

Targeted Monitoring Plan

Resource-Specific Management
2025 Annual Report

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ACRONYMS AND ABBREVIATIONS

Cal-IPC	California Invasive Plant Council
CDFW	California Department of Fish and Wildlife
City	City of San Diego
County	County of San Diego
DPR	Department of Parks and Recreation
GPS	Global Positioning System
HELIX	HELIX Environmental Planning, Inc.
MSCP	Multiple Species Conservation Program
NCCP	Natural Community Conservation Plan
SDMMP	San Diego Management and Monitoring Program
SR	State Route
TMP	Targeted Monitoring Plan
UCANR	University of California Agriculture and Natural Resources
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service
Wildlife Agencies	U.S. Fish and Wildlife Service and California Department of Fish and Wildlife

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EXECUTIVE SUMMARY

The County of San Diego (County) monitors and adaptively manages habitats and species covered by the Multiple Species Conservation Program (MSCP) to ensure MSCP biological conservation goals and conditions for species coverage are being met, as a requirement of the MSCP and the adopted South County MSCP Subarea Plan. The monitoring and adaptive management program is guided by the Targeted Monitoring Plan (TMP; ESA and ICF 2015) and its subsequent updates (ESA and ICF 2022; ESA 2024a).

The TMP and subsequent updates were prepared by the County Department of Parks and Recreation (DPR), with review and input by the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife (collectively known as the Wildlife Agencies), along with review and input from U.S. Geological Survey (USGS) and San Diego Management and Monitoring Program (SDMMP) resources experts. The TMP includes focused goals and objectives for target resources and detailed monitoring protocols. It is intended to achieve the management directives for species per the adopted South County MSCP Subarea Plan Framework Management Plan (County of San Diego 2001). The TMP addresses monitoring and adaptive management within 31 parks and preserves for 23 plant and wildlife species and two habitat types, located in the South County Subarea Plan and draft North County MSCP Subarea Plan Areas.

TMP implementation in 2025 included habitat and resource-specific adaptive management following the recommendations from the 2024 TMP Annual Report (ESA 2025). Resource-specific adaptive management was conducted in seven parks and preserves: Boulder Oaks County Preserve, Furby-North County Preserve, Tijuana River Valley Regional Park, Lusardi Creek County Preserve, Hellhole Canyon County Preserve, Santa Margarita County Preserve, and Ramona Grasslands County Preserve.

Adaptive management was conducted by HELIX Environmental Planning Inc. (HELIX) in 2025 for the following habitat types and six species, five of which are MSCP-covered species, and two of which are draft North County MSCP-covered:

- San Miguel savory (*Clinopodium chandleri*; MSCP)
- Otay tarplant (*Deinandra conjugens*; MSCP)
- Orcutt's bird's-beak (*Dicranostegia orcuttiana*; MSCP)
- Variegated dudleya (*Dudleya variegata*; MSCP)
- Harbison's dun skipper (*Euphyes vestris harbisoni*)
- Least Bell's vireo (*Vireo bellii pusillus*; MSCP and draft North County MSCP)
- Vernal pool and alkali habitats (MSCP and draft North County MSCP)

Table ES-1, *2025 TMP Management*, provides a summary of 2025 TMP management.

Table ES-1
2025 TMP MANAGEMENT

Sensitive Resource	County Park/Preserve	Management Activity
San Miguel savory	Boulder Oaks Preserve	Management area: 0.55 acre within and surrounding one monitoring plot
Otay tarplant	Furby-North Preserve	Management area: 0.11 acre within and surrounding one monitoring plot
Orcutt's bird's-beak	Tijuana River Valley Regional Park	Management area: 0.35 acre within and surrounding two monitoring plots
Variegated dudleya	Lusardi Creek Preserve	Management area: 0.75 acre within one monitoring plot and surrounding three herbivory enclosures
Harbison's dun skipper	Hellhole Canyon Preserve	Management area: 0.36 acre within and surrounding one survey location (eight Management Areas); 12.72 pounds of seed was broadcasted by hand across all eight Management Areas.
Least Bell's vireo	Santa Margarita Preserve	BHCO ¹ trapped: 15 individuals in two trap locations
Vernal pools/Alkali playas	Ramona Grasslands Preserve	Management area: 15 pools and four alkali playas, totaling 2.64 acres

¹ BHCO = brown-headed cowbird.

