act of 1973, as amended
Fish and Wildlife Act of 1956, as amended
Fish and Wildlife Coordination Act of 1934, as amended
Sikes Act of 1960, as amended

U.S. BUREAU OF LAND MANAGEMENT

Endangered Species Act of 1973, as amended
Federal Land Policy Management Act
Sikes Act of 1960, as amended

U.S. BUREAU OF RECLAMATION

Endangered Species Act of 1973, as amended
Fish and Wildlife Coordination Act of 1934, as amended

MARINE CORPS AIR STATION - YUMA

Endangered Species Act of 1973, as amended
Sikes Act of 1960, as amended

U. S. NAVY EL CENTRO NAVAL AIR FACILITY

Endangered Species Act of 1973, as amended
Sikes Act of 1960, as amended

ARIZONA GAME AND FISH DEPARTMENT

Arizona Revised Statute 17-231.B-7
Endangered Species Act of 1973, as amended
Sikes Act of 1960, as amended

CALIFORNIA DEPARTMENT OF FISH AND GAME

Endangered Species Act of 1973, as amended
Sikes Act of 1960, as amended
California Fish and Game Code section 1802
California Fish and Game sections 3450 et seq.

CALIFORNIA DEPARTMENT OF PARKS AND RECREATION

Endangered Species Act of 1973, as amended

In addition to the above-listed legislative authorities, the following interagency agreements provide a framework for cooperation and participation among involved parties in the conservation of species tending towards listing: a Memorandum of Understanding signed by the U.S. Fish and Wildlife Service, the U.S. Bureau of Land Management, the U.S. Forest Service, the National Park Service, the National Marine Fisheries Service, and the International Association of Fish and Wildlife Agencies, issued on January 25, 1994 and amended on March 20, 1994 (Appendix 2); and a Memorandum of Understanding signed by 14 federal agencies, including among others, the U.S. Fish and Wildlife Service, the U.S. Bureau of Land Management, U.S. Bureau of Reclamation, and Department of Defense on September 28, 1994 (Appendix 3).

IV. IMPLEMENTATION OF CONSERVATION ACTIONS

Conservation actions necessary to ensure the long-term persistence of the flat-tailed horned lizard are identified in the Flat-tailed Horned Lizard Management Plan implementation schedule. Subject to availability of funds and compliance with all applicable regulations, the involved parties agree to implement actions according to scheduled completion dates and by responsible parties, as shown in the implementation schedule. If threats have been removed to a degree that the flat-tailed horned lizard does

not meet the definition of a threatened species, pursuant to the Act, the Fish and Wildlife Service may withdraw the proposed rule to list the flat-tailed horned lizard as threatened. If the species is withdrawn and it becomes known that there are threats to the survival of the species that are not or cannot be resolved through this or any Conservation Agreement, the species will be re-assigned to candidate status and an appropriate listing priority assigned.

NOW THEREFORE, in consideration of the above premises, the cooperators enter into this Agreement as full and equal partners to accomplish its purpose and objectives.

All cooperators agree to:

1 . Further develop and implement the objectives, strategies, and tasks of the Flat-tailed Horned Lizard Rangewide Management Strategy

2. As needed for this conservation effort, and as available, provide program personnel with facilities, equipment, logistical support, and access to lands under their control.

3. Participate regularly in ICC and MOG meetings to enhance communication and cooperation, and to help develop annual or other work plans and reports.

4. Develop and distribute public information and educational materials on this conservation effort.

5. Provide ongoing review of, and feedback on, this conservation effort.

6. Cooperate in development of major media releases and media projects.

7. Keep local governments, communities, the conservation community, citizens, and other interested and affected parties informed on the status of this conservation effort, and solicit their input on issues and actions of concern or interest to them.

8. Whenever possible, develop voluntary opportunities and incentives for local communities and private landowners to participate in this conservation effort.

9. Assist in generating the funds necessary to implement this conservation effort.

V. FLAT-TAILED HORNED LIZARD INTERAGENCY COORDINATING COMMITTEE

1. The involved parties shall designate a representative to serve on the Flat-tailed Horned Lizard Interagency Coordinating Committee (ICC). The ICC shall monitor the implementation of the Rangewide Management Strategy and provide a forum for exchange of information on the species. The ICC shall also be responsible for specific tasks as set forth in the implementation schedule. Through mutual agreement among designated representatives of all involved parties, the ICC may recommend changes in the tasks and scheduling of task implementation to the MOG, as described in the implementation schedule of the Rangewide Management Strategy. The ICC shall in no way make recommendations to or serve as an advisory group to a federal agency.

Designated representatives shall attend at least two meetings of the ICC annually for the life of this Agreement to review progress and coordinate work priorities and schedules.

VI. FLAT-TAILED HORNED LIZARD MANAGEMENT OVERSIGHT GROUP

The involved parties shall designate a management-level representative to serve on the Flat-tailed Horned Lizard Management Oversight Group (FTHL MOG). The FTHL MOG will perform management-level duties, as described in the Rangewide Management Strategy and as identified by the ICC. The FTHL MOG shall

meet semi-annually, or as needed. Members of the FTHL MOG have been selected by each signatory agency, and are listed below.

Bureau of Land Management, California	El Centro Resource Area Manager
Bureau of Land Management, Arizona	Yuma Field Office Manager
Bureau of Reclamation, Yuma	Yuma Area Manager
U.S. Fish and Wildlife Service, Region 1	Assistant Field Supervisor, Carlsbad
U.S. Fish and Wildlife Service, Region 2	Field Supervisor, Phoenix
Arizona Game and Fish Department	Yuma Region Supervisor
California Department of Parks and Recreation	Ocotillo Wells SVRA Superintendent
Anza Borrego Desert State Park	Superintendent
El Centro Naval Air Station	Resource Management Officer
Barry Goldwater Range	Range Management Officer
California Department of Fish and Game	Regional Manager

VII. ADMINISTRATIVE CLAUSES

1. Nothing herein shall be construed as obligating the parties to expend or as involving the parties in any contract or other obligation for the payment of money in excess of appropriations authorized by law and administratively allocated to work described herein.

2. This agreement is not a fund obligating document, and each party shall carry out its separate activities in a coordinated and mutually beneficial manner. Any activity that may create an exchange of funds will be conducted outside the scope of this agreement as authorized by law or regulations of each party.

3. All parties are hereby put on notice that the Arizona Game and Fish Department's participation in this agreement is subject to cancellation by the Governor of Arizona pursuant to A.R.S. 38-511 if any person is significantly involved in initiating, negotiating, securing, drafting, or creating a contract on behalf of the state of Arizona or any of its departments or agencies at any time while the contract or any extension of the contract is in effect, or is an employee of any other party to the contract in any capacity or a consultant to any other part of the contract with respect to the subject matter of the contract.

4. This Agreement will not be effective with respect to the Arizona Game and Fish Department until the fully executed Agreement is filed with the Arizona Secretary of State.

5. Pursuant to the laws of Arizona (A.R.S. 35-124 and 35-215, and section 41-1179.04, as amended), California, and the United States, all jointly maintained books, accounts, reports, files, and other records relating to this Agreement shall be subject at all reasonable times to inspection and audit by the state of Arizona, the state of California, and the federal government for five years after completion of the Agreement. Such records shall be reproduced as designated by the state of Arizona, the state of California, and the federal government.

6. Any contracts entered into as a result of this Agreement shall comply with all state and federal contracting laws, including all applicable laws prohibiting discriminatory employment practices by contractors. Contracts entered into by the state of Arizona shall incorporate the Arizona Governor's Executive Order No. 75-5 entitled "Prohibition of Discrimination in State Contracts - Non-discrimination in Employment by Government Contractors and Subcontractors".

7. To the extent required or permitted by the laws of Arizona (Arizona Revised Statutes section 12-1518 and any successor statutes), California, and the United States, the cooperators agree to use arbitration, after exhausting all applicable administrative remedies, to resolve any dispute arising out of this agreement, where not in conflict with federal law or laws of the state of California. Any arbitration with respect to real property shall occur in the state where the real property is located or, if the real property is owned by the United States, shall be conducted pursuant to federal law.

IT IS MUTUALLY AGREED AND UNDERSTOOD BY AND BETWEEN THE COOPERATORS THAT:

1. Specific work projects or activities that involve transfer of funds services, or property among cooperators to this Agreement may require execution of separate agreements or contracts.

2. Specific proposed project actions or changes in management activities may require amendments to existing land use plans and further environmental analysis before implementation.

3. Conflicts between or among cooperators concerning procedures or actions under this Agreement that cannot be resolved at the operational level (i.e. by cooperator representatives to the MOG or ICC) will be referred to the next higher level within each cooperator, as necessary, for resolution.

VIII. DURATION OF AGREEMENT

The term of this Agreement shall begin on the date the Agreement is filed with the Secretary of State, after signed by all parties, and end after all tasks identified in the implementation schedule are completed, or until terminated by mutual concurrence of all the parties. The involved parties shall review the Conservation Agreement and its effectiveness annually to determine whether it should be revised. Within a year of completing the tasks identified in the implementation schedule, the Conservation Agreement shall be reviewed by the involved parties and either modified, renewed, or terminated. This Agreement may, at any time, be amended, extended, modified, supplemented, or terminated by mutual concurrence. Any party may withdraw from this Agreement by providing 60 days notice to the other parties in writing.

IX. SIGNATURES

[The original, signed signature pages are not included]

IN WITNESS WHEREOF:

The cooperators hereto have executed this Agreement as of the last written date below.

For the **U.S. DEPARTMENT OF INTERIOR, FISH AND WILDLIFE SERVICE, REGION 1**

Michael Spear, Regional Director

For the **U.S. DEPARTMENT OF INTERIOR, FISH AND WILDLIFE SERVICE, REGION 2**

Nancy Kaufman, Regional Director

For the **U.S. DEPARTMENT OF INTERIOR, BUREAU OF LAND MANAGEMENT, CALIFORNIA STATE OFFICE**

Edward Hastey, State Director

For the **U.S. DEPARTMENT OF INTERIOR, BUREAU OF LAND MANAGEMENT, ARIZONA STATE OFFICE**

Denise Meridith, State Director

For the **U.S. DEPARTMENT OF INTERIOR, BUREAU OF RECLAMATION, LOWER COLORADO REGION**

Robert Johnson, Regional Director

For the **U.S. DEPARTMENT OF DEFENSE, MARINE CORPS AIR STATION - YUMA**

C. J. Turner, Commanding Officer

For the **U.S. DEPARTMENT OF DEFENSE, EL CENTRO NAVAL AIR FACILITY**

Captain P. T. Madison, Commanding Officer

For the **ARIZONA GAME AND FISH DEPARTMENT**

Duane Shroufe, Director

For the **CALIFORNIA DEPARTMENT OF FISH AND GAME**

Jacqueline E. Schafer, Director

For the **CALIFORNIA DEPARTMENT OF PARKS AND RECREATION**

Donald Murphy, Director

Appendix 2. Federal Plans Affecting Flat-tailed Horned Lizard Habitat

Bureau of Land Management Lands

In 1980, the Secretary of the Interior signed the California Desert Conservation Area Plan (BLM 1980) prescribing land uses on BLM-administered lands in California. The existing network of designated routes is illustrated on BLM's Desert Access Guides (maps). The Desert Plan established two ACECs to conserve the FTHL - the Yuha Basin (40,622 acres) and East Mesa ACECs (40,712 acres). The Desert Plan also directed that habitat management plans be written for lands adjacent to these ACECs. Although not designated specifically for the FTHL, the San Sebastian Marsh/San Felipe Creek ACEC (6,337 acres) and Dos Palmas ACEC (14,400 acres) also contain habitat for the FTHL.

In 1990, the BLM and CDFG signed the "Management Strategy for the Flat-tailed Horned Lizard on Bureau of Land Management Administered Lands within the California Desert Conservation Area" (BLM and CDFG 1990). Habitat categories were defined, and a category map was developed in the plan. A policy and formula were instituted for projects to compensate for lost or degraded habitat. Other management activities to reduce habitat degradation and loss were implemented. Measures implemented through various plans were brought into a species rangewide (California only) context. Among these were the research program, the inventory and monitoring program, interagency coordination, and habitat compensation.

California

Yuha Basin ACEC

In 1981, a combined plan was prepared for the Yuha Basin ACEC (BLM 1981). Specific actions in the plan were designed to protect sensitive cultural and wildlife resources while allowing for mineral material sales, geothermal development, and motorized vehicle competitive events. In 1983, a habitat management plan was prepared for the adjacent Yuha Desert area (BLM 1983). Measures were similar to the Yuha Basin ACEC Plan with additional measures dealing with monitoring of FTHL population trends, exchanges and acquisitions, and formation of an interagency coordinating committee. In response to indications of declining FTHL populations and increasing damage to cultural resources due to route proliferation and cross-country vehicle travel in Yuha Basin, the "Yuha Desert Management Plan" (BLM 1985) was prepared. This plan covers both of the previous areas plus several adjacent ACECs and Natural Areas. The plan tightened controls on, but did not eliminate OHV competitive events. Routes of travel were reduced in number. Camping was restricted to a 25-foot corridor along routes of travel. Law enforcement was increased. Other actions dealing with interagency coordination and monitoring of population trends were strengthened. In 1985, the Yuha Basin ACEC was expanded to 63,000 acres.

East Mesa ACEC

In 1982, the "Southern East Mesa ACEC Management Plan" (BLM 1982a) and "East Mesa Wildlife Habitat Management Plan" (BLM 1982b) were completed. The two plans covered adjacent areas and included similar measures. Although not previously conducted in East Mesa, competitive events were formally prohibited, but oil and gas leasing and geothermal energy development were allowed. The ACEC is closed to mineral material sales. Inventory and monitoring of FTHL populations were given a high priority.

San Sebastian Marsh/San Felipe Creek ACEC

In 1986, the "San Sebastian Marsh/San Felipe Creek [ACEC] Management Plan" (BLM 1986a) was signed. Based on scat counts, FTHLs are locally abundant in this ACEC (BLM 1986a). Most measures in the plan were aimed at protecting and enhancing the aquatic and riparian resources. The

ACEC is closed to vehicle entry. The ACEC encompasses about 5,100 acres administered by the BLM and about 1,250 acres administered by the CDFG.

Dos Palmas ACEC

Limited FTHL habitat is found in the Dos Palmas ACEC along the northeastern side of the Salton Sea. This area encompasses about 14,400 acres of federal, state, and private lands. Dos Palmas ACEC originated in 1980 as the Salt Creek ACEC, at the time about 2,500 acres to protect Yuma clapper rail, desert pupfish, and other sensitive biological resources, including the FTHL. In 1998, BLM prepared an Ecosystem Management Plan for the ACEC and continues to implement that today.

West Mesa

The West Mesa ACEC was officially designated in 1986 to protect habitat of the FTHL, rare plants, and cultural resources. No plan has been written at this time. The ACEC encompasses more than 20,300 acres, including about 1,600 acres of private land.

Algodones Dunes

A habitat management plan for the Algodones Dunes was prepared in 1987 (BLM 1987b). Based on scat counts, FTHLs are present in small numbers, mostly around the periphery of the dunes. The plan focuses on general enhancement and protection of the flora and fauna of the dunes. Most of the dunes north of Highway 78 is designated wilderness; the dune area south of Highway 78 is open to vehicular cross-country travel.

Arizona

BLM Yuma Field Office manages approximately 900 acres of potential FTHL habitat. These 19 land parcels range in area from 1.6 to 335 acres with an average area of 46 acres. Most of the potential FTHL habitat is poor quality because parcels are typically small, fragmented, and disturbed.

BLM manages lands within the Yuma Field Office under the Yuma District Resource Management Plan (BLM 1987a) and the Lower Gila South Resource Management Plan (BLM 1998). In addition, amendments have been developed for the Yuma Resource Management Plan. They are the: Lower Gila South Resource Management Plan – Goldwater Amendment (BLM 1990), Yuma District Resource Management Plan Amendment (BLM 1992), Yuma District (Bill Williams) Resource Management Plan Amendment (BLM 1994), Yuma District (Havasu) Resource Management Plan Amendment (BLM 1994), Yuma District (Lands) Resource Management Plan Amendment, and Lechuguilla-Mohawk Habitat Management Plan (BLM 1997).

Currently, the FTHL RMS is addressed in the Lechuguilla-Mohawk Habitat Management Plan, and BLM-Yuma has been following the RMS since its inception. BLM-Yuma plans to incorporate the RMS in its upcoming resource management plan.

Department of Defense Lands

California

The Congress has withdrawn two military ranges in California, R-2510 (West Mesa) and R-2512 (East Mesa). The ranges have been withdrawn from all forms of appropriation under public land laws and are reserved for use by the Secretary of the Navy for defense-related purposes. This withdrawal became effective on October 1, 1996, and is in effect for 25 years. FTHLs occur throughout both of these ranges. Although the ranges are withdrawn from entry for non-military uses, R-2510 is adjacent to an OHV open area, and trespass OHV activity occurs. R-2512 also has some OHV use but to a lesser extent. Land management strategies and responsibilities will be developed through a new memorandum of understanding between BLM and the Department of the Navy.

Arizona

The passage of the Military Lands Withdrawal Act of 1986 (Public law 99-606) transferred land management responsibilities on the BMGR to the BLM. However in 2001, land management responsibilities transferred back to the DOD under the Military Lands Withdrawal Act of 1999 (Public law 106-65). DOD will manage the BMGR under the Integrated Natural Resources Management Plan, which is in preparation as of this writing.

On the BMGR, FTHL habitat occurs in portions of three special areas: 1) the Gran Desierto Dunes ACEC; 2) the Yuma Desert and Sand Dunes Habitat Management Area; and 3) the extreme western portion of the Tinajas Altas Mountains ACEC. In these areas, OHV use, camping, new ROWs, and other land use authorizations are limited. For safety reasons, MCAS-Yuma issues range passes for visitors to the BMGR. Visitors are restricted to driving street-legal vehicles, which further inhibits off-road travel.

For military activities on the BMGR, the USFWS has prepared a conference opinion (USFWS 1996a) that provides guidance for activities affecting the FTHL.

Bureau of Reclamation Lands

About 600,000 acres, mostly in Imperial County, California, were withdrawn by Secretarial orders dating back to the early 1900's for use by the BOR in development of the All-American Canal, Boulder Canyon, Colorado River Storage, and Yuma Reclamation projects. Lands were withdrawn from settlement, sales, location under the mining laws, and entry. Withdrawn lands are managed by the BLM under an agreement with the BOR signed in 1978. The Federal Land Policy and Management Act of 1976 directed agencies holding withdrawals to work with the BLM to determine which withdrawals were obsolete and should be terminated; agency recommendations were to be submitted to the Department of the Interior for review and approval. In January 1992, recommendations reflecting the coordinated efforts of the BOR, BLM, and the Imperial and Coachella Valley Irrigation Districts were submitted to the Department of the Interior. It was recommended that 133,712 acres continue under withdrawal and that withdrawals be terminated on 444,781 acres. The California Desert Conservation Area Plan (BLM 1980) will cover lands released from withdrawal. Unless within the boundaries of the 1964 Lower Colorado River Land Use Plan, lands continuing under withdrawal and covered under the earlier agreements will be managed by BOR.

Appendix 3. Legal Description of Management and Research Areas

Description of Yuma Desert Flat-tailed Horned Lizard Management Area

Beginning in the northwest corner of the area, the northern boundary of the MA is approximately 50 feet south of the BMGR boundary to accommodate County 14th Street and its right-of-way. On the eastern side of the MA, the boundary follows Foothills Boulevard south to the Auxiliary 2 service road. East and south along the Auxiliary 2 road to its end in Sec. 23 in T.11S., R.21W. The boundary then follows a southeasterly direction to the International Boundary. The southern boundary of the MA follows the International Boundary to Avenue D. The boundary includes federally administered lands in the Five-Mile Zone east of Avenue D and south of County 23rd Street, excluding the State Prison and the Yuma City Landfill. Along County 23rd Street and the western side of the BMGR, the boundary follows the proposed Area Service Highway route, excluding the proposed highway and its ROW.

In the interim period until a full analysis of alternative corridors is completed, federally administered lands within the BMGR west of the proposed route of the Area Service Highway and in the Five-Mile Zone north of the proposed route will be managed in accordance with prescriptions that apply to MAs.

QUAD SHEETS:

East boundary – Butler Mountains, Vopoki Ridge SE, Vopoki Ridge, W. of Vopoki Ridge, Fortuna SW, Fortuna

North boundary – Fortuna, Yuma East

West boundary – Yuma East, Yuma SE, S.E. of Somerton, S. of Somerton

South boundary – S. of Somerton, S.E. of Somerton, W. of Vopoki Ridge, Vopoki Ridge SW, Vopoki Ridge SE, Butler Mountains

Description of East Mesa Flat-tailed Horned Lizard Management Area

All are San Bernardino Meridian.

[East boundary] Beginning in Sec. 31 in T.16S., R.20E. at the intersection of Frontage Road and West Levee Road on the north side of the All-American Canal, then northwest along the West Levee Road (on west levee of Coachella Canal) to Highway 78 (Glamis Highway) in Sec. 35 in T.13S., R.17E;

[North boundary] then west on Highway 78 to the intersection with an unnamed dirt road in NW¼NE¼NE¼ Sec. 2 in T.14S., R.16E.;

[West boundary] then south on this dirt road to the intersection with BLM Route A181 in Sec. 23 in T.14S., R.16E., then south on BLM Route A181 to BLM Route A3410 in Sec. 11 in T.15S., R.16E., then eastward and southward on BLM Route A3410 to BLM Route A357 in Sec. 18 in T.15S., R.17E, then east on BLM Route A357 for about 0.3 miles to the west side of Sec. 17 in T.15S., R.17E., then south on the west side of Sec. 17, 20, 29, 32 in T.15S., R.17E. and Sec. 5, 8, and 17 in T.16S., R.17E to the Frontage Road on the north side of Interstate Highway 8 in Sec. 17 in T.16S., R.17E.;

[South boundary] then east on Interstate 8 Frontage Road to the west side of E½E½ Sec. 31 in T.16S., R.19E., then due north to the northern side of Sec. 31, then east 1.0 miles to the west side of E½E½ Sec. 32 in T.16S., R.19E., then due south to the Frontage Road, then east to the west

side of Sec. 36 in T.16S., R.19E., then north to the N½ Sec. 36, then due east 1 mile to the east side of Sec. 36, then south to Frontage Road, then east on Frontage Road to the West Levee Road.

QUAD SHEETS:

East boundary - Grays Well, Cactus, Glamis SE, Glamis SW, Glamis NW.

North boundary - Glamis NW, Holtville NE.

West boundary - Holtville NE, Holtville East, Glamis SW.

South boundary - Glamis SW, Midway Well NW, Midway Well, Grays Well.

Description of West Mesa Flat-tailed Horned Lizard Management Area

All are San Bernardino Meridian.

[East boundary] Beginning in southeast corner of Sec. 30 in T.14S., R.13E. and north along the east side of Sec. 30, 19, 18, and 7 to the south side of N½ of Sec. 7, then west and north around SW¼NE¼ Sec. 7, then west and north around NW¼NE¼ Sec. 7, then west along the north side of N½ Sec. 7, then north about 0.15 miles along the east side of Sec. 13 in T.14S., R.12E. to the southeast corner of Sec. 12, then in Sec. 12, west and north around E½SE¼, then west and north and east around SW¼NE¼, then north along the west side of NE¼NE¼, then in Sec. 1 in T.15S, R.12E., north along the west side of SW¼SW¼, then west and north around NW¼SE¼, then west and north around E½NW¼, then west to the southeast corner of Sec. 35 in T.13S., R.12E., then north along the west side of Sec. 35 to the northeast corner of Sec. 35, then west and north around E½ of Sec. 26, then west along the northern side of Sec. 26 W½, 27, and 28 to the intersection with BLM Route SF291 (transmission power line service road), then northwest on BLM Route SF291 to the northern side of Sec. 28 in T.12S., R.11E., then west on the north side of Sec. 28 to the southeast corner of Sec. 20, then north on the east side of Sec. 20 to Highway 86, then northwest on Highway 86 to the northern side of Sec. 20, then west on the northern side of Sec. 20 to the southeast corner of Sec. 18 in T.12S., R.11E., then north along the east side of Sec. 18 to Highway 78;

[North boundary] then west on Highway 78 to the west side of Sec. 18 in T.12S., R.10E.;

[West boundary] then south on the west side of Sec. 18 in T.12S., R.10E., then west on the north side of Sec. 24 in T.12S., R.9E. to the west side of Tarantula Wash, then southeast along the west side of Tarantula Wash to the south side of Sec. 24, then east to the northwest corner of Sec. 30 in T.12S., R.10E., then south along the west side of Sec. 30 and east along the south side of Sec. 30, then south on the west side of Sec. 32 and east along the south side of Sec. 32 to Carrizo Wash near the northeast corner of Sec. 5 in T.13S., R.10E., then south along the west side of Carrizo Wash through Sec. 5, 8, 17, 20, 29, and 32 in T.13S., R.10E., and then south through Sec. 5, 8, 17, 20, 29, and 32 in T.14S., R.10E. to the intersection with BLM Route SF397 in NW¼ Sec. 32 in T.14S., R.10E., then southeast on BLM Route SF397 to an unnamed, east-west route along the northern side of the SW¼SE¼ Sec. 15 in T.15S, R.10E., then west about .25 miles to the boundary of the U.S. Navy Target 103 at about the northwest corner of SE¼SE¼ Sec. 15, then south along the boundary of Target 103 (approximately west side of SE¼SE¼ Sec. 15 and E½E½ Sec. 22 to the south side of Sec. 22 in T.15S, R.10E.,

[South boundary] then (along the boundary of Target 103) east on the south side of Sec. 22 and east and south around NW¼ of Sec. 26 in T.15S, R.10E., then east along the south side of NE¼ of Sec. 26 and N½ Sec. 25, in T.15S., R.10E., and N½ Sec. 30 and NW¼ Sec. 19, in T.15S.,

R.11E., then north along the east side of NW¼ Sec. 19, then north and east around the S½SW¼ Sec. 20, then north along the east side of Sec. 20 and 17, then east along the south side of Sec. 9, then north along the east side of Sec. 9, then east along the north side of Sec. 10, then north along the east side of Sec. 3, in T.15S., R.11E and along the east side of Sec. 34 and 27 in T.14S., R.11E, then diagonally from the southeast corner to the northwest corner across Sec. 22, the west along the north side of Sec. 21, then north on the east side of Sec. 17 to the 120-ft. contour line, then northwest on this contour line to the intersection with BLM Route SF274 in Sec. 17 T.14S., R.11E., then northwest on BLM Route SF274 to the intersection with BLM Route SF391 in Sec. 6 T.14S., R.11E., then southwest on BLM Route SF391 to the boundary of U.S. Navy Target 101 in Sec. 32 T.14S., R.12E., then southeast along the boundary of Target 101 to the southwest corner of Sec. 34 in T.14S., R.12E., then west on the south side of Sec. 34, 35, and 36 in T.14S., R.12E., then south along the west side of Sec. 30 in T.14S., R. 13E., then along the south side of Sec. 30 to the southeast corner of Sec. 30.

QUAD SHEETS:

East boundary - Brawley NW, Calipatria SW, Kane Spring, Kane Spring NE.

North boundary - Kane Spring NE, Kane Spring NW.

West boundary - Kane Spring NW, Harpers Well, Plaster City NW, Painted Gorge.

South boundary - Painted Gorge, Plaster City, Superstition Mountain, Brawley NW.

Description of Yuha Desert Flat-tailed Horned Lizard Management Area

All are San Bernardino Meridian.

[East boundary] Beginning at the International Boundary Road on the east side of Sec. 19 in T.17S., R.13E., then north along the eastern edge of public lands lying west of the Westside Main Canal Service Road in T.17S., R.13E.; T.17S., R.12E.; and T.16½S., R.12E. to Interstate Highway 8;

[North boundary] then east along the south side of Interstate Highway 8 to the west side of Sec. 30 in T.16S., R.11E.;

[West boundary] then south along the west side of Sec. 30 and 31 (T.16S., R.11E.) about 1.5 miles to the intersection with BLM Route Y1929, then south on BLM Route Y1929 to BLM Route 2716 in Sec. 12 in T.17S, R.10E., then south on BLM Route Y2716, to BLM Route Y2722 in Sec. 11 in T.17S, R.10E., then south to the International Boundary Road;

[South boundary] then east along the International Boundary Road to the east side of Sec. 19 in T.17S., R.13E.

QUAD SHEETS:

East boundary - Mount Signal, Yuha Basin, Plaster City.

North boundary - Plaster City, Painted Gorge.

West boundary - Painted Gorge, Coyote Wells.

South boundary - Coyote Wells, Yuha Basin, Mount Signal.

Description of Borrego Badlands Flat-tailed Horned Lizard Management Area

All are San Bernardino Meridian.

[East boundary] Beginning at the road near the northeast corner of the SE¼ of Sec. 32 (unsurveyed) in T.11S., R.8E., then north along the east side of Sec. 32, 29, 20, and 17 (unsurveyed), then east on the south side of Sec. 9 and 10 in T.11S., R.8E. to the east side of the east fork of Palo Verde Wash in Sec. 10, then northwest and north along the east side of Palo Verde Wash to Borrego Springs Highway, then northwest along Borrego Springs Highway to the intersection with Truckhaven Trail in NE¼SW¼ Sec. 13 in T.10S., R.7E., then west on Truckhaven Trail to the 800-ft. contour line in NE¼NW¼ Sec. 14, then north and northwest along the 800-ft. contour line through Sec. 14, 11, 12, 1, and 2 in T.10S, R7E and Sec. 35, 34, 27, 28, 21, and 20 in T.9S., R.7E. to the northern side of Sec. 20 in T.9S., R.7E;

[North boundary] then west along the northern side of Sec. 20 and 19 in T.9S., R.7E. and the northern side of Sec. 24 and 23 in T.9S., R.6E. to the northwest corner of Sec. 23;

[West boundary] then south on the west side of Sec. 23 in T.9S., R.6E. to the intersection with the Rockhouse Trail in ¼SW¼NW Sec. 23, then southeast on Rockhouse Trail (west fork in Sec. 36, 1, 6, 7) through Sec. 23, 26, 25, and 36 in T.9S., R.6E. and Sec. 1 in T.10S., R.6E. and Sec. 6 and 7 in T.10S., R.7E. to the northwest corner of Sec. 17 in T.10S., R.7E., then east along the northern side of Sec. 17, then south along the eastern side of Sec. 16, 21, 28, and 33 in Sec. T.10S., R.7E. and the eastern side of Sec. 4, 9, 16, and NW¼ Sec. 21 in T.11S., R.7E. to the southwest corner of NW¼ Sec. 16;

[South boundary] then west on the south side of NW¼ of Sec. 21 then south on the south side of E½ Sec. 21, then east on the south side of Sec. 21, 22, and 23 to the Borrego Mountain Wash Jeep Trail in Sec. 23 in T.11S., R.7E., then north along the Borrego Mountain Wash Jeep Trail to the intersection with the San Felipe Creek Road in SW¼SE¼ Sec. 14, then west along the San Felipe Creek Road to the east side of Sec. 32 (unsurveyed) in T.11S., R.8E.

QUAD SHEETS:

East boundary - Borrego Mountain, Fonts Point, Clark Lake, Clark Lake NE.

North boundary - Clark Lake NE.

West boundary - Clark Lake NE, Clark Lake, Borrego Sink

South boundary - Borrego Sink, Borrego Mountain

Description of Ocotillo Wells Flat-tailed Horned Lizard Research Area

All are San Bernardino Meridian.

East boundary Beginning at the intersection of Highway 86 and Highway 78 in Sec. 17 in T.12S, R.11E., then north along Highway 86 to the north side of Sec. 9 in T.11S., R.10E.;

North boundary then west on the northern side of Sec. 9, 8, and 7 in T.11S., R.10E., then north on the east side of Sec. 1 in T.11S., R.9E to the intersection with the northern fork of Arroyo Salada Wash in ¼NE¼NE¼NE of Sec. 1., then northwest along this wash through Sec. 36 in T.10S., R.9E. and east through N½N½ Sec. 35 and 34 to the intersection with Truckhaven Trail in NE¼NE¼, then west on Truckhaven Trail to the west side of Sec. 30 (Imperial/San Diego County Line);

West boundary then south on the west side Sec. 30 and 31 in T.10S., R.9E. and the west side of Sec. 6 and 7 in T.11S., R.9E to a point about 0.6 miles south of the northwest corner of Sec. 7, then due west 4 miles, then due south along the west side of Sec. 16, 21, 28, and 33 in T.11S., R.8E. and the west side of Sec. 4 in T.12S., R.8E. to Highway 78;

South boundary then east on Highway 78 to the intersection with Highway 86.

QUAD SHEETS:

East boundary - Kane Spring NE, Kane Spring NW.

North boundary - Kane Spring NW, Truckhaven, Seventeen Palms.

West boundary - Seventeen Palms, Shell Reef, Borrego Mountain.

South boundary - Borrego Mountain, Kane Spring NW, Kane Spring NE.

Appendix 4. Population Monitoring Protocol

Introduction

This protocol describes how to establish and survey 12 plots on a MA and is based on Wright and Grant's (2002, 2003) surveys of the Yuha Desert MA.

Plot selection

The MA can be stratified based on coarse habitat differences (three strata were defined based on substrate in the Yuha Desert MA). The 12 plots should be divided between strata. Plots should be randomly selected from within the strata. Each plot should measure 200 x 200 m (4 ha; 10 acres). Divide the plot into 20, 10 m-wide north/south lanes using pin flags (this takes 400 pin flags and about a day of work).

Disturbance surveying

Data on substrate and disturbance should be collected for each plot in a separate procedure (usually after flagging the plot on the first day). Each of the three technicians walks the flag lines (one beginning at each end and one beginning in the middle), and records the substrate and disturbance category at the tip of his/her toe on every tenth step until each technician has recorded 100 point observations (see data sheet in Appendix 8). A vehicle track is recorded if the point was in a vehicle track of any kind of any age. Two digital photos should also be taken at each plot, from the middle of the north and south sides, facing into the plot.

Lizard surveying

All surveys shall be conducted from April through September when air temperatures are between 25 and 37 °C (75 and 100 °F) (Young and Young 2000). Each plot is to be surveyed by three technicians looking for lizards while walking side by side in each lane, taking care to search the whole plot thoroughly. Technicians should begin searching 20 minutes before sunrise. The entire plot should be searched in a morning before temperatures get too hot for the lizards to be on the surface (it generally takes three people two to four hours per plot). Each plot should be surveyed for five consecutive days.

When a FTHL is found, all data on the Horned Lizard Observation Data Sheet (see Appendix 8) should be filled in completely. Additional data to be collected while walking the plot includes number of horned lizard scat seen and other lizard species observed.

To minimize survey variance, always use the same number of people each day on a plot and use the same people on a plot for all survey days. Try to search for the same amount of time each day, and only search all areas and lanes of the plot once a day, giving equal effort to each area of the plot. Rotate where you start the plot each day from one side to the other and then from the center in either direction, thus ensuring that each portion of the plot is searched under the ideal temperature regime.