1.0 INTRODUCTION

1.1 PURPOSE OF THE PROJECT

As a participant in the Multiple Species Conservation Program (MSCP) and the adopted South County MSCP Subarea Plan, the County of San Diego (County) is obligated to conduct biological maintenance to protect habitats and species covered by the MSCP to ensure that the MSCP biological conservation goals and conditions for species coverage are being met. The County Department of Parks and Recreation (DPR) prepared a Targeted Monitoring Plan (TMP; ESA and ICF 2015) to provide detailed specifications for implementation of monitoring and adaptive management within 10 County-owned and managed parks and preserves (Preserve Group 1) overseen by DPR. The TMP was revised in December 2022 (ESA and ICF 2022) to incorporate 10 additional parks and preserves (Preserve Group 2) and again in August 2024 (ESA 2024a) to incorporate 11 additional parks and preserves (Preserve Group 3). These 31 parks and preserves fall within the South County MSCP Subarea Plan Area and the draft North County MSCP Subarea Plan Area. The draft North County MSCP Subarea Plan Area preserves are included due to the number of sensitive on-site resources that require conservation and management. In total, the TMP addresses monitoring and adaptive management within 31 parks and preserves, for 23 plant and wildlife species and two habitat types.

The TMP is an adaptive implementation plan that includes focused goals and objectives for target resources and detailed monitoring protocols. It is intended to achieve the management directives for species per the adopted South County MSCP Subarea Plan Framework Management Plan (County 2001). The regional framework that guides monitoring at the preserve level has been refined over time and is evolving through a collaborative effort among the U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW; collectively known as the Wildlife Agencies), MSCP jurisdictions, and scientific experts. It is understood by all stakeholders (e.g., the Wildlife Agencies, municipal and County agencies, and land managers) that adaptive management is an iterative process in which lessons are learned and used to further refine priorities, goals, objectives, maintenance activities, and monitoring methods.

The TMP addresses monitoring and management within the following 4 parks and 27 preserves: El Monte County Park, Louis A. Stelzer County Park, San Luis Rey River Park, and Tijuana River Valley Regional Park; and Barnett Ranch, Bottle Peak, Boulder Oaks, Del Dios Highlands, Dictionary Hill, El Capitan, Escondido Creek, Furby-North, Hellhole Canyon, Iron Mountain, Keys Creek, Lakeside Linkage, Lawrence and Barbara Daley, Los Peñasquitos Canyon, Lusardi Creek, Mountain Meadow, Mount Olympus, Oakoasis, Peutz Valley, Ramona Grasslands, Sage Hill, Santa Margarita, Simon, Skyline, Stoneridge, Sycamore Canyon/Goodan Ranch, and Wilderness Gardens County Preserves.

Implementing the TMP resource-specific management recommendations from the 2024 TMP Annual Report, resource-specific management was conducted in one park and six preserves identified in the TMP: Tijuana River Valley Regional Park; and Boulder Oaks, Furby-North, Lusardi Creek, Hellhole Canyon, Santa Margarita, and Ramona Grasslands Preserves (ESA and ICF 2022; ESA 2025).

Maintenance conducted by HELIX Environmental Planning, Inc. (HELIX) for the following five MSCP- and/or draft North County MSCP covered species, and one habitat in 2025, is detailed in Table 1, *TMP Species and Habitats Maintained in 2025*.

Table 1
TMP SPECIES AND HABITATS MAINTAINED IN 2025

TMP Species/Habitat	Covered by		Maintained
	MSCP	Draft North County MSCP	
San Miguel Savory (<i>Clinopodium chandleri</i>)	X		X
Otay Tarplant (<i>Deinandra conjugens</i>)	X		X
Orcutt's Bird's Beak (<i>Dicranostegia orcuttiana</i>)	X		X
Variegated Dudleya (<i>Dudleya variegata</i>)	X		X
Harbison's Dun Skipper (<i>Euphyes vestris harbisoni</i>)			X
Least Bell's Vireo (<i>Vireo bellii pusillus</i>)	X	X	X
Vernal Pool and Alkali Playa Habitat	X	X	X

The goal of the focused adaptive management is to enhance suitable habitat and support the persistence of MSCP-covered and draft North County MSCP-covered species and habitats.

1.2 MULTIPLE SPECIES CONSERVATION PROGRAM CONTEXT

The MSCP is a comprehensive habitat conservation planning document and one of several subregional habitat conservation programs in San Diego County that contribute to the preservation of regional biodiversity. Agencies participating in the MSCP include the County, other local jurisdictions within San Diego County (e.g., City of San Diego, City of Chula Vista), and the Wildlife Agencies. The County and other local jurisdictions implement the MSCP through subarea plans, which describe specific implementing mechanisms for the MSCP. The Final MSCP Plan and subarea plans serve as a multiple species Habitat Conservation Plan pursuant to Section 10(a)(1)(B) of the federal Endangered Species Act and a Natural Community Conservation Plan (NCCP) pursuant to the California NCCP Act of 1991 (amended in 2001) and the state Endangered Species Act.