Data analysis

Capture histories are to be analyzed using the computer program MARK (Otis *et al.* 1978; White and Burnham 1999), which gives an estimate of the population using the plot. Population estimates for adults and juveniles (<60 mm SVL) should be obtained separately. The most appropriate model, as determined by MARK's model selection procedure (using Akaike's

Criterion and M(0) as a baseline), should be used for abundance estimates, although models determined to have unrealistic assumptions (i.e., regarding individual capture heterogeneity, capture response, or temporal variability) may be disregarded. The population calculated by MARK can't simply be divided by 4 ha to get a density estimate (Otis *et al.* 1978). More lizards use the plot over time than are on the plot at any single time. Many home ranges are only partially in the plot. To calculate density, the mean maximum distance moved (MMDM) method of Wilson and Anderson (1985) should be used. This method adds a boundary strip around the plot using the observed recapture distances during the survey as an index of home range size for that site/year. This method is more appropriate than using a set boundary based on home range averages because FTHL home range size varies according to habitat, gender, size, density of lizards, how wet the year is and how long you follow the lizard (Young and Young 2000; Setser 2001; Young, pers. obs.; Kirk Setser, pers. comm.).

Appendix 5. Distribution Monitoring Protocol

Distribution shall be monitored through one-hour presence/absence surveys at one-hectare (100 x 100 m) [2.5 acre (330 x 330 ft.)] sample points. All surveys shall be conducted from April through September when air temperatures are between 25 and 37 °C (75 and 100 °F) (Young and Young 2000). Surveys should be conducted by personnel who have demonstrated competence at locating FTHLs. The distribution monitoring datasheet in Appendix 8 should be used for data collection. Each sample point should be surveyed by only one person, but it is recommended that researchers work in pairs (drive together to the general area and split up to survey nearby sample points).

Key Areas

Within each MA, two permanent key areas will be selected for long-term monitoring. These key areas will serve as an early warning system where localized population declines can be detected before becoming widespread. Hence, key areas should be selected in areas of known or suspected habitat decline, most likely on the margins of the MA. Key areas can be of any shape, but should be four square miles (10.4 km^2) in total area. A control area, also four square miles, should be selected in the interior of the MA away from disturbances, to serve as a control against which changes in distribution within key areas can be compared. Within each area, 30 permanent one-hectare sample points should be randomly selected. Thirty additional sample points should be randomly selected from outside the control and key areas. These last 30 points are for refining the predictive distribution model over time and should not be permanent. Choose all sample points ahead of time and assign an identifying number to each. Vary which area you sample from week to week to avoid a seasonal bias. Sample each point only once each year. In subsequent years, resample the permanent points in the control and key areas, but select new random points for model refinement.

Monitoring Protocol at Sample Points

To survey, navigate to a sample point with a GPS unit, put down a tall pin flag to mark the position (the center of the hectare), note the starting time, then take a digital photo from the middle point, facing whichever direction you feel best represents the average habitat of that hectare. Spend up to one hour searching carefully within a 50-meter radius of the flag. Measure disturbance and other variables of interest during your initial search by collecting 50 “toe point” samples. This is done by walking north/south transects spaced 10-20 m apart and recording whether there is a vehicle track (of any size or age) or other variable of interest (e.g. galleta grass) within two m (6.5 ft) of every 10th footstep (if you encounter a horned lizard track while doing toe point samples, pause the sampling and follow the track—you can finish your sampling later). If you encountered a FTHL while measuring disturbance, no additional searching is needed. If you did not encounter a FTHL, continue surveying in any fashion that gives good coverage of the hectare and maximizes the chance of encountering a FTHL (tracking is encouraged when conditions allow). Note presence of scat, but focus on finding a lizard. The survey ends after one hour, or as soon as a FTHL is found and disturbance data have been gathered. Note end time, check that all data are filled out and then (if conditions permit) navigate to the next sample point (with a goal of completing two or three samples per person each morning).

Data analysis

The presence or absence of FTHLs (represented as a 1 or 0 respectively) at each location serves as the dependent variable to be used in conjunction with GIS overlays that represent various

habitat features (the independent variables) in a logistic regression model. Using a recently developed ArcView extension, StatMod (Garrard 2002), the goal is to create a predictive spatial model of FTHL occurrence within the MA and surrounding area. Such a model predicts probability of presence, and should indicate areas of high and low importance to the lizard. Proximity to roads and agriculture, as well as disturbance from OHV activity (if available as GIS overlays) can also be used as predictor variables, thus allowing assessment of their effects upon FTHL occurrence.

StatMod samples the independent variables at each survey point, and the resulting data set is used to create the model. The user has great flexibility in model creation (e.g. selecting which independent variables will be used in the model through either backward elimination, forward selection, stepwise selection, no selection, or specifying certain variables that must be included). Careful thought should be given to the choice of independent variables and to the settings for model parameters. Either categorical or continuous predictor variables may be used. It is recommended that Chris Garrard (Utah State University), or another statistician familiar with spatial modeling, be consulted prior to undertaking any analyses. The StatMod extension and a user's guide are available (at no cost) at http://bioweb.usu.edu/gistools/statmod/ but to run the logistic regression model requires ArcView 3.2 and SAS statistical software. The model can be refined as additional survey data are collected.

Appendix 6. Project Evaluation Protocol

Introduction

The objective of this protocol is to provide an assessment of FTHL presence or absence at proposed project sites within FTHL habitat on federal lands outside of MAs, to determine whether mitigation may be required (mitigation and compensation are automatically required on MAs, and compensation is required on all lands that can potentially support FTHLs). If the results indicate the species is present in a proposed project area, that project will be subject to appropriate mitigation and compensation. Surveys to determine presence or absence of the species are only required in areas of unknown occurrence (mitigation and compensation are automatically required in areas of known occurrence). However, a project proponent can forego these surveys by assuming the species is present and applying appropriate mitigation and compensation. If less than 20 acres of continuous potential habitat remain on and adjacent to the project site, no surveys or mitigation will be required (but compensation will still be required).

Areas of Known Occurrence

Resource and land management agencies have mapped areas of known FTHL occurrence (Figure 2). Within the historical range, assume the species is present if:

1. There is a locality record within two miles; and
2. the habitat is continuous (i.e., not divided by impermeable barriers such as a canal) and suitable between the locality and the project site; and
3. major habitat alteration or conversion has not taken place since the species was detected.

Areas of Unknown Occurrence

In areas of potentially suitable habitat within or on the edge of the species' range (Figure 2) in which presence is not assumed, surveys must be conducted to determine the presence or absence of FTHLs at project sites prior to project initiation. If the surveys indicate FTHLs are present at the project site, then mitigation and compensation will be required. If all survey requirements are met and the species is deemed absent, then mitigation is not required.

Required Authorizations and Qualifications

Only persons authorized by AGFD (in Arizona) or CDFG (in California) shall conduct surveys and handle FTHLs. Investigators shall have experience in surveying for FTHLs, including ability to recognize and follow FTHL tracks, or shall obtain training from an experienced investigator. Prior to any survey effort, a survey proposal shall be developed and approved by AGFD (in Arizona), CDFG (in California), and/or by the state or federal agency that manages the lands to be surveyed.

Survey Protocol

Although investigators shall focus on finding horned lizards, both scat and horned lizards shall be noted. All surveys shall be conducted from April through September when air temperatures are between 25 and 37 ^{o}C (75 and 100 ^{o}F) (Young and Young 2000). For projects that will impact less than nine hectares (22 acres), surveys should cover an area of at least nine hectares, centered on the proposed project site (unless one or more edges of the project site are unsuitable habitat, in which case the surveys would be conducted in adjacent suitable habitat). A minimum

of four one-hour presence/absence surveys (Appendix 5) shall be conducted in this area, with one of the surveys centered on the project site.

For larger projects the number of one-hour presence/absence surveys will increase in the following manner:

Project impact size (ha)	Number of one-hour presence/absence surveys
10-25	4
26-50	6
51-100	8
100-260 (1 section)	10
>260	10 per section

Road Surveys

FTHLS are often easier to detect on roadways than during walking surveys. Thus, road surveys shall also be conducted and shall consist of driving all roads at least twice in or near the survey area and recording any horned lizards observed. Workers should drive very slowly (no more than 10 miles per hour on unpaved roads) to allow detection of lizards. Road surveys should be conducted from April through September primarily in the morning when air temperatures range from 25 to 37 ^{o}C (Young and Young 2000).

Data Records

The location of transects, and each FTHL, desert horned lizard, and horned lizard scat found during walking or road surveys shall be recorded on maps of scale no less than 1:24,000. Date and time observed, and (if captured) sex and snout-vent length shall be recorded for each horned lizard observed. A 35-mm color photograph with the lizard filling at least half of the frame shall be taken of each horned lizard. A sample of horned lizard scat shall be collected. A qualitative assessment of the habitat should be conducted, including listing dominant perennial and annual plants, substrate types, and level of disturbance (note roads, OHV tracks, vegetation removal, etc.) Photographs can be used to document habitat characteristics. Survey dates, and beginning and ending times and surface temperatures of each survey shall be recorded. Any blocks of time not actually spent conducting the survey shall be subtracted from the total survey time. Data collected during walking surveys shall be recorded on the attached sample survey form. Survey results shall be detailed in a report to which all survey forms and data on lizards, including photographs and maps, shall be appended.

Interpretation of Survey Results

The following criteria shall be used to derive presence or absence of the FTHL from the survey results:

Species present if:

1. FTHLs are found; or
2. Horned lizard scat is found and the desert horned lizard is unlikely to occur at the project site; or, as noted previously,
3. No FTHLs are found; but
    a) FTHLs have been found within two miles of the project site, and
    b) The habitat is continuous or suitable between the locality and the project site.

Species absent if:

1. No scat or horned lizards are found; and
    a) No FTHLs have been found within two miles of the project site; or
    b) FTHL locality record(s) exist within two miles, but the habitat is not continuous or suitable between the locality and project site; or
2. Scat is found, no FTHLs are found, but desert horned lizards occur within two miles of the project site; and
    a) No FTHL locality record(s) exist within two miles of the project site; or
    b) FTHL locality record(s) exist within two miles, but the habitat is not continuous or suitable between the locality and project site.

If, based on the above analysis, FTHLs are deemed present, locality records, scat occurrence, and descriptions of habitat shall be sent to the ICC secretary to update the distribution map.

Appendix 7. Fencing and Removal Survey Protocols

In accordance with Measure 8 of the Mitigation section, sites of permanent or long-term (greater than one year) projects in MAs where continuing activities are planned and where FTHL mortality could occur may be enclosed with FTHL barrier fencing. After clearing the enclosed area of horned lizards following the protocol described in this appendix, no on-site monitor is required (see Measure 7 of the Mitigation section). Fencing for the purpose of producing a FTHL barrier along roads (see Mitigation Measure 10) shall also follow these protocols as applicable. Prior to any fencing or removal survey, a proposal shall be developed and approved by AGFD (in Arizona), CDFG (in California), and/or by the state or federal agency that manages the lands to be surveyed.

Fencing Protocol

Barrier fences for the exclusion of FTHLs shall follow these specifications:

1) The barrier fence shall be constructed along the entire perimeter of the project and be inset sufficiently from the perimeter of the parcel to allow for construction and maintenance.
2) Barrier material shall be 0.25” mesh hardware cloth and 36” in height
3) Barrier material shall be buried 6” deep, providing 30” above the surface.
4) Barrier material shall be securely attached (using metal clips or wire—not plastic) to t-posts or fence posts, and to barbed wire strung at heights of 15” and 30”. A third barbed wire may be strung above the FTHL proof fencing to deter vehicles.
5) Additional t-posts or fence posts shall be placed at any junctions between rolls of hardware cloth to discourage the formation of gaps.
6) An experienced biological monitor shall oversee the construction of the barrier fence and be on-site to search for and remove FTHLs during surface-disturbing activities.
7) The entire fence shall be maintained in perpetuity, including but not limited to the repair of gaps under or in the fence, and accumulation of plant debris or sand on the outside of the fence.
8) Biological monitors shall conduct a removal survey, following the protocol below, only after the fence construction is completed.

Removal Survey Protocol

Removal surveys shall be conducted after barrier fence completion and prior to construction activities. Surveys shall follow these guidelines:

1) Surveys shall be conducted by experienced biological monitors as described in Appendix 6.
2) Surveys shall occur only during appropriate survey conditions as described in Appendix 6

3) Projects < 4 acres (1.6 ha) in size require four hours of survey effort. For larger projects, minimum survey effort shall be 0.5 hour per acre. The land managing agency may require a greater survey effort.

4) Survey methods shall be designed to achieve a maximal capture rate and shall include but not be limited to the following: strip transects, tracking, and raking around shrubs.

5) Survey methods shall incorporate a systematic component to ensure that the entire fenced project site is surveyed. A modification of the Population Monitoring Protocol (Appendix 7) may be used.

6) All encountered FTHLS will be collected and relocated to a nearby safe habitat in accordance with the removal plan, approved by AGFD or CDFG.

Appendix 8. Forms and Data Sheets

Population Monitoring Data Sheet

MA: _____ Plot#: _____ Technicians: _____

Corner locations (NAD 27 projection, UTM Zone_) NW ____ ,_____ SW_____ , _____

NE _____ , _____ SE_____, _____ Photo ID #'s_____ , _____ Dominant Vegetation_____

Habitat Inventory (report totals from 300 point obs here): OHV trails _____ Fine sand (<0.5 mm): _____ Coarse sand (0.5 – 1.0 mm):_____ Gravel (>1 – 30 mm): _____ Rock (>30 mm): _____

5 DAY CAPTURE HISTORY TABLE

	DAY 1		DAY 2		DAY 3		DAY 4		DAY 5		Start Date:
Start/End times											
Start/End temps											End Date:
Start corner											

Record UTM (NAD 27) of capture for each day caught (or mark '0' if not seen). Record full capture data of each lizard's initial capture on the Horned Lizard Observation data sheet

ID	SEX[1]	AGE[2]	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	CAP. HIST.[3]
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15[4]								

[1]Sex categories: 0 = female, 1 = male. [2]Age categories: 0 = hatchling = <40 mm; 1 = juvenile = 40-60 mm; 2 = adult = >60 mm. [3]Series of five 0's and 1's where 1 = caught, 0 = not seen. Compile capture histories for each animal at the end of the 5 survey days. [4]If more than 15 individuals are captured on a plot, use an additional data sheet.

Distribution Monitoring Data Sheet

Sheet #______________

(Time should be recorded in 24:00 clock)

Use NAD27 projection and **specify UTM Zone________**

Observer	Date	Start time	End time	Easting (UTM)	Northing (UTM)	Plot #	Photo #
NOTES:							

FTHL	DHL	Scat	GrSq	Ztail	<500 m from development?	Disturbance	Ggrass
Record these as 1 = present; 0 = absent. Record FTHL measurements on FTHL observation data sheet.					If yes, specify type (road, ag, housing)	Values between 0 and 50 from toe-point samples	

Observer	Date	Start time	End time	Easting (UTM)	Northing (UTM)	Plot #	Photo #
NOTES:							

FTHL	DHL	Scat	GrSq	Ztail	<500 m from development?	Disturbance	Ggrass
Record these as 1 = present; 0 = absent. Record FTHL measurements on FTHL observation data sheet.					If yes, specify type (road, ag, housing)	Values between 0 and 50 from toe-point samples	

Observer	Date	Start time	End time	Easting (UTM)	Northing (UTM)	Plot #	Photo #
NOTES:							

FTHL	DHL	Scat	GrSq	Ztail	<500 m from development?	Disturbance	Ggrass
Record these as 1 = present; 0 = absent. Record FTHL measurements on FTHL observation data sheet.					If yes, specify type (road, ag, housing)	Values between 0 and 50 from toe-point samples	

Horned Lizard Observation Data Sheet

Sheet #______________

(Time should be recorded in 24:00 clock)

Use NAD27 projection and **specify UTM Zone________**

Observer		Date		Time	Easting (UTM)	Northing (UTM)	Plot #	I.D. #	Photo #
Species		Sex		SVL (mm)	Weight (g)	Notes:			
FTHL	DHL	M	F						
Observer		Date		Time	Easting (UTM)	Northing (UTM)	Plot #	I.D. #	Photo #
Species		Sex		SVL (mm)	Weight (g)	Notes:			
FTHL	DHL	M	F						
Observer		Date		Time	Easting (UTM)	Northing (UTM)	Plot #	I.D. #	Photo #
Species		Sex		SVL (mm)	Weight (g)	Notes:			
FTHL	DHL	M	F						
Observer		Date		Time	Easting (UTM)	Northing (UTM)	Plot #	I.D. #	Photo #
Species		Sex		SVL (mm)	Weight (g)	Notes:			
FTHL	DHL	M	F						
Observer		Date		Time	Easting (UTM)	Northing (UTM)	Plot #	I.D. #	Photo #
Species		Sex		SVL (mm)	Weight (g)	Notes:			
FTHL	DHL	M	F						
Observer		Date		Time	Easting (UTM)	Northing (UTM)	Plot #	I.D. #	Photo #
Species		Sex		SVL (mm)	Weight (g)	Notes:			
FTHL	DHL	M	F						
Observer		Date		Time	Easting (UTM)	Northing (UTM)	Plot #	I.D. #	Photo #
Species		Sex		SVL (mm)	Weight (g)	Notes:			
FTHL	DHL	M	F						

Project Reporting Form

for Projects or Activities that Disturb Flat-tailed Horned Lizard Habitat

*This form is to be filled out before project initiation **and** after project completion.*
If this form is used for reporting unauthorized disturbances (within or outside of MAs), document all information sources, preferably with publicly available documents. In all cases, respect private property rights.

PROJECT DESCRIPTION/LOCATION:
Project Number:_____Authorizing Agency:_____Field Contact Rep:_____
Project name/description:_____
Project proponent:_____ Authorized:___
Unauthorized:___

Project type: Construction___ Military Maneuver___ Land Disposal___ Maintenance of Existing Project___ Intrusive Research___ Recreation/Interpretive Development___ Mining (includes sand and gravel)___ Other (describe)_____

Project location: (attach map showing location and footprint of project)
Within MA___ (indicate which MA)_____
Outside MA___Township_____ Range_____ Section_____ 1/4 Section_____

EFFECTS OF THE PROJECT:
Growth inducing effects: Yes___ No___ **Previously disturbed:** Yes___ No___ Partly___
Duration of effect: Short term (<10 yrs)___ Long term (≥10 yrs)___ **New access:** Yes___ No___
Acres lost as habitat:_____ Acres degraded:_____
Lands outside project footprint: Not affected_____ Adversely affected_____

MITIGATION/COMPENSATION:
Mitigation required: Yes___ No___ **Mitigation plan:** Yes___ No___ **Mitigation type:** Construction limited to 11/15-2/15___ Worker education___ Location altered___ FCR___ Define and limit work areas___ Biological monitor___ Preconstruction surveys___ Perimeter lizard fence___ Restoration___ Post-project monitoring___Other_____
_____

Compensation required: Yes___ No___ **Compensation type:** $(amount)_____ Lands(acres):_____
If compensation is lands: Lands transferred to:_____
Location of lands:_____

FTHL ***OBSERVATIONS***:
FTHL Observed on Project Site: Yes___ No___ **If Yes, fill out the FTHL Observation Data Sheet**
#FTHLs relocated_____ #FTHLs killed_____ #FTHLs injured_____

COMMENTS:_____(continue other side if needed)

Preparer (print):_____
Title:_____

Signature:_____ ***Date:***_____

Mail a copy of this form and any additional data to the Secretary of the Interagency Coordinating Committee

Additional Copies of This Document Available at the Following MOG and ICC Member Offices

Appendix B

Flat-Tailed Horned Lizard Survey Report

FLAT-TAILED HORNED LIZARD PRESENCE/ABSENCE SURVEY AND MITIGATION PLAN

WEST COUNTY 19TH STREET SOLID WASTE TRANSFER STATION SITE YUMA COUNTY, ARIZONA

Prepared for:
Yuma County Public Works
4343 S. Avenue 5 ½ E
Yuma, AZ 85365

Prepared by:
Nicklaus Engineering, Inc.
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Yuma, AZ 85364
Phone: (928) 344-8374
Fax: (928) 726-6994

March 2024

TABLE OF CONTENTS

ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

°F	Fahrenheit
APN	Assessor's Parcel Number
AZGFD	Arizona Game and Fish Department
CCA	Candidate Conservation Agreement
FR	Federal Register
FTHL	Flat-tailed Horned Lizard
GIS	Geographic Information System
GPS	Global Positioning System
HEG	Harris Environmental Group
ICC	Flat-tailed Horned Lizard Interagency Coordinating Committee
MA	Management Area
OHV	Off-Highway Vehicle
Reclamation	Bureau of Reclamation
SGCN	Species of Greatest Conservation Need
USFWS	United States Fish and Wildlife Service

1.0 INTRODUCTION

Nicklaus Engineering, Inc. (Nicklaus) performed a wildlife presence/absence survey for Yuma County Public Works, who are preparing to construct a solid waste transfer station along West County 19th Street (Assessor's Parcel Number [APN] 211-23-003) between Avenue D and Avenue E (Figure 1 and Figure 2). The transfer station would consist of a 10-acre fenced area containing a variety of waste storage containers from 24 yards to 50 yards, an office structure, safety railings, lighting, a green waste grinder and burner, and paved avenues for customer and County vehicles.

The goal of this assessment was to establish the presence or absence of the Flat-tailed Horned Lizard (*Phrynosoma mcallii*) (FTHL) on the property to determine the need for FTHL mitigation measures during the development and operation of the waste transfer station.

2.0 PROJECT DESCRIPTION

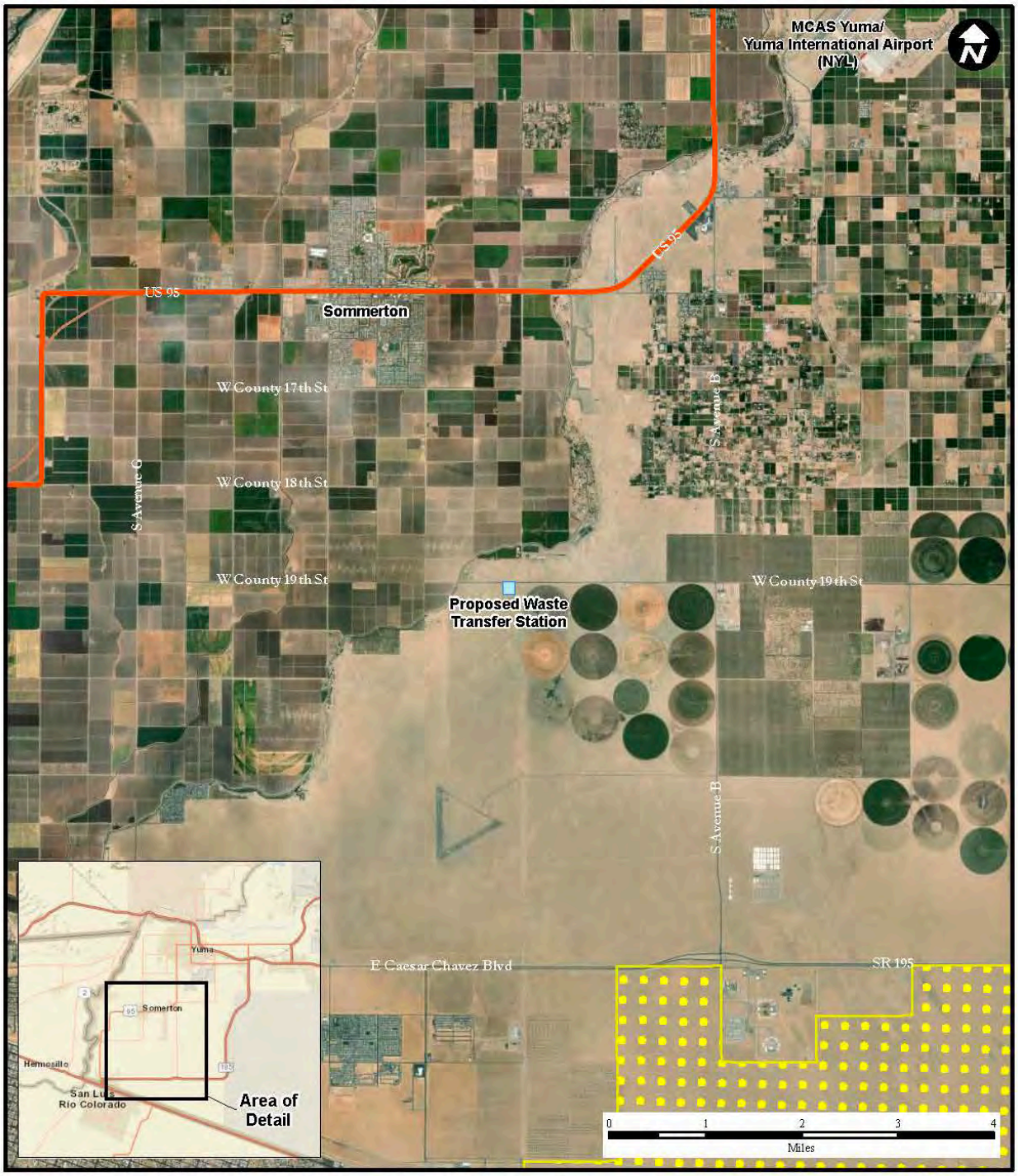
The existing site would be graded except for areas surrounding the storage containers. Existing illegal dumping waste would be removed from the site. The southern portion of the site would be raised approximately 10 feet with local fill and paved to provide a level surface with the top of the storage containers. This design allows customers to park vehicles next to the storage containers for accessible and safe dumping.

A chain link fence would encompass the site to discourage trespassing, reduce wildlife encounters, and prevent trash from blowing into neighboring areas. The fence would include three gates along the border of West County 19th Street: two for dedicated customer access and egress and one larger fence for County vehicles. Four 25-foot light poles would be installed at each corner of the facility, with the potential for additional light poles throughout the facility, as required. A permanent structure would be constructed to function as an office and check-in area. Electrical utilities would be constructed to provide power to the light poles, office structure, and surveillance systems. Trenching would be required for the installation of utility elements. Waste Storage Elements

Municipal solid waste would be dumped at the proposed transfer station by residents of south Yuma County. Six 50-yard waste storage containers would be placed in the center of the facility. The containers would store waste for no more than two days. Additional bins would be included along the western border of the site for tire, home appliance, and concrete/rock disposal. County-operated roll-off trucks would be used to haul full containers and ship them to the South Yuma County Landfill to be emptied prior to being returned to the site.

3.0 SITE DESCRIPTION

The waste transfer station would be constructed on Bureau of Reclamation (Reclamation)-owned and County of Yuma-managed land within Yuma County (Figure 2). The proposed development area is located on undeveloped land covered by native Sonoran desert plant life. The development area is formally an empty and unused site. However, existing conditions indicate that his parcel is used as an informal, illegal dumping area. Various metal, plastic, and household trash items can be found across the site and in adjacent parcels. Signs of off-roading activities can also be found throughout the area. Agriculture is the dominant land use to the north, east, and west. Land south of the proposed development area is predominantly undeveloped.



Legend

Waste Transfer Station

Yuma Desert Management Area

Survey Location Coordinates:
32.55202, -114.68559

Figure 1

Project Location
FTHL Survey Report
Waste Transfer Station
Yuma County, Arizona

Legend

Waste Transfer Station Boundary

FTHL Survey Area

Figure 2

FTHL Survey Area
FTHL Survey Report
Waste Transfer Station
Yuma County, Arizona

4.0 ENVIRONMENTAL SETTING

The local topography of the proposed development area is characterized by sloping plains and broad, flat valleys, with distant mountains in the background. The predominant vegetation character of the study area is dominated by creosote and characterized by a sparse, open shrub canopy that is low to the ground. Average maximum and minimum temperatures range from 106 to 68 degrees Fahrenheit (°F) in July and 67 and 41 °F in December. Precipitation occurs primarily in the winter months, with annual precipitation levels of around 3.7 inches (United States Climate Data, 2024). The project area is relatively flat and is located approximately 170 feet above mean sea level. Land use to the north, east, and west consists of agricultural developments. Land south of the proposed development area is predominantly undeveloped.

The proposed development area lies within the range of the Lower Colorado River Valley subdivision of the Sonoran Desert scrub biotic community (Brown, 1994). Vegetation is distributed sparsely across most of the proposed development area, with large swaths of bare soil and sand interspersed with a few desert-adapted shrubs. Vegetation within the proposed development area consists of upland desert species. Creosote (*Larrea tridentata*) is the dominant species, with fewer individuals of Allscale saltbush (*Atriplex polycarpa*) dispersed throughout. These two species comprise the full inventory of vegetation observed during the December 2023 site assessment conducted by Harris Environmental Group (HEG).

Erosion, soil compaction, and disturbance to vegetation were all observed during site investigations. The proposed development area has been significantly disturbed by human use and through its proximity to the roadway (West County 19th Street). Vehicle use along the southern shoulder of West County 19th Street has disturbed the northern boundary of the project footprint, and disturbance due to foot traffic and vehicle tracks were observed throughout the project footprint and within the immediate vicinity of the proposed development area. Each of these factors has led to reductions in vegetation density and diversity throughout the proposed development area. Roadway runoff has allowed for a slightly higher density of *Larrea tridentata* and *Atriplex polycarpa* to grow along the northern edge of the project footprint than in the surrounding areas.

5.0 SPECIES BACKGROUND INFORMATION

The FTHL is endemic to the low-elevation deserts of southwestern Arizona, southern California, northern Baja California, and northwestern Sonora (Smith, 1946; Schmidt, 1953; Stebbins, 2003; Grismer, 2003; Rorabaugh and Young, 2009). It is restricted to aeolian sand habitats associated with present-day and historical drainages and dune complexes (Van Denburgh, 1922; Smith, 1946; Schmidt, 1953; Stebbins, 1985; Rorabaugh and Young, 2009), as well as hardpan or gravel with sandy patches for individuals to burrow (Stebbins, 1985; Rorabaugh and Young, 2009). The FTHL is a distinctive lizard with a host of features that allow it to survive in hot, dry environments with a sandy substrate. Adults emerge from overwintering sites in April and thermoregulate at 100 °F.

The FTHL was proposed to be federally listed as threatened by the United States Fish and Wildlife Service (USFWS) in 1993, but the proposal was withdrawn in March of 2011 (proposal withdrawal published in the Federal Register [FR] on March 15, 2011; 76 FR 14210). The FTHL is still considered a Species of Greatest Conservation Need (SGCN) by the state of Arizona and is

protected under a multi-agency Candidate Conservation Agreement (CCA). It is in the genus *Phrynosoma* within the *Phrynosomatidae* family, or North American spiny lizards. The FTHL is a medium-sized lizard with a wide, oval-shaped body and a flattened tail. Enlarged pointed scales are scattered on both the upper body and tail. Extending from the back of the head are two elongated occipital horns (3-4 times longer than the basal horn width) and six temporal horns. Their coloring dorsally is pale gray, buff, brownish, tan, or white, matching the sand and soil, and the belly is white and unmarked. The FTHL is distinguishable from other horned lizards by a dark mid-dorsal stripe. The fringe scales consist of round brown spots with yellow or white centers. Ants of the genera *Messor*, *Pogonomyrmex*, *Conomyrma*, and *Myrmecocystus* generally comprise the majority of their diets, as well as other beetles and arthropods opportunistically. In Arizona, the FTHL can be found in the Lower Colorado River Valley subdivision of Sonoran Desert scrub, in a creosote (*Larrea tridentata*)-white bursage (*Ambrosia dumosa*) plant association, at an elevation between 155 feet to 540 feet (Arizona Game and Fish Department [AZGFD], 2023). They inhabit areas dominated by sandy flats, with fine packed sand or pavement, overlain with loose, fine sand in areas that are sparse or lacking in vegetation.

6.0 SURVEY METHODOLOGY

The Flat-tailed Horned Lizard Interagency Coordinating Committee's (ICC) FTHL rangewide management strategy was consulted to determine the appropriate survey methodology for this project (ICC, 2003). Additionally, Nicklaus and HEG conducted a literature review and a habitat assessment to evaluate biological resources within the project area. No previous known surveys have been conducted on this property. However, the habitat was identified as potentially suitable for FTHL due to its proximity to the Yuma Desert FTHL Management Area (MA) (approximately 4.15 miles) (Figure 1). Additionally, there is relatively contiguous potential habitat between the project area and the Yuma Desert MA. Per the ICC management strategy, surveys must be conducted to determine the presence or absence of FTHLs at project sites prior to project initiation in areas of potentially suitable habitat within or on the edge of the species' range in which presence is not assumed.

The presence/absence survey team consisted of an AZGFD-certified investigator and two Nicklaus employees with experience identifying FTHL, Desert horned lizard (*Phrynosoma platyrhinos)*, and horned lizard scat. Presence/absence surveys were conducted over the course of four consecutive days (September 5, 2023, to September 8, 2023) when air temperatures were between at least 75 and 100 °F during all surveys (Young and Young, 2000).

A 22-acre survey boundary was delineated using pre-measured Geographic Information System (GIS) shapefiles, a Trimble DA2 handheld Global Positioning System (GPS) device and flagged marking stakes (Figure 2). The 22-acre boundary was centered on the 10-acre project area and offset to the southwest due to the West County 19th roadway to the north and private agricultural parcel to the east. The 22-acre survey area was further divided and staked into three 7.33-acre survey areas with three walking transects per survey area.

The September 5, 2023, survey was conducted entirely on the 10-acre project area (Figure 3, Survey Area 4). Subsequent daily surveys (September 6, 2023, to September 8, 2023) were conducted on one of the three 7.33-acre survey areas per day (Figure 3, Survey Areas 1, 2, and 3).