The South County MSCP Subarea Plan was adopted in October 1997 and covers 23 vegetation communities and 85 species (County 1997). The County is preparing the draft North County MSCP Subarea Plan for the northwestern unincorporated areas of the County and the draft East County MSCP Subarea Plan for the eastern unincorporated areas of the County.

Species-specific management and monitoring requirements for the MSCP are summarized in Table 3-5 of the Final MSCP Plan. In addition, the assurances and obligations to implement the South County MSCP Subarea Plan have been established in the Implementing Agreement (County 1998), signed by the County and the Wildlife Agencies.

2.0 STUDY AREA DESCRIPTION

2.1 OVERVIEW

During the 2025 reporting period, HELIX performed resource-specific management in one park and six preserves identified in the TMP: Tijuana River Valley Regional Park, Boulder Oaks, Furby-North, Lusardi Creek, Hellhole Canyon, Santa Margarita, and Ramona Grasslands County Preserves (Figure 1, *Regional Location*).

Boulder Oaks and Lusardi Creek Preserves are located within the South County MSCP Subarea Plan Area and are monitored and managed in accordance with the Implementing Agreement (County 1998). Portions of Ramona Grasslands County Preserve are located within the MSCP South County Subarea Plan Area and the draft North County MSCP Subarea Plan Area. Hellhole Canyon and Santa Margarita County Preserves are located completely within the draft North County MSCP Subarea Plan Area. These preserve areas are managed in accordance with the draft North County MSCP Subarea Plan. They are included in the TMP due to the number of sensitive resources on-site that require conservation and management. Furby-North County Preserve and Tijuana River Valley Regional Park are located within the City of San (City) Diego MSCP Subarea Plan Area and are monitored and managed in accordance with the County's Implementing Agreement (County 1998).

2.2 PROJECT LOCATION

Descriptions of the seven park and preserve locations managed in 2025 are provided below.

2.2.1 Boulder Oaks County Preserve

Boulder Oaks County Preserve is in central San Diego County, California, approximately five miles southwest of the community of Ramona, and approximately two miles south of State Route (SR) 67 along the west side of Mussey Grade Road (Figure 2, *Boulder Oaks Preserve*).

2.2.2 Furby-North County Preserve

The Furby-North Preserve is located south of Otay Mesa Road and east of Interstate 805 (Figure 3, *Furby-North Preserve*).

2.2.3 Tijuana River Valley Regional Park

The Tijuana River Valley Regional Park is bounded to the north by Sunset Avenue, to the south by the United States-Mexico International Border, to the west by Border Field State Park, and to the east by Interstate 5 (Figure 4, *Tijuana River Valley Regional Park*).

2.2.4 Lusardi Creek County Preserve

Lusardi Creek County Preserve is located along the northern boundary of the city of San Diego, slightly southeast of Rancho Santa Fe, an unincorporated community of San Diego County. It is in western San Diego County in the Lusardi Creek Valley, just north of San Dieguito Road, west of Del Sur, and South of Artesian Road (Figure 5, *Lusardi Creek County Preserve*).

2.2.5 Hellhole Canyon County Preserve

Hellhole Canyon County Preserve is located approximately six miles northeast of Escondido in Valley Center, east of Valley Center Road. The Hellhole Canyon County Preserve falls under the planning boundaries of the Draft North County MSCP Subarea Plan. It is located around the intersection of Hell Creek Road and Santee Lane, and consists of two main mountains, Rodriguez Mountain and an unnamed mountain, as well as Hell Creek (Figure 6, *Hellhole Canyon County Preserve*).

2.2.6 Santa Margarita County Preserve

Santa Margarita County Preserve is located in the northern portion of the County, approximately 5.5 miles west of Interstate 15, approximately nine miles north of SR 76, and approximately two miles northwest of downtown Fallbrook, California. Specifically, Santa Margarita County Preserve is located directly west of Sandia Creek Drive, just east of the northeastern portion of Camp Pendleton Marine Corps Base, and the southern portion of the Preserve is bisected by De Luz Road (Figure 7, *Santa Margarita County Preserve*).

2.2.7 Ramona Grasslands County Preserve

Ramona Grasslands County Preserve is west of Ramona, an unincorporated community of San Diego County. It is in west-central San Diego County, in the western portion of Santa Maria Valley (Figure 8, *Ramona Grasslands County Preserve*).

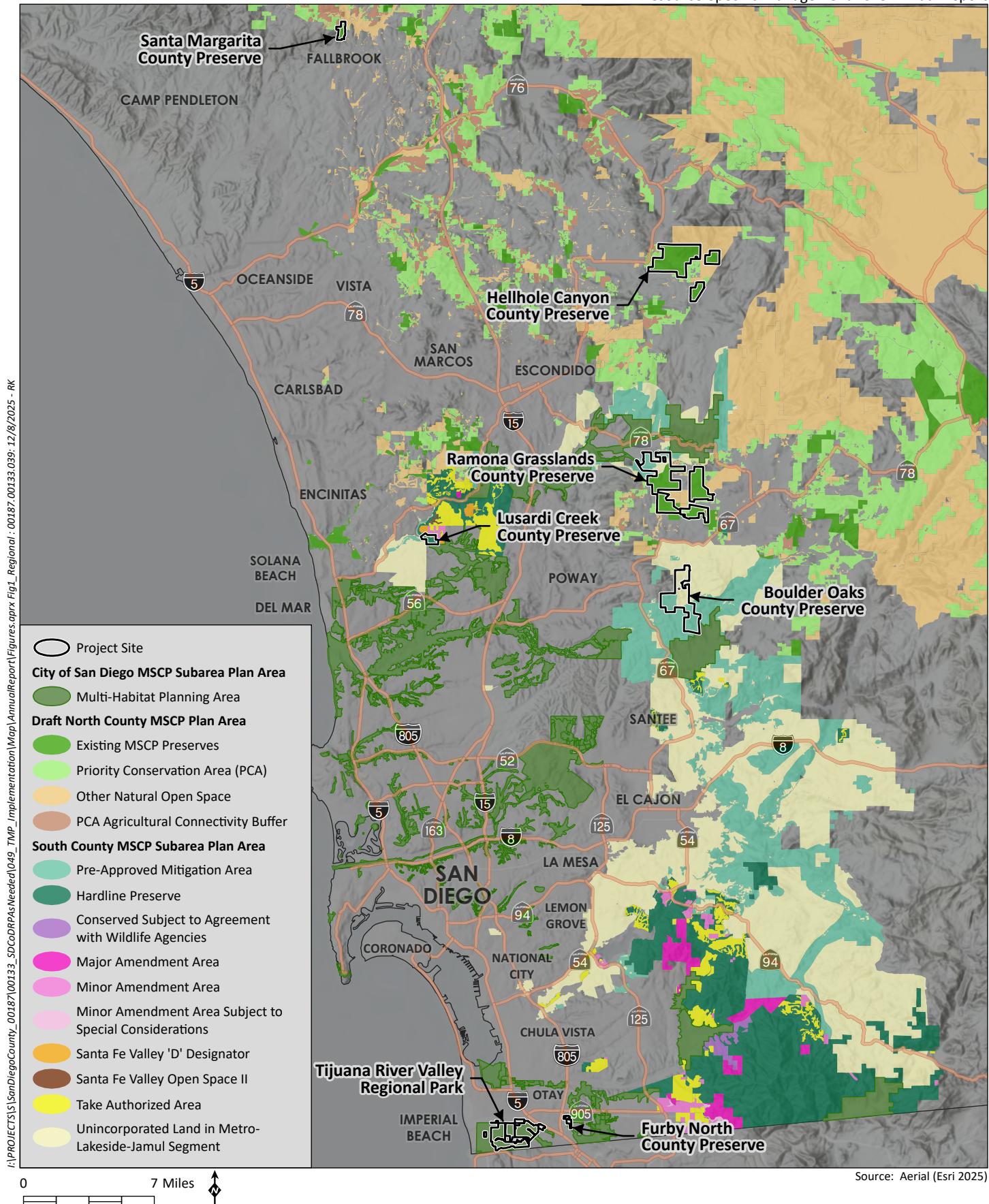
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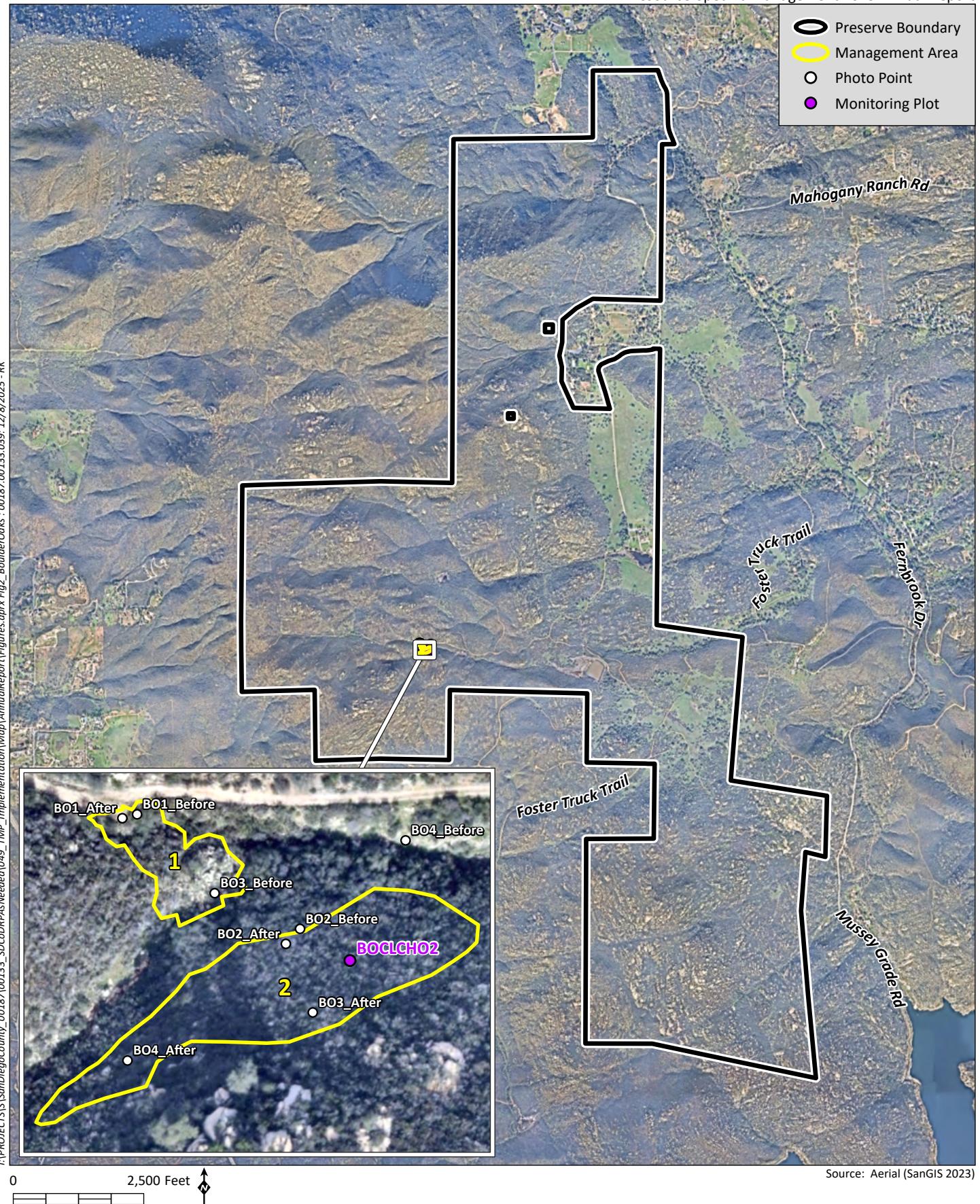
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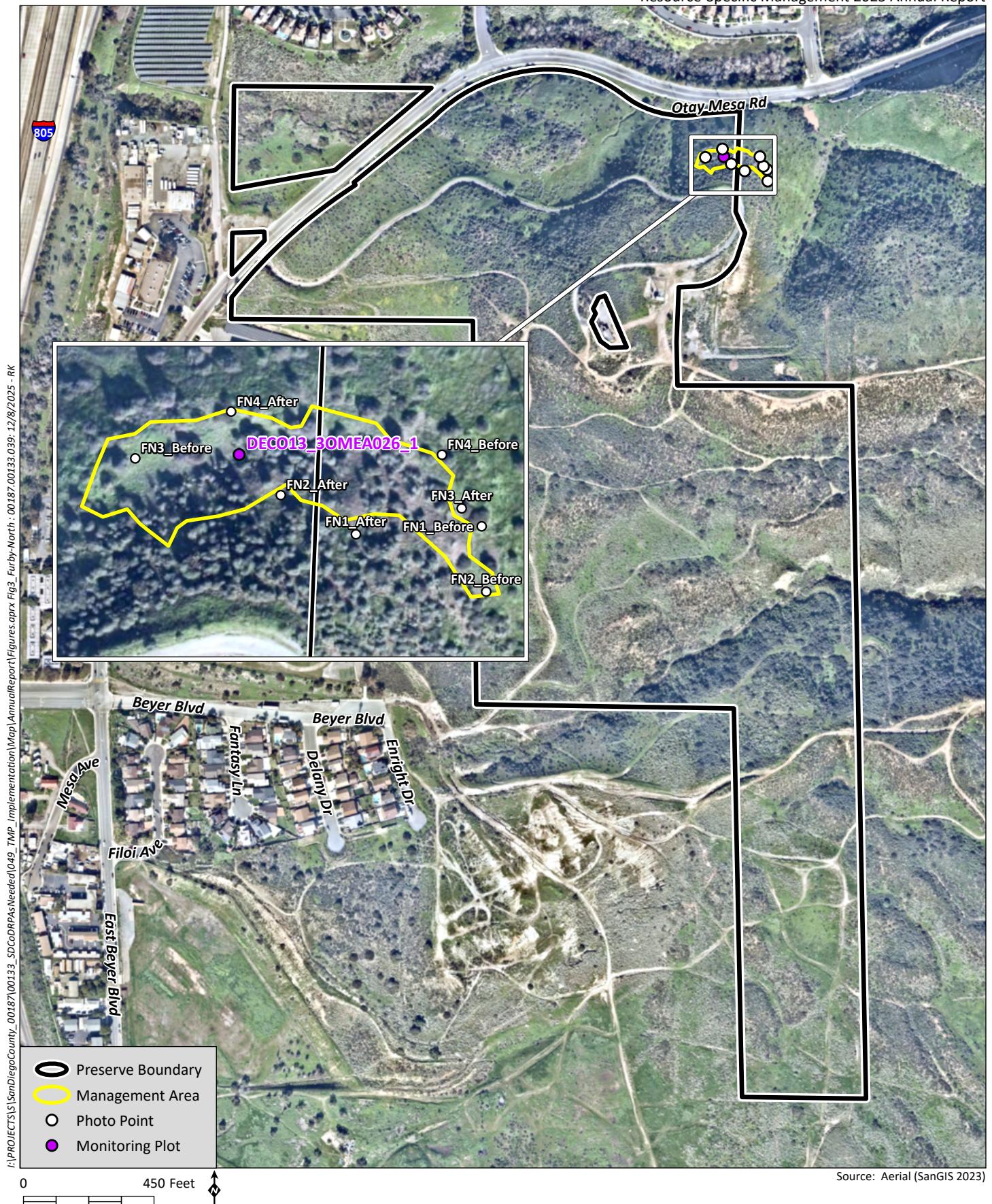
Specific management methods are described below. For the purposes of this report, non-native plant species are species that were introduced to California after European contact as a direct or indirect result of human activity, as defined by the California Invasive Plant Council (Cal-IPC). Invasive non-native plant species are species rated by Cal-IPC in the Invasive Plant Inventory Database (Cal-IPC 2025) because they are not native, and once introduced, can establish, quickly reproduce and spread, and cause harm to native vegetation communities, the environment, economy, and/or human health. Once invasive non-native plant species spread into wildland ecosystems, they can displace native plant and wildlife species, alter biological communities, alter ecosystem processes, and some species can hybridize with native plants (Cal-IPC 2025).