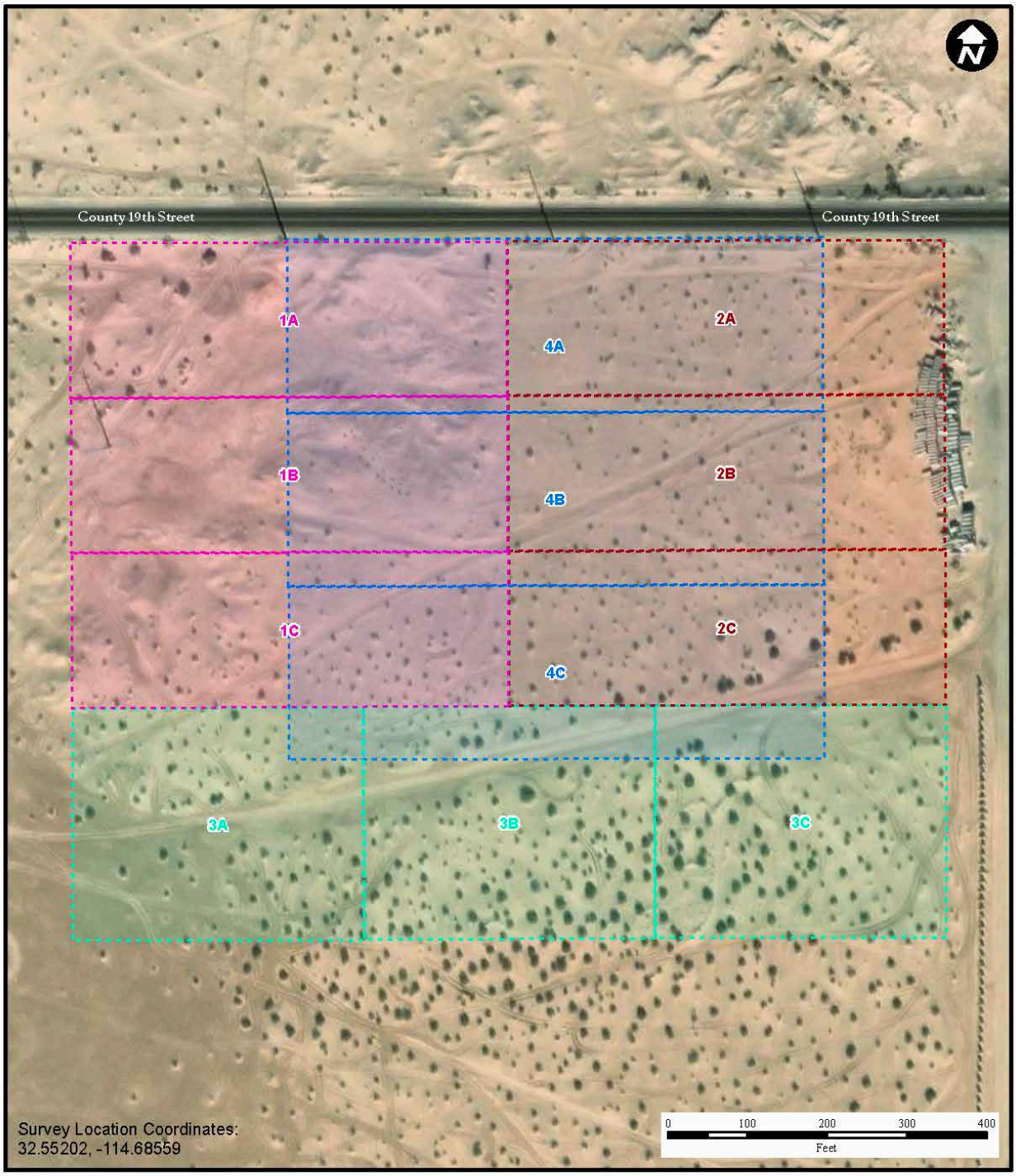


Figure 3

Survey Transects
FTHL Survey Report
Waste Transfer Station
Yuma County, Arizona

Each day, the three surveyors were assigned equally spaced transects within the survey areas to survey for a total of one hour (Example: Surveyor 2, Survey Area 1, Transect 1B). Each survey area was assessed with 100% survey coverage through this methodology. Photos of each survey area are included in Attachment 1.

The survey was conducted slowly and systematically by walking linear transects while surveyors visually searched for FTHL, FTHL/horned lizard scat, and lizard tracks. Particular emphasis was placed on searching around the bases of shrubs and near signs of ant species such as Harvester ants (genera *Messor* and *Pogonomyrmex*) (Turner and Medica, 1982; Rorabaugh et al., 1987). Surveys were completed after one hour had elapsed and all surveyors had reached the end of their respective transects.

7.0 RESULTS

No FTHL, FTHL/horned lizard scat, or lizard tracks were observed during the presence/absence surveys conducted by Nicklaus or during biological site surveys conducted by HEG.

The project area is within the geographic and elevational range of the FTHL. Vegetation within the project area consists of predominantly Lower Colorado River Valley subdivisions of Sonoran Desert scrub, with a very sparse distribution of *Larrea tridentata* and a few individuals of *Atroplex polycarpa*. The majority of the project footprint was disturbed and consisted of flat, sandy substrate and compacted soil, and could be considered potential habitat. However, no burrows, scat, or FTHL were observed during the presence/absence surveys.

FTHLs have a limited distribution and are susceptible to habitat destruction and fragmentation by nearby urban and agricultural expansion, military activities, energy development, and off-highway vehicle (OHV) activities within the project area. While the overall vegetation and terrain within the project area meets FTHL habitat requirements, the geographic proximity of the project area to roads, agricultural fields, border traffic, and other rural development fragments available habitat.

It is unlikely that further development of the project area will have any effect on the FTHL during construction since no FTHLs were observed during the site assessment, and the project area is already heavily disturbed. However, if FTHL is documented during construction activities, guidelines outlined by the ICC would be followed should any be encountered during the active construction phase (ICC, 2003).

8.0 CONSERVATION AND MITIGATION MEASURES

Mitigation measures must be implemented per the ICC's 2003 FTHL rangewide management strategy (ICC, 2003). The biological site assessment conducted by HEG determined that the project area meets FTHL habitat requirements despite the heavily disturbed state of the area. Additionally, property south of the project area may contain significantly less disturbed and potentially more viable FTHL habitat. The following mitigation measures serve to eliminate the possibility of encountering or adversely affecting FTHL during construction activities.

1. Prior to project initiation, an individual shall be designated as a field contact representative. The field contact representative shall have the authority to ensure compliance with protective measures for the FTHL and will be the primary agency contact dealing with

these measures. The field contact representative shall have the authority and responsibility to halt activities that are in violation of these terms and conditions.

2. All construction personnel will be trained to identify FTHL and provided with a wallet-size card identifying the flat-tailed horned lizard. The ground around equipment will be inspected by the equipment operators for flat-tailed horned lizards prior to moving equipment.
3. All project work areas shall be clearly flagged or similarly marked at the outer boundaries to define the limit of work activities. All construction workers shall restrict their activities and vehicles to areas that have been flagged to eliminate adverse impacts to the FTHL and its habitat. All workers shall be instructed that their activities are restricted to flagged and cleared areas.
4. Existing roads shall be used for travel and equipment storage whenever possible.

Compensation is charged if residual effects occur after all reasonable on-site mitigation has been applied (Title 43 Code of Federal Regulations and the Federal Land Policy and Management Act of 1976). Compensation intends to mitigate potential FTHL habitat losses within and outside MAs. While any potential FTHL habitat within the project area is fragmented and disturbed with no observable FTHL residents, the project area and surrounding habitat to the south have the potential to support FTHL. The funds obtained through compensation are used to consolidate land ownership within the MAs or to enhance habitat.

9.0 REFERENCES

AZGFD (Arizona Game and Fish Department). 2023. Phrynosoma mcalli. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. 1 pp.

Brown, David E. (ed.). 1994. Biotic Communities: Southwestern United States and Northwestern Mexico. University of Utah Press, Salt Lake City.

ClimateData.org. 2023. Yuma, Arizona Climate Data. Accessed online at: https://en.climate-data.org/north-america/united-states-of-america/arizona/yuma-16348/.

Grismer, L. 2003. Amphibians and Reptiles of Baja California, Including its Pacific Islands and the Islands of the Sea of Cortés. University of California Press, Berkeley and Los Angeles, California. 409p.

ICC (Flat-tailed Horned Lizard Interagency Coordinating Committee). 2003. Flat-tailed horned lizard rangewide management strategy, 2003 revision. 78 pp. plus appendices.

Rorabaugh, J. and K. Young. 2009. Flat-tailed Horned Lizard. Pp. 182-185. In: Jones, L. and R. Lovich (Eds.), Lizards of the American Southwest: A Photographic Field Guide. Rio Nuevo Publishers, Tucson, Arizona. 567p.

Rorabaugh, J.C., C.L. Palermo, and S.C. Dunn. 1987. Distribution and relative abundance of the flat-tailed horned lizard (Phrynosoma mcallii) in Arizona. Southwest. Natural. 32(1):103-109.

Schmidt, K. 1953. A check list of North American amphibians and reptiles. American Society of Ichthyologists and Herpetologists.

Smith, H. 1946. Handbook of Lizards: Lizards of the United States and Canada. Comstock Publishing Co., Ithaca, New York.

Stebbins, R. 1985. Western reptiles and amphibians. Houghton Mifflin Company, Boston, Massachusetts.

Stebbins, R. 2003. A Field Guide to Western Reptiles and Amphibians. 3rd Edition. Houghton Mifflin Harcourt. New York, New York. 560p.

Turner, F.B., and P.A. Medica. 1982. The distribution and abundance of the flat-tailed horned lizard (Phrynosoma mcallii). Copeia 1982(4):815-823.

USFWS (United States Fish and Wildlife Service). 2023. Endangered and Threatened Wildlife and Plants; Listing the Flat-tailed Horned Lizard as Threatened. Federal Register 75(40):9377-9379.

Van Denburgh, J. 1922. The reptiles of western North America: An account of the species known to inhabit California and Oregon, Washington, Idaho, Utah, Nevada, Arizona, British Columbia, Sonora, and Lower California. Occas. Pap. California Acad. Sci. Volume 10.

Young, K.V., and A.T. Young. 2000. Final report. Scientific study of the flat-tailed horned lizard, Phrynosoma mcallii. U.S. Dep. of Navy Contracts N68711-95-LT-C0032, N68711- 95-LT-C0035. 72 pp.

ATTACHMENT 1

Photo Log

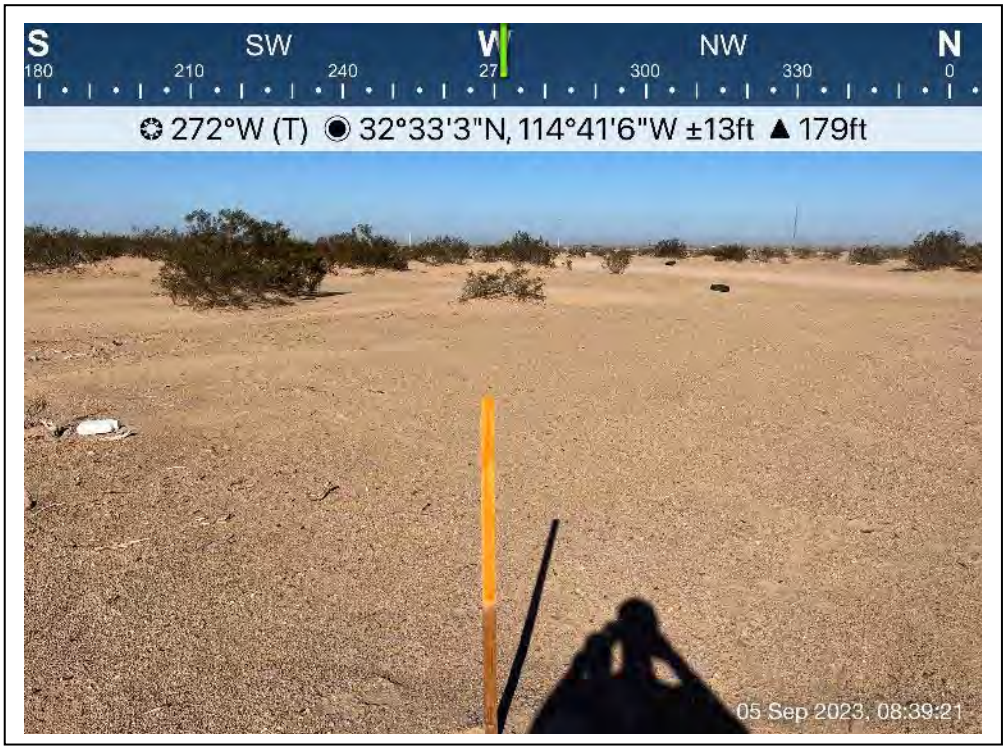


Photo 1: Survey Area 4 facing west

Photo 2: Survey Area 4 facing east

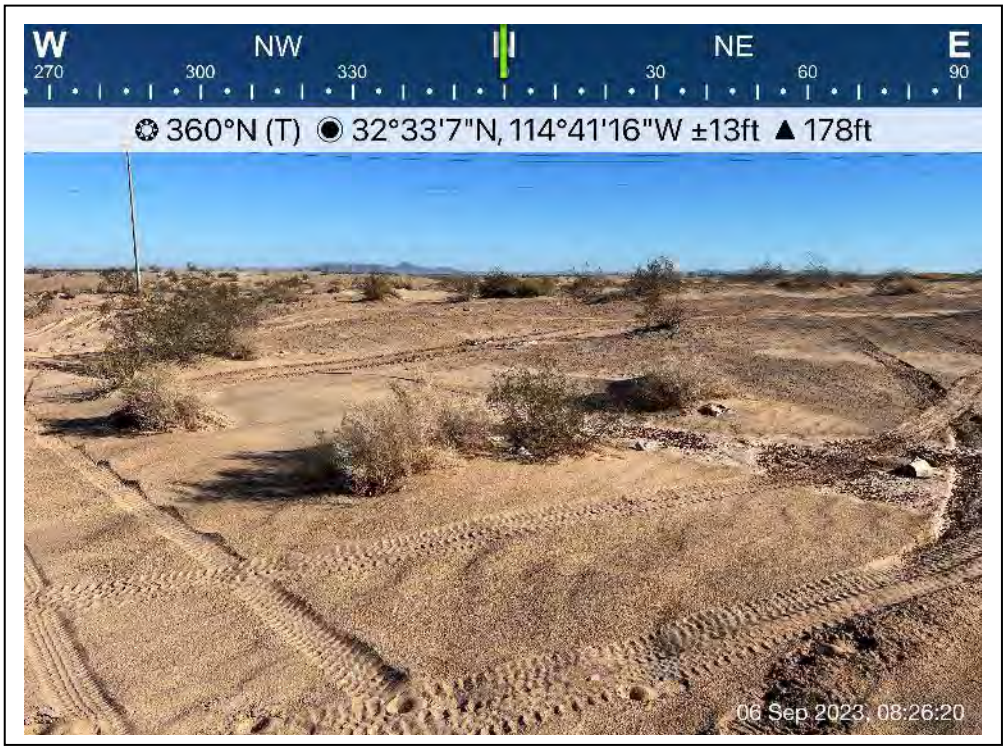


Photo 3: Survey Area 1 facing north

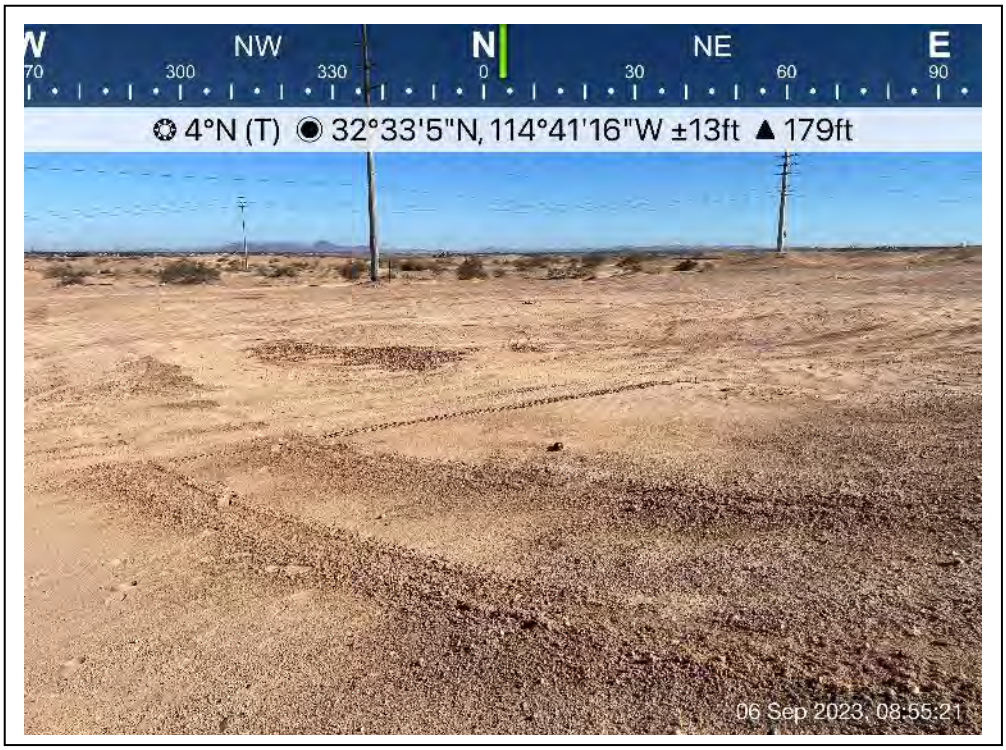


Photo 4: Survey Area 1 facing north

Photo 5: Survey Area 2 facing north

Photo 6: Survey Area 2 facing south

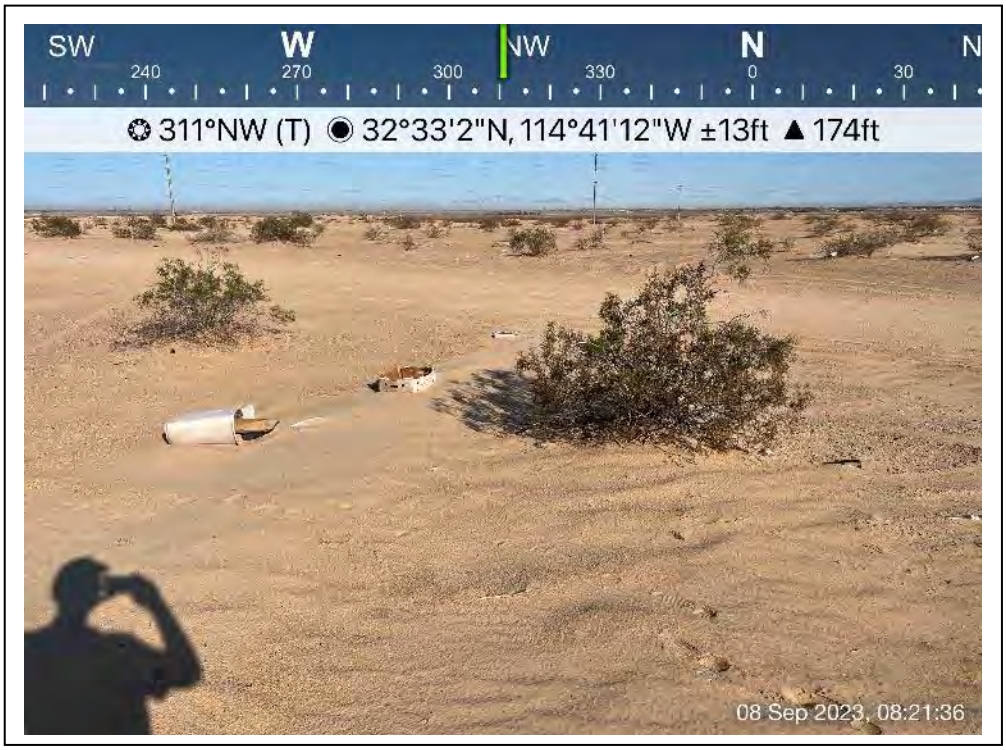


Photo 7: Survey Area 3 facing northwest

Photo 8: Survey Area 3 facing east

Appendix C

Cultural Resources Survey Report

A CULTURAL RESOURCES SURVEY OF APPROXIMATELY 10 ACRES OF LAND ADMINISTERED BY THE BUREAU OF RECLAMATION, YUMA AREA OFFICE, NEAR SOMERTON, YUMA COUNTY, ARIZONA

Prepared by
David P. Doak

HARRIS ENVIRONMENTAL GROUP INC

650 North 6th Avenue
Tucson, Arizona 85705

Prepared for
Nicklaus Engineering, Inc.
1851 W. 24th St., Suite 101
Yuma, AZ 85364

HEG Report No. 22-161

October 2023

SHPO REPORT ABSTRACT

Report Title: A Cultural Resources Survey of Approximately 10 Acres of Land Administered by the Bureau Of Reclamation, Yuma Area Office, near Somerton, Yuma County, Arizona

Project Name: EA for Somerton Waste Transfer Station

Project Location: The project area is a roughly square block that measures approximately 660 feet on a side, located in the NE ¼ of the NE ¼ of Section 23, T. 10 S, R. 24 W, Gila and Salt River Baseline and Meridian, in Yuma County, Arizona. The northern edge of the parcel abuts W County 19th Street South, with the eastern edge of the parcel being approximately 415 feet west of the eastern boundary for the section, which lies at the alignment for South County Avenue D. The project area lies entirely on land administered by the US Department of the Interior's Bureau of Reclamation, Yuma Area Office.

Project Locator UTM (S corner of the project area): E 717124, N 3603828 (NAD 83, Zone 11S)

Project Sponsor: Nicklaus Engineering

Sponsor Project Number(s): 023-0195.00000

Lead Agency: Bureau of Reclamation, Yuma Area Office (BOR)

Other Involved Agencies:

Applicable Regulations: Archaeological Resources Protection Act of 1979 (16 U.S.C. 470aa-mm) and its regulations (43 CFR 7); The Antiquities Act of 1906 (P.L. 59-209; 34 Stat. 225, 16 U.S.C. 431-433) and its regulations (43 CFR 3)

Funding Source: Private

ASLD ROW Application Number: N/A

Description of the Project/Undertaking: Pedestrian survey of a 10-acre parcel of BOR-administered land east of Somerton, in support of the construction of a Waste Transfer Station on the parcel.

Project Area/Area of Potential Effects (APE): The project area is a square parcel totaling 10 acres.

Legal Description: The project area is located in the northeast quarter of the northeast quarter of Section 16, Township 10 South, Range 24 West, Gila and Salt River Baseline and Meridian, in Yuma County, Arizona

Land Jurisdiction: BOR

Total Acres: 10

Acres Surveyed: 10

Acres Not Surveyed: 0

Consultant Firm/Organization: Harris Environmental Group, Inc.

Project Number: HEG 22-161

Permit Number(s): ARPA Permit LC-AZ-23-03

Date(s) of Fieldwork: 22 September 2023

Number of IOs Recorded: 0

Number of Sites Recorded: 0

NRHP-Eligible Sites: 0

Ineligible Sites: 0

Unevaluated Sites: 0

Management Summary and Recommendations
No sites and no isolated occurrences were identified during the survey. Inasmuch as no NRHP eligible properties are present within the surveyed area, Harris Environmental is recommending that no further cultural resources work be required in connection with the current Nicklaus Engineering undertaking.

PROJECT DESCRIPTION

Introduction

On 22 September 2023, archaeologist Dakota Larrick, MA of Harris Environmental Group, Inc. (HEG) performed a Class III (100 percent) pedestrian archaeological survey of a ca. 10-acre parcel south of Yuma, in Yuma County, Arizona. HEG performed the survey under a contract with Nicklaus Engineering, who are developing a Waste Transfer Station within the project footprint. The following report will detail the physical and cultural setting of the project area, previous research in and near the study area, survey methods, criteria for defining cultural properties and evaluating their potential for National Register of Historic Places (NRHP) eligibility, and the results of the archaeological survey, including a discussion of the information potential of identified archaeological materials and our recommendations regarding their eligibility for NRHP inclusion.

Project Location

The project area is south of the City of Yuma, in unincorporated Yuma County, Arizona, about 6 miles south-southwest of Marine Corps Air Station Yuma, 6 miles east of the Colorado River (at Gadsden), and 6 miles north of the International Border with Mexico. It is located less than a half mile south and east of the East Main Canal, which draws water from the Colorado River near Laguna Dam and defines the eastern limit of broad, canal-based irrigation on the floor of the Lower Colorado Valley; a strip of desert separates this broad area of irrigated land from another area irrigated with waters from the Gila River, and the project area lies within this strip of desert. In legal terms the project area is located in the northeast quarter of the northeast quarter of Section 23, Township 10 South, Range 24 West, Gila and Salt River Baseline and Meridian, in Yuma County, Arizona.

Environmental Context

Topography, Geology, and Hydrology

While the project area is located in what is generally defined as the Basin and Range physiographic province, which is characterized by block faulting and abrupt elevation changes, the project area specifically is located on a broad, flat expanse, miles from any noteworthy landform. Soils here were produced by wind action, rather than flooding along the Colorado River; a 1929 USDA soil map identifies soil underlying the project area as Superstition Sands, "very deep, somewhat excessively drained soils that formed in sandy aeolian deposits," on slopes in the 0 to 10 percent range, in areas with an annual rainfall of about 3 inches and a mean annual temperature of around 74 degrees. More formally, and recently, this soil unit has been defined taxonomically as a sandy, mixed, hyperthermic Typic Haplocalcid. Because of its permeability, surface water tends not to accumulate atop these soils, and as a result, surface drainages do not form. In the field the ground surface had the characteristics of thinly spread dune sands, uncompacted and riddled with animal burrows.

Climate

The climate of the area is semi-arid, with average precipitation (measured between 1975 and 2010) of 8.54 inches (Western Regional Climate Center n.d.). The rain is split relatively evenly through the seasons, with 2.97 inches in winter, 1.27 inches in spring, 2.06 inches in summer, and 2.23 inches in fall. Summers are hot, and winters are relatively mild. July is the hottest month, with an average maximum temperature of 108.3°F, and January is the coldest month with an average maximum temperature of 65.7°F (Western Regional Climate Center n.d.). There is a 90 percent probability of a "freeze-free" period lasting at least 246 days.

Plant Life

The project area falls within the range of the Lower Colorado Subdivision of the Sonoran Desertscrub biotic community (Brown 1994; Brown and Lowe 1980). The Lower Colorado River Valley subdivision is the driest of the Sonoran Desert subdivisions, and the characteristically open and confined plant growth reflects competition for the scarce precipitation and run-off. A single plant series or community dominates the subdivision: the Creosotebush-White Bursage series. Within this community, creosotebush (*Larrea tridentata*) is ubiquitous; white bursage (*Ambrosia dumosa*) is also common but thrives in sandier soils nearer the broad valley floors. Other plants within this community include mesquite (*Prosopis* sp.), big galleta grass (*Hilaria rigida*), ocotillo (*Fouquieria splendens*), and triangle-leaf bursage (*A. deltoidea*).

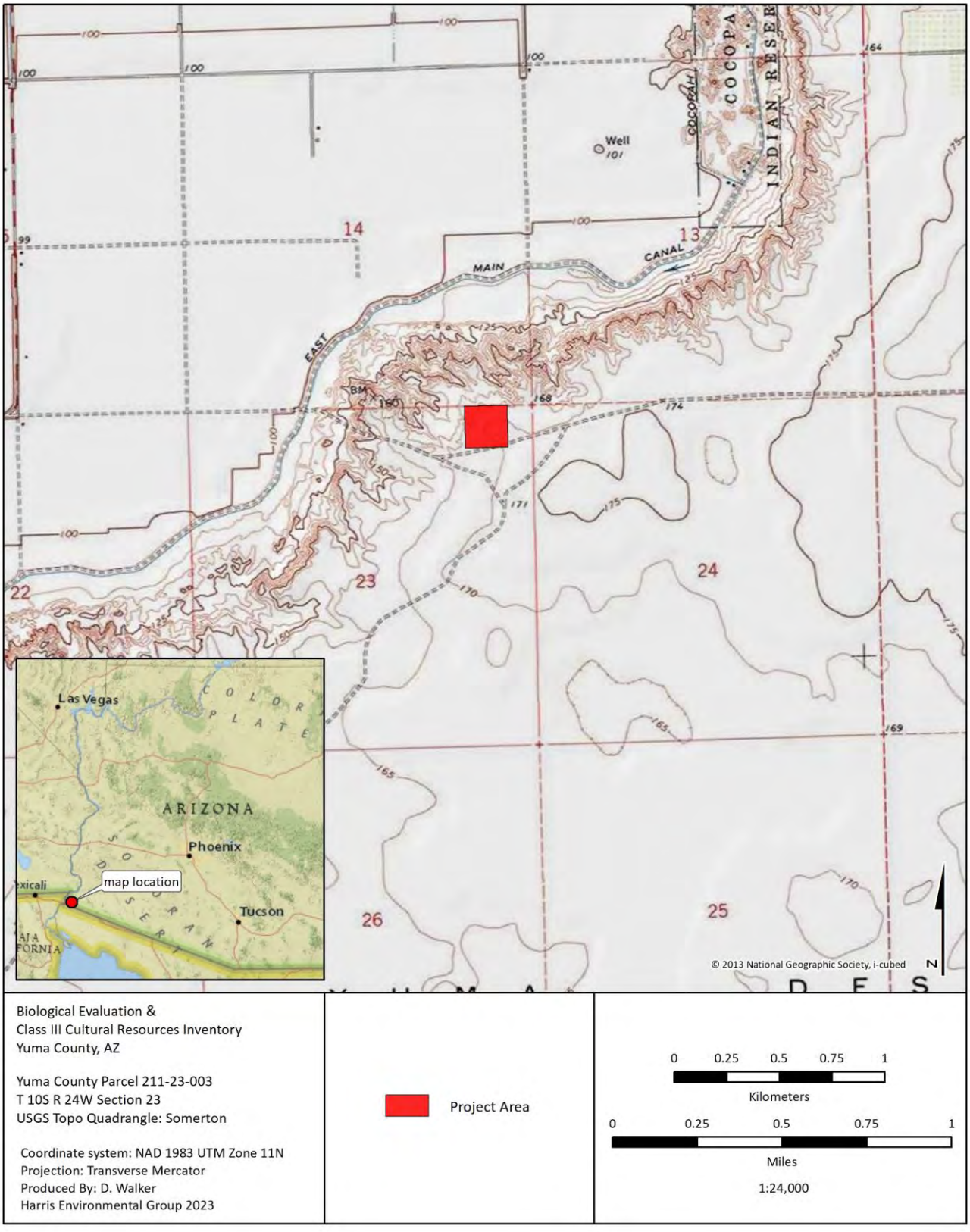


Figure 1. Map showing the survey area.

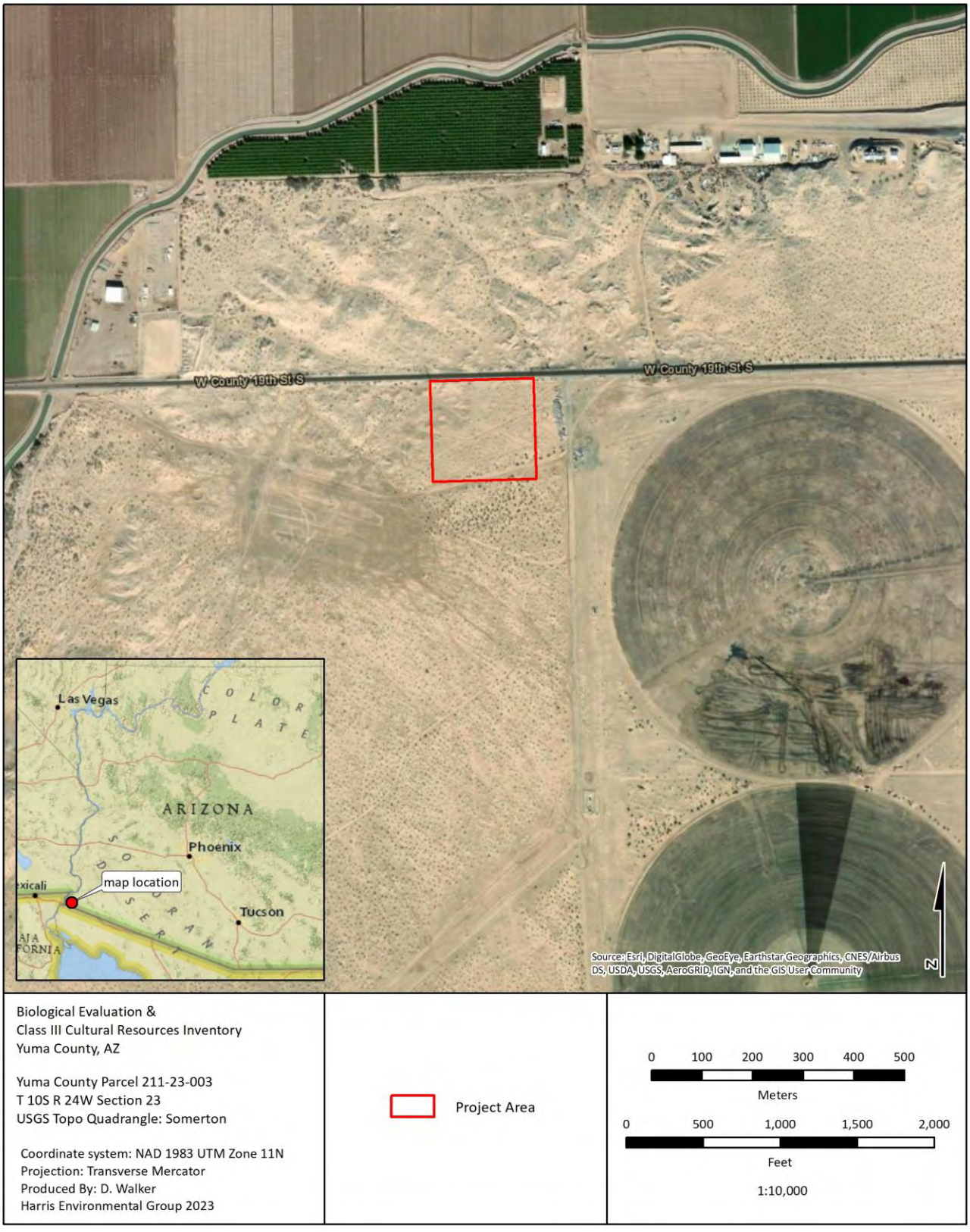


Figure 2. Aerial image showing the survey area.

CULTURE HISTORY

Paleoindian Period (ca. 13,000—8500 B.C.)

There has been a human presence, perhaps not without interruption, in the Lower Colorado region dating back perhaps as far as 15,000 years. The earliest documented culture in the region is the Malpais archaeological complex, defined on the basis of a tool kit that includes flaked stone choppers and worked shell tools, and associated with non-constructive features such as intaglios (images created by raking away pebbles and cobbles on desert-paved surfaces, leaving shapes in the sand), trails with associated shrines and trail markers, and cleared areas, perhaps used for sleeping (Rogers 1939, 1945, 1958, 1966; McGuire 1982:161). Following the Malpais came what Rogers (1939, 1966) referred to as the San Dieguito complex, a distinctive Paleoindian (big-game hunting) adaptation roughly contemporaneous with the better known Clovis complex from southeastern Arizona (Hayden 1976; Warren and True 1961). Only the first of three phases in the San Dieguito sequence, San Dieguito I, has been recognized as extending into southwestern Arizona (Stone 1986:61); it has been suggested that the area was subsequently abandoned for a time, because "relatively low population levels at the end of Pleistocene allowed groups to concentrate in the most favorable western environments: the lakes of the Great Basin and the southeastern Arizona grasslands that supported herds of game" (Stone 1987).