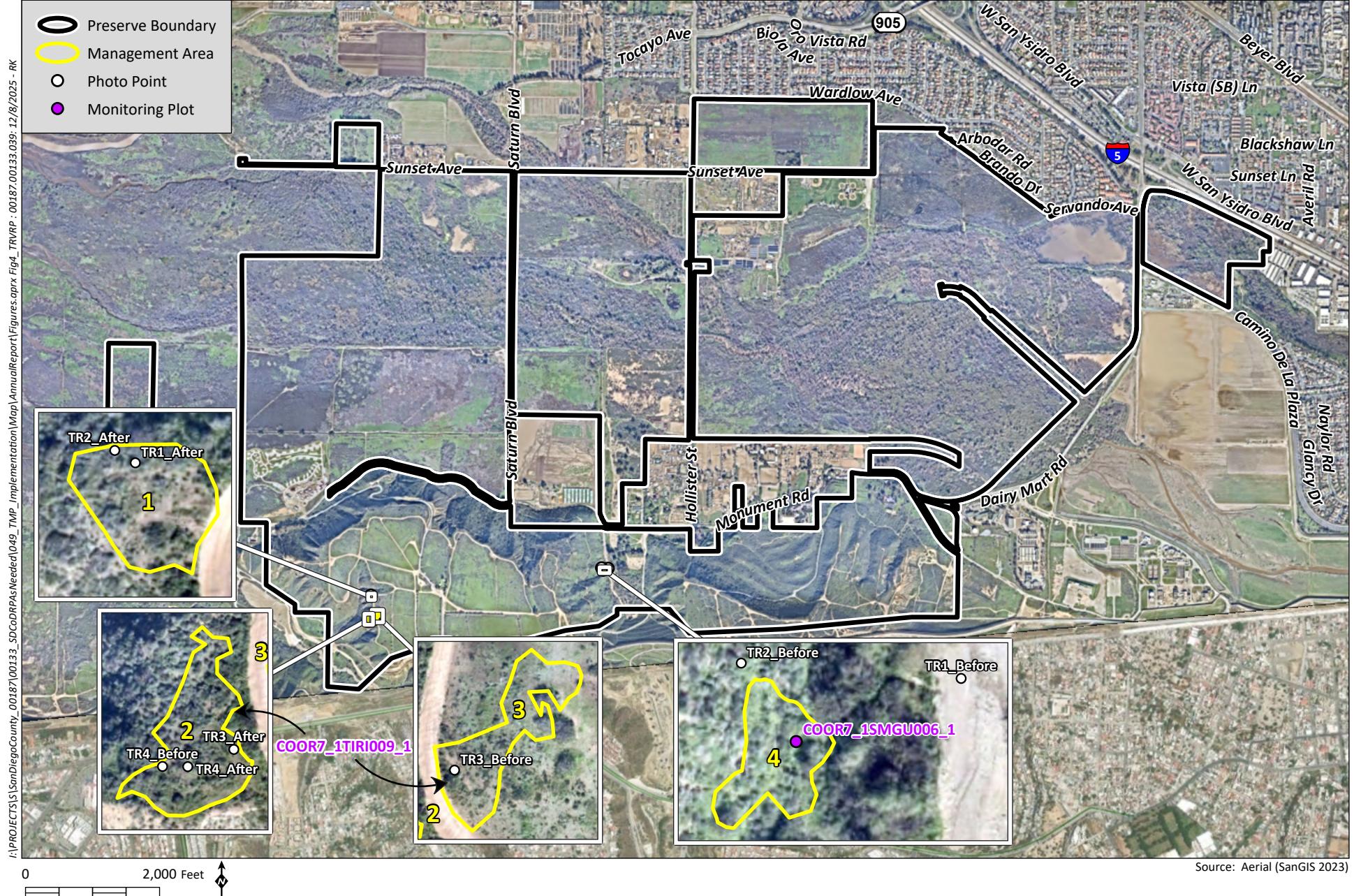
3.2 RARE PLANT FOCUSED MANAGEMENT

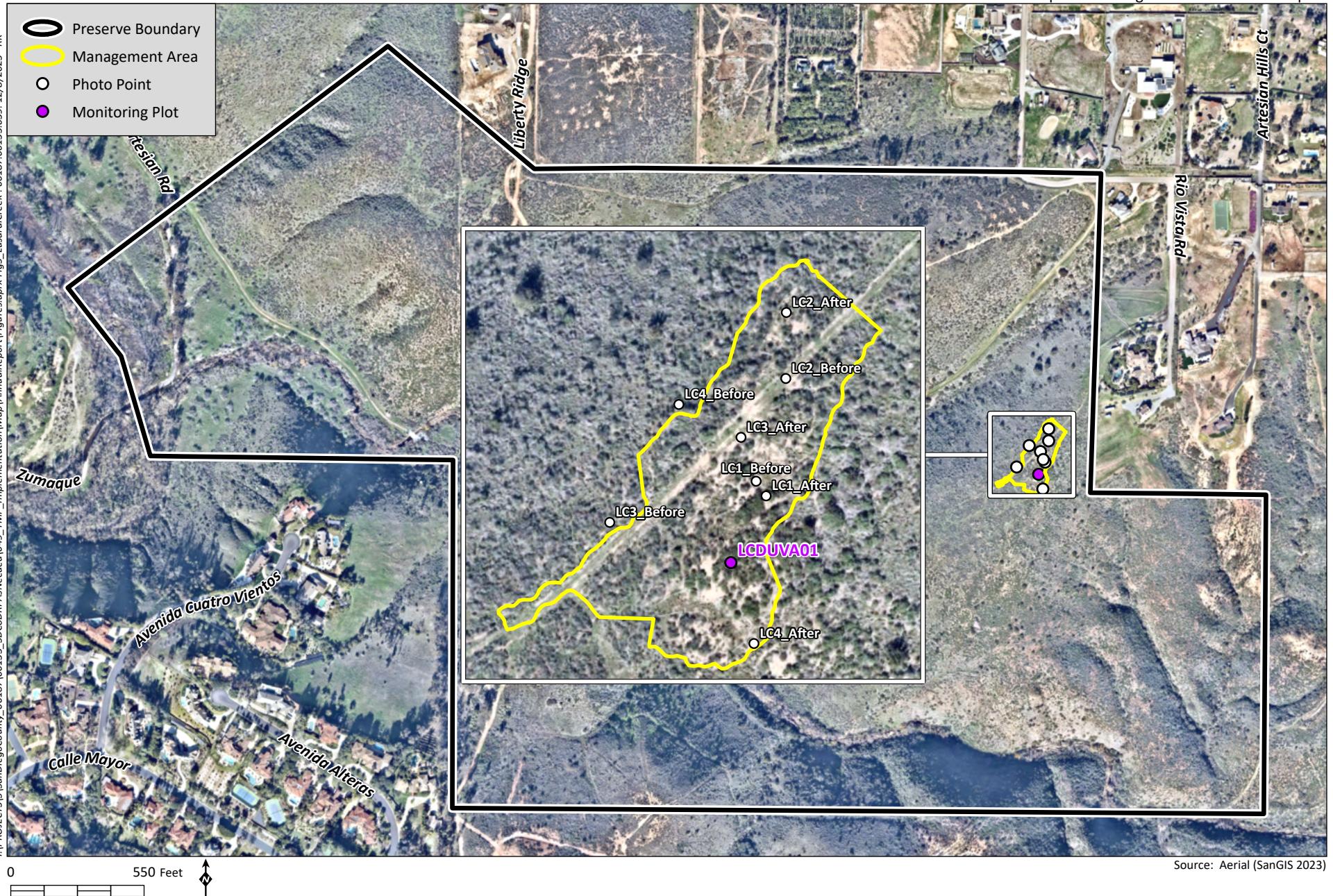
HELIX crews conducted resource-specific management in 2025 for four TMP rare plant species. Rare plant focused management followed TMP management recommendations (ESA 2025). Management details, including species, dates, preserve, and approximate acreage managed, are listed in Table 2, *Rare Plant Management Summary*. Additional details are included in the following sections.