Archaic Period (ca. 8500 B.C.—A.D. 200)

The Archaic period (ca. 8500 B.C. --- A.D. 200) is generally viewed as a time when hunting and gathering skills were sharpened and optimized toward the utilization of resources available at different places at different times of the year, which would be exploited over the course of an annual round of migration within a fairly circumscribed area. The evolution of this more varied subsistence and settlement system was likely forced by the extinction of the large mammals of Paleoindian times. Tool kits from this period are distinguished by the inclusion of projectile points suitable for mounting on atlatl darts, in place of the larger spear points of Paleoindian times, and by the first use of ground stone tools. The Archaic sequence typically associated with southwestern Arizona is the Amargosa complex; however, since the 1980s it has been common to lump together this and other Archaic complexes identified in the Southwest under an overarching sequence that consists of Early, Middle, and Late periods, differentiated primarily on the basis of changes in projectile point styles (Huckell 1982; Sayles and Antevs 1941). Early Archaic (8500 to 4800 B.C.) assemblages include tapering-stemmed projectile points (Lake Mohave and Silver Lake point types) with percussion-flaked scrapers, foliate bifacial knives, choppers, flat slab metates, and oval manos. Middle Archaic (4800 to 1500 B.C.) assemblages are generally identified by the presence of Pinto, Gypsum Cave, Chiricahua, or Bajada type corner-notched points, by stemmed points with indented bases, and the by the first appearance of basin-shaped metates. The Late Archaic (1500 B.C. to A.D. 1-300) tool kit is characterized by a higher proportion of bifacial tools. Ground stone technology is thought to have become more elaborate at this time with the introduction of a greater variety of implement types and shapes that may reflect reliance on a broader spectrum of plant resources.

While the Archaic period, as traditionally defined, was a pre-ceramic, pre-agricultural tradition, in recent years it has become apparent that agriculture, involving cultivation of a complex that included maize, squash, beans, and possibly tobacco, was in fact introduced from Mexico across parts of the American Southwest, particularly in southeastern Arizona, between 1500 and 1000 B.C. (Wills and Huckell 1994; Huckell 1995) and perhaps even earlier (Mabry 2005; Mabry and Doolittle 2006). To account for this without disrupting accepted chronological schemes too badly, in recent years it has become common to refer to an Early Agricultural Period (1500 B.C.—ca. 500 B.C.) and a subsequent "Early Ceramic Period (500 B.C.—A.D. 200) either in place of, or as cultural manifestations contemporaneous with, but distinctive from, the Late Archaic occupation. Thus far, however, none of this new development has proven applicable to the Lower Colorado region, as no evidence of early agriculture or early ceramics have been found in that area.

Ceramic Period (A.D. 200 – 1540)

The Ceramic period, as the name indicates, was marked by the appearance of true ceramic container technology. In much of the Southwest, the appearance of pottery marked an increase in sedentism and dependence on horticulture, but it is unclear if this correlation is also relevant for the Lower Colorado River Basin, where people living away from the rivers maintained a mobile lifestyle well into the contact period. Although ostensibly beginning with the introduction of ceramic vessel production from more permanent village communities to the east and west, the Archaic tradition appears to have lasted longer in the upland areas of southwestern Arizona because critical wild resources were too widely scattered to support a more sedentary settlement system, and the arid climate precluded the wholesale adoption and success of floodwater farming away from the Gila and Colorado rivers.

Patayan (A.D. 700 – 1800)

Remains of the Patayan archaeological culture are found in the lower Colorado River Valley, the lower Gila River, and into southern California. Patayan groups were relatively small and highly mobile, moving according to the availability of seasonal

resources. Evidence for farming is minimal, although it is possible that farming settlements located along the Colorado and Gila Rivers—the most likely settings for such sites—existed, but were destroyed by erosion and shifting of the river channels over time. Stone (1991) suggested that small, dispersed groups along the Colorado River practiced a mixed economy of floodwater farming, fishing, small-game hunting, and gathering of wild-plant foods, with seasonal base camps located in the uplands during cooler months, similar to that documented for Yuman groups (Castetter and Bell 1951). In the absence of their distinctive Lower Colorado Buff Ware ceramics, identification of sites as Patayan can be difficult, as sites frequently contain no datable deposits or distinctive stone artifacts, but do include features just as characteristic of other cultures, including, for example, trails, lithic scatters, rock shrines, rock rings, rock piles, intaglios, and clearings, all also characteristic of the much more ancient Malpais complex (McGuire 1982; Stone 1991).

Lower Colorado Buff Wares began to appear in the Lower Colorado region around A.D. 700, and are distinguished by a suite of ceramic traits including the Colorado shoulder, rim notching, incised decoration, lug-and-loop handles, burnishing, red slip, and basket molding (Rogers 1945; Waters 1982). The Patayan I phase (ca. A.D. 700–1000/1050) marks the appearance of this type of pottery in sites along the Lower Colorado and Gila Rivers, and more generally in the western Papagueria. Patayan II (ca. A.D. 1000/1050–1540) witnessed the extension of the use of this type of pottery to the north and east, with specimens being found at Hohokam sites in the Phoenix basin; Euler (1958) attributed this extension to the movement of Yuman-speaking peoples into the northern uplands (Stone 1987:58–59). Patayan II pottery is distinguished from Patayan I by the presence of stucco finish, fine-lined geometric pattern decoration, and recurved rims. Patayan III (ca. A.D. 1500–1800) is marked by the introduction of high-necked, small-mouthed ollas into assemblages, and a few other added traits (e.g., reinforced rim bands). Patayan III material culture and settlement strategies appear similar to those of the historical-period Hualapai, suggesting continuity with historical Quechan (Yuman) groups.

Historic/Recent Period (A.D. 1540 – present)

The Historical period begins with the introduction of written documents and can be addressed in terms of early and late Historical periods. The early history of the region includes early Native American, Spanish, and Mexican components. For the earliest Historical periods, we may draw on archaeological evidence, more or less contemporary accounts of Spanish priests and other Euro-American explorers, as well as ethnographic studies that occurred as much as a century later that provide important insights into past lifeways. The late Historical period includes early, middle, and late American periods and is punctuated by the discovery of gold in California in 1848, the beginning of the twentieth century, and by World War II (WWII) and the Cold War.

Early Historical Period (A.D. 1540 – 1821)

Native American Ethnohistory and Ethnography

Evidence for occupation of the Lower Colorado River Basin and adjacent areas during the Early Historical period is derived almost exclusively from accounts of early Spanish explorers and missionaries, as well as ethnographic studies conducted during the late nineteenth and early twentieth centuries. When Europeans arrived in the Yuma area, several distinctive groups occupied the Lower Colorado valley, the largest being Quechans (or Yumans), Yavapai, and Cocopah, but with Halchidoma, Cohuana, and Halykwamai also present in the Lower Colorado valley, and Pima, Maricopa, and Papago groups occupying the regions to the east and southeast, along the Gila. Archaeological and ethnohistorical data from the expeditions of Alarcón (1540), Oñate (1605), Kino (1701), and Garcés (1771-1776) indicate that trade; warfare, alliance, and migration were common among these groups (Kelly 1977; Spier 1933). Athapaskan-speaking Apache groups are also known to have traveled into the Western Papaguería; however, the extent of this presence prior to the late 1700s is not well documented. Warfare led to frequent territorial shifts and interaction among the peoples of the western Papaguería. Floodplain farming was practiced along the Colorado River and along other major drainages, although floods were unpredictable and Yuman reliance on agriculture here was limited (Stone 1991); irrigation-based agriculture was more easily managed along the Gila River, where floods were not so widespread and the river was more manageable. Much of Yuman subsistence came from hunting and gathering in the surrounding foothills, mountains, and valleys, with as much as 50 percent of the Yuman diet consisting of mesquite pods (Castetter and Bell 1951). Protohistoric and historic Native American settlement patterns are similar to patterns that appear in the archaeological record for prehistoric groups, with temporary seasonal camps located along rivers appearing during the rainy season and similar camps being established in peripheral areas throughout the winter and spring. Structures typically consisted of pole frames covered with brush, mats, or mud daub.

Spanish and Mexican Periods

The first Europeans to travel through the Lower Colorado region were Hernando de Alarcón and Melchior Diaz, who visited the region separately in 1540, in journeys peripherally related to that of Francisco Vásquez de Coronado farther east. Alarcón came by sea and sailed up the river some distance; he may have returned in the following year, but died in Alta California before returning home (Weber 1992). Diaz traveled overland from Sonora to the mouth of the Colorado, finding a note left by Alarcón shortly before, but died on a foray into California shortly thereafter. Sixty years later, in 1604, the governor of the new Spanish

colony in northern New Mexico, Juan de Oñate, led an expedition across central Arizona and then southward along the Colorado to the Gulf of California (Officer 1987:27; Wagoner 1975:67). Spaniards would revisit the region several times during the 18th century, as part of efforts to convert natives to Christianity and to secure communications routes with California. Late in 1779, construction began on a mission and presidio at the Yuma Crossing. Relationships between the Quechans and Spaniards quickly soured, resulting in a revolt that forced Spaniards from the region in July 1781 (Bee 1982; Forbes 1957). As a result, for several decades the only land connection between California and Mexico was through the Mojave Trail, some 130 miles north of Yuma Crossing.

In 1821 Mexico won independence from Spain. The road to California was reopened shortly thereafter by Captain José Romero, commander of the Tucson presidio. Although the Quechans were at peace with Mexico through most of the Mexican period, the Yuma area was seldom visited. During the 1820s and 1830s, Euroamerican trappers filtered down the Gila River from New Mexico in search of beaver pelts. Trappers, including Antoine Leroux, Jedediah Smith, Pauline Weaver, Bill Williams (for whom the river is named), and Ewing Young, traveled through the area, and their interactions with Native American tribes were at times peaceful and at other times violent. Because the trappers exported their pelts through California or northern New Mexico, they avoided confrontations with Mexican authorities headquartered in the settlements of Tucson and Tubac to the south (Sheridan 1995:44). Trappers severely impacted animal populations along the Gila and Colorado rivers, and moved west into California by the 1840s in search of larger beaver populations (Batman 1984). By the time of the Mexican-American War of 1846–1848, a Euro-American presence in the area had been firmly established.

Late Historical (American) Period (A.D. 1821 – present)

The Mexican-American War ended in 1848 with the signing of the Treaty of Guadalupe Hidalgo, the terms of which cost Mexico its claim to California and much of the Southwest. In 1854, with the acquisition of additional land south of the Gila River through the Gadsden Purchase, control of southern Arizona passed to the United States. The discovery of gold in California in 1848 resulted in the migration of thousands of fortune seekers from the eastern states, many of whom came through southern Arizona along the routes established by Colonel Stephen Watts Kearny, Captain Philip St. George Cooke, and Major Lawrence Pike Graham (Bischoff 2000). Mining became the chief motivator for Anglo activity in southwestern Arizona during this period. Early American settlement in the Yuma area was focused on the Colorado River. The community maintained a reliable crossing at the river and profited from increased traffic into California. John Glanton maintained ferry services until he and associates were killed by Yuman tribal members. Subsequently, in 1850, the U.S. Army established Camp Yuma, which was occupied until 1883. With the protection of the U.S. Army, settlement continued in the Yuma area (first called Colorado City, then Arizona City), and increased traffic north to Bullhead City (Hardyville) via ferry and steamboat followed. Growing populations and creation of the Arizona Territory in 1863 led to an increased military presence in the area and the establishment of the Colorado River Indian Reservation in 1865 (Stone 1991). Placer gold strikes along the Gila and Colorado rivers in the late 1850s, including those at Gila City, Oroville, Las Flores, and La Paz, led to a mining boom in the mountains along the rivers. Hundreds of mines existed in the area during the late 1880s, and smaller operations and prospectors continued to work claims into the early 1900s. At the turn of the century, population growth in the Yuma area was spurred by the construction of dams on the Colorado River for irrigation. The first such dams, funded through the Reclamation Act of 1902, included the Laguna Dam in 1905; the East Main Canal, which passes within a half mile of the current survey area, originally drew water from the Laguna Dam, was completed in 1912. The Laguna Dam was eventually superseded by the Imperial Dam in 1936, and the canal has drawn water from this source ever since. Irrigation allowed successful farming of the Colorado and Gila river floodplains and an increase in the local population from 3,150 in 1912 to 23,000 in 1946 (Vorbeck and Abbott 1989). Upland areas and basins away from the river would not see this growth in settlement, but continued to be visited by miners and prospectors or by groups traveling overland between communities or to steamboat stops on the Colorado River. While settlement and agricultural development continued in the Yuma area along the Colorado and Gila rivers, the mountainous areas to the north and east only realized increased activity and development as a result of international developments that brought the United States into World War II. In the early years of the war, 1942 to 1944, the Desert Training Center (DTC) of California and Arizona was established, along with facilities in other contrasting climatic conditions, to study the effects of severe weather on equipment and troops (Bischoff 2000).

METHODS

Previous Research

Prior to field work, Harris Environmental initiated records searches in the archives of the Arizona State Museum (ASM) and the Bureau of Reclamation's Yuma Area Office. Records pertaining to any previous cultural resource surveys that might have covered areas within 1 mile of the current survey area, and of any cultural properties that might have been recorded within the same radius, were obtained from these sources. The central element of this search was an inquiry on the AZSITE online database, maintained by the Arizona State Museum (and theoretically containing records performed by all agencies working within the state), but in addition, historical maps and literature that was considered potentially relevant were consulted. Five previous surveys and two previously recorded sites were identified during this search. The surveys are listed and briefly described in Table 1; the sites, in Table 2.

Table 1. Surveys within one mile of the current survey area.

Project Number	Performing Organization	Description	Report Reference
BLM-050-92-54	Bureau of Land Management, Yuma Field Office	Survey along multiple canals in western Arizona, including East Main Canal, and properties within Yuma	Pfaff et al 1992
2007-81.ASM	Transcon	Somerton Materials Pit Survey—survey of 40-acre block adjacent to north side of current project area	Louis 2007
2007-569	Environmental Planning Group	Survey of overhead power line corridor running along West County 19th Street in vicinity of project area	Rowe 2007
2012-253.ASM	Recon	Water Measurement and Control Improvement Survey (actually performed in 2004), along East Main Canal	Finney 2004
2012-439.ASM	Logan Simpson Design	Survey along South Avenues D and E—Avenue D alignment is less than 500 feet from current project area	Fahrni 2012

Table 2. Sites within one mile of the current survey area.

Site Designation	Description	Ownership/ Jurisdiction	Recording Organization	Reference
AZ X:6: 65(ASM)	East Main Canal—irrigation ditch, built in 1912	Bureau of Reclamation, Yuma Area Office	Bureau of Reclamation, Yuma Projects Office	Pfaff et al 1992
AZ X:6: 130(ASM)	unknown (advanced site)	Bureau of Reclamation, Yuma Area Office	Logan Simpson Design	Fahrni 2012

Survey Coverage

The survey was done in accordance with standards outlined by the Arizona State Museum for surveys of state-administered lands, which most Federal agencies operating in Arizona (including the Bureau of Reclamation) have embraced as appropriate for surveys on their lands as well. Archaeologist Dakota Larrick performed the survey by walking a series of parallel transects, each covering a 20-m-wide (66-foot-wide) swath (as specified in the standards), back and forth across the ground surface within the project area in sufficient numbers to ensure 100 percent coverage of the entire width of the corridor. This meant making five trips in each direction, navigating with the help of a Garmin hand-held GPS unit with sub-meter accuracy.

Cultural resources identified during the survey were to be assessed and recorded in compliance with definitions summarized in an anonymous and undated document entitled *ASM Site Definition Policy* (Arizona State Museum n.d.. Under these standards a property must be recorded as an archaeological site if it is comprised of features and/or artifacts that are at least 50 years old, found in one or more of the following combinations:

Thirty or more artifacts of a single artifact class within an area 15 meters (49 ft) in diameter, except when all pieces appear to originate from a single source (e.g., one ceramic vessel, one core, or one glass bottle, etc.); or

Twenty or more artifacts that include at least two artifact classes (e.g., sherds, lithics, or historic artifacts, etc.), within an area 15 meters (49 ft) in diameter; or

One or more archaeological features in association with any number of artifacts; or

Two or more temporally-associated archaeological features without artifacts.

ASM policy (not explicitly specified in the standard, but implied and enforced) calls for a minimum spacing of 100 m between sites; if multiple discrete areas meeting the site definition given above are found within 100 m (328 feet) of each other they are generally lumped together into a single site, with each area being defined as a locus of the overall site. Artifacts and features that do not qualify as sites are recorded as isolated occurrences (IOs); these will typically consist of a small concentration of a single class of artifact (down to and including a single isolated artifact) or an isolated feature with no associated artifacts. If artifacts or other features are found to lie within 100 m of what would otherwise appear to be an isolated feature then these must together be recorded as a site. Along with these findings, which must be recorded as sites, an archaeologist may, at her or his

discretion, record as a site a property that does not meet the formal standard, but that is, in the archaeologist's professional opinion, of comparable significance. As with the survey interval specified by ASM, these site definition standards have been widely adopted by Federal agencies working within the State of Arizona. Locations of all cultural properties (a datum and a site boundary for each one) were shot in using the Garmin GPS unit; notes regarding the composition of all findings, including descriptions of at least a representative sample of the artifacts that were present and of any features (including artifact concentrations) that were found, were taken on a tablet, to which software appropriate for preparing digital versions of site forms had been uploaded. Photographs of all sites, including shots to help future visitors in relocating datums, general overview shots, photos of features, and photos of artifacts of particular interest were taken, in accordance with ASM reporting standards. Recording of Isolated Occurrences proceeded along the same general lines, although no plan map was produced and photographs were taken only when something of particular interest was seen.

Once a site is defined its significance is evaluated with reference to criteria established to determine whether a property is eligible for inclusion on the National Register of Historic Places (NRHP). The legislative mandate to protect historical properties (including archaeological sites), found in Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, and in implementing regulations found in the Code of Federal Regulations, 36 CFR Part 800, Protection of Historic Properties, define a federal agency's authority to protect an historical property (understood to include cultural resources and archaeological sites) as being based on the determination that the property or site is included in or eligible for inclusion in the NRHP. Procedures for determining eligibility are described in various publications issued by the National Register of Historic Places (NRHP). Briefly, for a site to be considered for NRHP inclusion, it must be at least 50 years old, and must also possess historical significance and integrity. As stated in National Register Bulletin 15, How to Apply the National Register Criteria for Evaluation,

> The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and
>
> A. that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> B. that are associated with the lives of persons significant in our past; or
>
> C. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> D. that have yielded, or may be likely to yield, information important in prehistory or history (National Park Service 1997:2).

Most historical and prehistoric archaeological resources are evaluated for NRHP eligibility for their potential to yield important information on prehistory or history under Criterion D, although such resources may also have broader public and ethnic significance. The importance of the information in prehistory or history must be weighed by its relevance to historic contexts. A historic context is "a body of information about historic properties organized by theme, place, and time" (US Department of the Interior 1997:7-10).

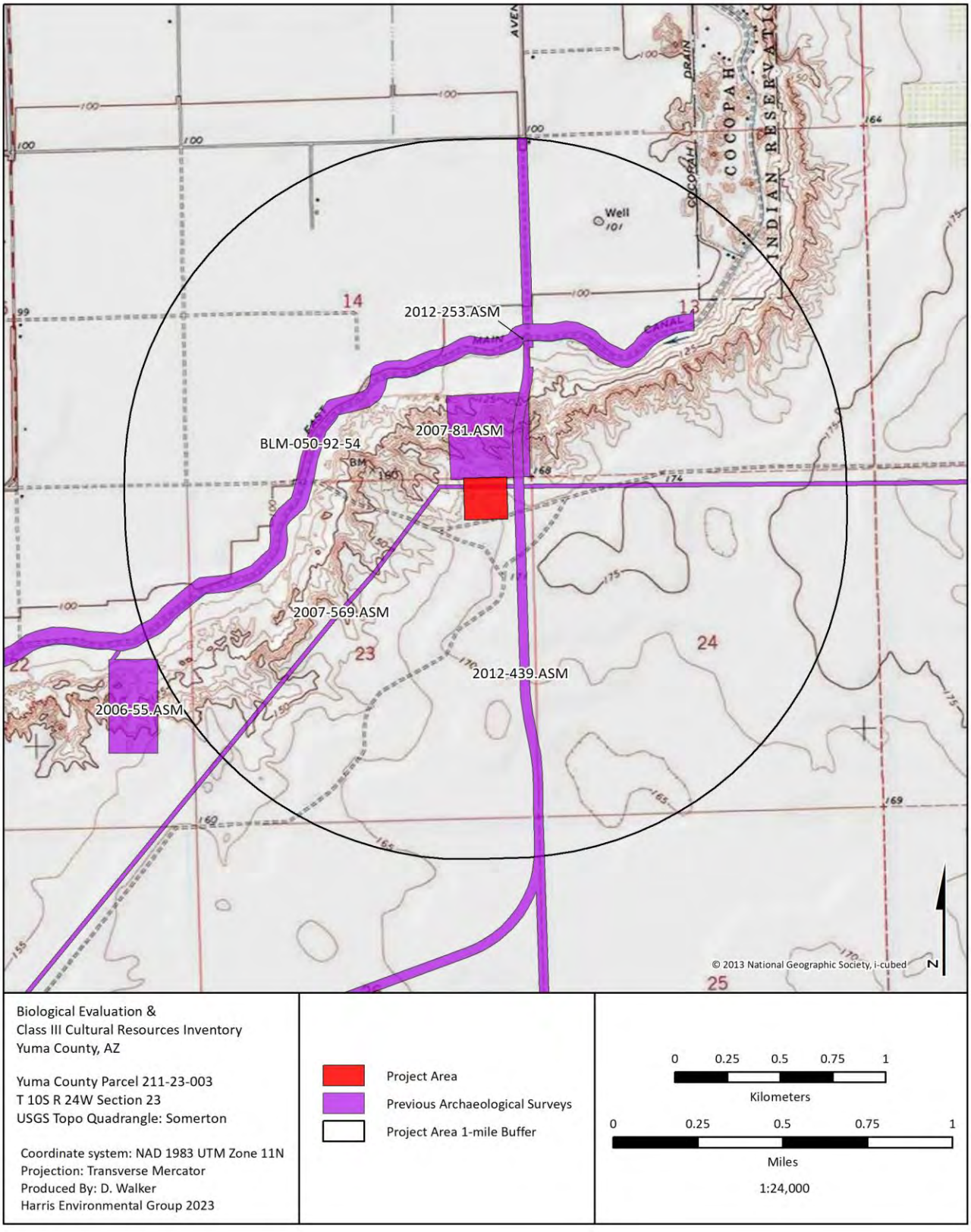


Figure 3. Map showing previous surveys within one mile of the current survey area.

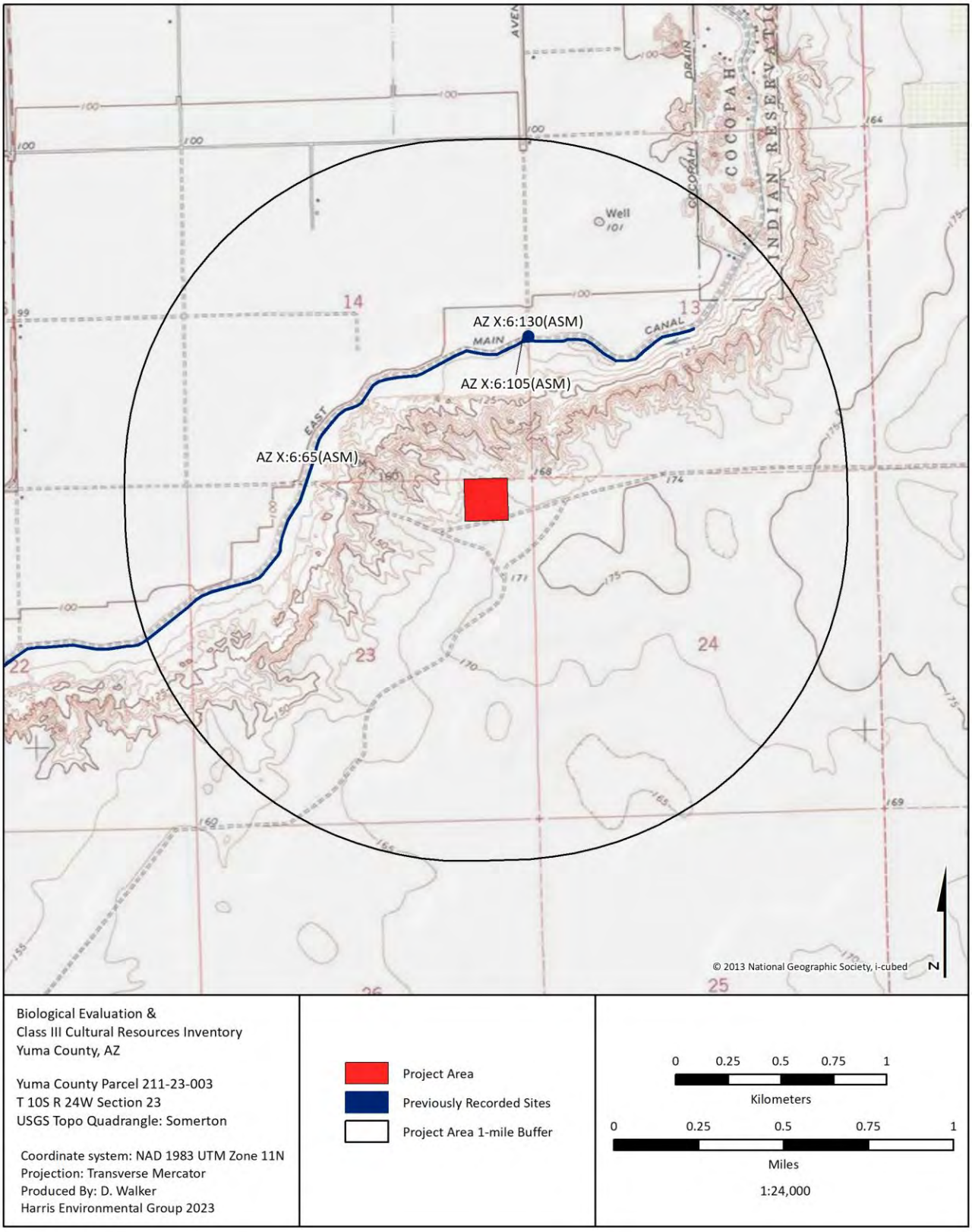


Figure 4. Map showing previously recorded sites within one mile of the current survey area.

CONCLUSION & PROPOSED ACTIONS

No cultural features or artifacts that could be defined, under the standards laid out above, as either an archaeological site or an IO were identified during the current survey. No efforts at management of cultural resources are recommended as necessary as the current undertaking goes forward. An unanticipated discoveries plan should be developed for this project, to be implemented should any archaeological resources that were not identifiable during survey be identified during the course of future ground-disturbing activities within the surveyed project area.

Photo 1: Site overview, facing south

Photo 2: Site overview, facing north

Photo 3: Site overview, facing east

Photo 4: Site overview, facing west

REFERENCES CITED

Arizona State Museum
n.d. ASM Site Definition Policy. Available at http://azsite3.asurite.ad.asu.edu/azsite/links/asm_site_definition_policy.pdf. Accessed August 16, 2023. Arizona State Museum, Tucson.

Batman, Richard
1984 James Pattie's West: The Dream and the Reality. University of Oklahoma Press, Norman.

Bischoff, Matt C.
2000 The Desert Training Center/California-Arizona Maneuver Area, 1942–1944: Vol. 1: Historical and Archaeological Contexts. Technical Series No. 75. Statistical Research, Inc., Tucson.

Brown, David E. (ed.)
1994 *Biotic Communities: Southwestern United States and Northwestern Mexico*. University of Utah Press, Salt Lake City.

Castetter, Edward F., and Willis H. Bell
1951 Yuman Indian Agriculture. University of New Mexico Press, Albuquerque.

Courtright, J. Scott
2001 A Cultural Resource Survey of 85.6 Acres for the Proposed Yuma Area Service Highway Port of Entry Road, East of San Luis, Yuma County, Arizona. LSD Technical Report No. 95542. Logan Simpson Design, Tempe.

Crownover, C. Scott
1996 Cultural Resources Assessment of the Arizona Public Service Company County 23rd Road Tie Line, near San Luis, Yuma County, Arizona. ACS Project No. 96-35. Archaeological Consulting Services, Tempe.

Euler, Robert C.
1958 Walapai Culture History. Unpublished Ph.D. dissertation, Department of Anthropology, University of New Mexico, Albuquerque.

Fahrni, Grant
2012 A Cultural Resources Survey of 161.3 Acres for a Proposed Extension of Avenue E from State Route 195 Milepost 3 to County 18th Street, Southeast of Somerton, Yuma County, Arizona. Technical Report No. 115447. Logan Simpson Design, Tempe.

Finney, J. K. "Pete"
2004 Intensive Cultural Resource Survey for the Yuma County Water Users Association Measurement and Control Project, Yuma County, Arizona. Report No. LC-AZ-04-04-P/RECON Number 4006A. RECON Environmental, San Diego.

Forbes, Jack D.
1957 A History of the Yuma Indians and Yuma Land to 1821. Unpublished M.A. thesis, Department of Anthropology, University of Southern California, Los Angeles.

Hayden, Julian
1976 Pre-Altithermal Archaeology in the Sierra Pinacate, Sonora, Mexico. American Antiquity 41(3):274-289.

Hohmann, John W., and Margaret "Peg" Davis
2005 A Class III Archaeological Survey of 720 Acres of the Highlander Farms in San Luis, Yuma County, Arizona. Cultural Resource Division Clearance Report No. 525. Louis Berger Group, Cultural Resource Division.

Huckell, Bruce B.
1982 The Distribution of Fluted Points in Arizona: A Review and Update. Archaeological Series No. 147, Vol. 1. Arizona State Museum. University of Arizona, Tucson.

1995 Of Marshes and Maize: Preceramic Agricultural Settlements in the Cienega Valley, Southeastern Arizona. Anthropological Papers No. 59. University of Arizona, Tucson.

Lite, Jeremy

1997 Cultural Resources Survey for the Proposed 25 Mile-Long Yuma Area Service Highway between San Luis and Interstate-8 at Araby Road, Southwestern Yuma County, Arizona. Project Report No. 98:45. Archaeological Research Services, Tempe.

Louis, Heather
2007 Class III Cultural Resources Survey of Approximately 40 Acres of Bureau of Land Management Administered Land in the Vicinity of Somerton, Yuma County, Arizona. Transcon Environmental, Mesa.

Mabry, Jonathan B.
2005 Diversity in Early Southwestern Farming and Optimization Models of Transition to Agriculture. In *Subsistence and Resource Use of Early Agricultural Communities in Southern Arizona*, edited by Michael W. Diehl, pp. 113-152. Anthropological Papers 34. Center for Desert Archaeology, Tucson, Arizona.

Mabry, Jonathan B., and William Doolittle
2006 Modeling the Early Agricultural Frontier in the Desert Borderlands. In Archaeology Without Borders: Contact, Commerce, and Change in the U.S. Southwest and Northwestern Mexico, edited by Laurie D. Webster and Maxine McBrinn. University Pres of Colorado, Boulder.

McGuire, Randall H.
1982 Problems in Culture History. In *Hohokam and Patayan: Prehistory of Southwest Arizona*, edited by Randall H. McGuire and Michael B. Schiffer, pp. 153–222. Academic Press, New York.

McQuestion, Kathleen M, Robert G. Haynes-Peterson, and Pat H. Stein
1992 Archaeological Survey of the Yuma Lateral Expansion Project, La Paz and Yuma Counties, Arizona. SWCA Archaeological Report 92-19. SWCA, Inc., Flagstaff, Arizona.

Morrison, Mary K.
2002 A Cultural Resources Survey of 84.6 Acres for the Proposed Yuma Area Service Highway, East of San Luis, Yuma County, Arizona. Technical Report No. 015145. Logan Simpson Design.

Officer, James E.
1987 Hispanic Arizona, 1536–1856. University of Arizona Press, Tucson.

Pfaff, Christina, Rolla L. Queen, and David Clark
1992 The Historic Yuma Project: History, Resource Overview, and Assessment. US Bureau of Reclamation, Denver.

Rogers, Malcolm J.
1939 Early Lithic Industries of the Lower Basin of the Colorado River and Adjacent Desert Areas. San Diego Museum Papers No. 3. San Diego Museum of Man, San Diego.

1945 An Outline of Yuman Prehistory. Southwestern Journal of Anthropology 1:167-198.

1958 San Dieguito Implements from the Terraces of the Rincon-Pantano and Rillito Drainage System. The Kiva 24:1-23.

1966 *Ancient Hunters of the Far West*. Union-Tribune Publishing, San Diego.

Rowe, Robert A.
2007 A Cultural Resource Survey for the Yuma TS-8 to San Luis 69kV Transmission Line Project, Yuma County, Arizona. EPG Cultural Resource Services Technical Paper No. 2007-0026. Environmental Planning Group, Phoenix, Arizona.

Sayles, E. B., and Ernst Antevs
1941 The Cochise Culture. Medallion Papers 29. Gila Pueblo, Globe, Arizona.

Sheridan, Thomas E.
1995 *Arizona: A History*. University of Arizona Press, Tucson.

Slawson, Laurie V.

2011 A Cultural Resources Inventory of 240 Acres on Arizona State Trust Land for a Solar Energy Project East of San Luis, Yuma County, Arizona. Technical Report No. 2011-25. Aztlan Archaeology, Inc., Tucson.

Stone, Bradford W.
1995 Cultural Resources Survey of a 25 Mile Long Segment of Arizona Department of Transportation Right-of-Way for U.S. Highway 95 Between Mileposts 38 and 63, North of Yuma, Yuma and La Paz Counties, Arizona. Archaeological Research Services, Inc., Tempe.

Stone, Connie L.
1986 Deceptive Desolation: Prehistory of the Sonoran Desert in West Central Arizona. Cultural Resource Series Monograph No. 1. USDI Bureau of Land Management, Arizona State Office, Phoenix.

1987 People of the Desert, Canyons and Pines: Prehistory of the Patayan Country in West Central Arizona. Cultural Resources Series Monograph No. 5. Bureau of Land Management, Phoenix.

1991 The Linear Oasis: Managing Cultural Resources along the Lower Colorado River. Cultural Resource Series No. 6. Bureau of Land Management, Phoenix.

Vorbeck, Raymond Priest, and Bellamy Priest Abbott
1989 Raymond Marshall Priest – The Yuma Project. Monograph No. 4, Yuma County Historical Society, Yuma, Arizona. Wagoner, Jay 1975 Arizona Territory 1863–1912: A Political History. University of Arizona Press, Tucson.

Warren, Claude N., and D. L. True
1961 The San Dieguito Complex and its place in Southern California Prehistory. Archaeological Survey Annual Report, 1960-1961. University of California, Los Angeles.

Waters, Michael R.
1982 The Lowland Patayan Ceramic Tradition. In Hohokam and Patayan: Prehistory of Southwest Arizona, edited by R. McGuire and M. Schiffer, pp. 275–297. Academic Press, New York.

Weber, David J.
1992 *The Spanish Frontier in North America.* Yale University Press, New Haven, CT.

Western Regional Climate Center
n.d. Western Regional Climate Center. Available at http://www.wrcc.dri.edu.

Appendix D

Coordination and Public Involvement