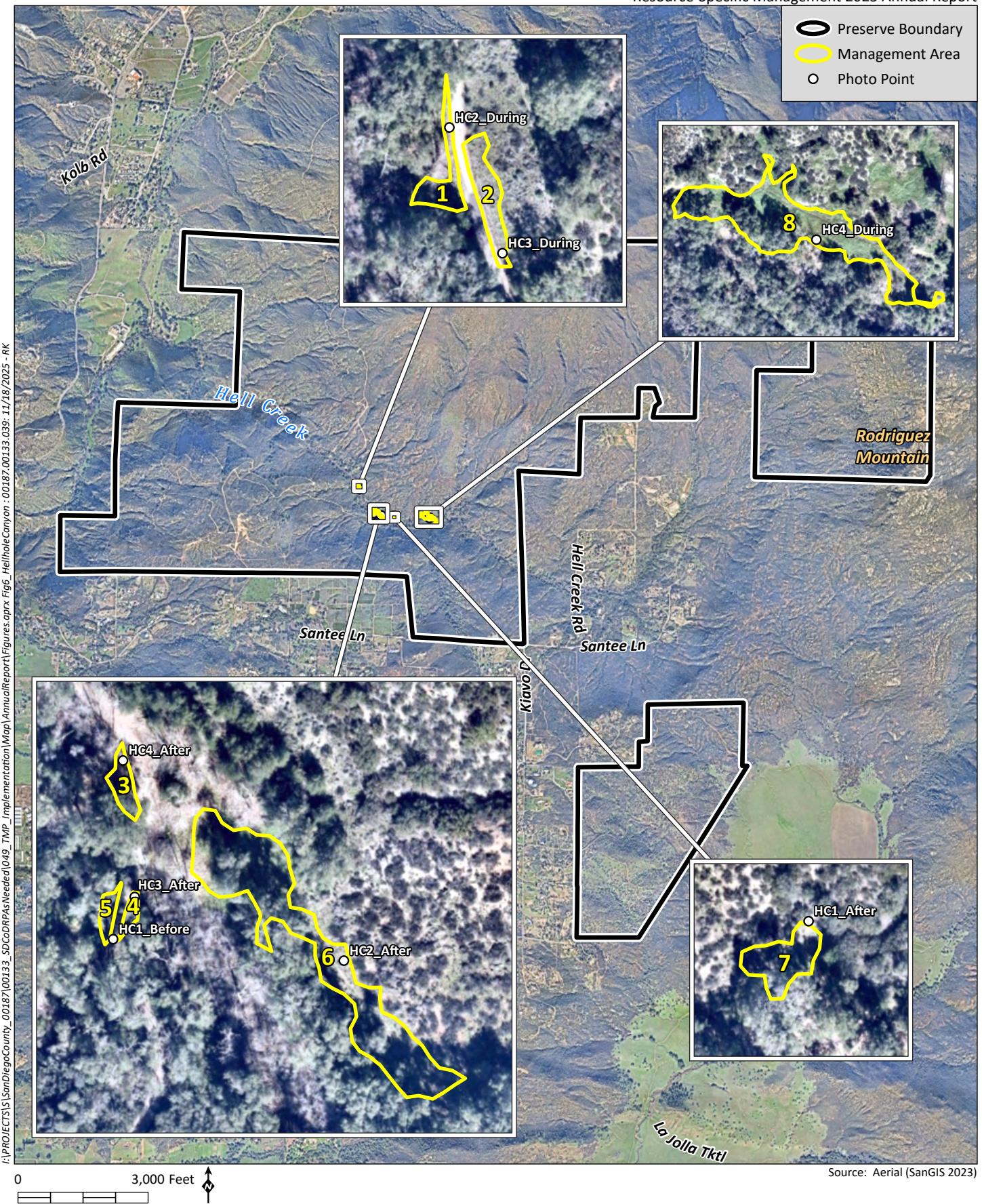


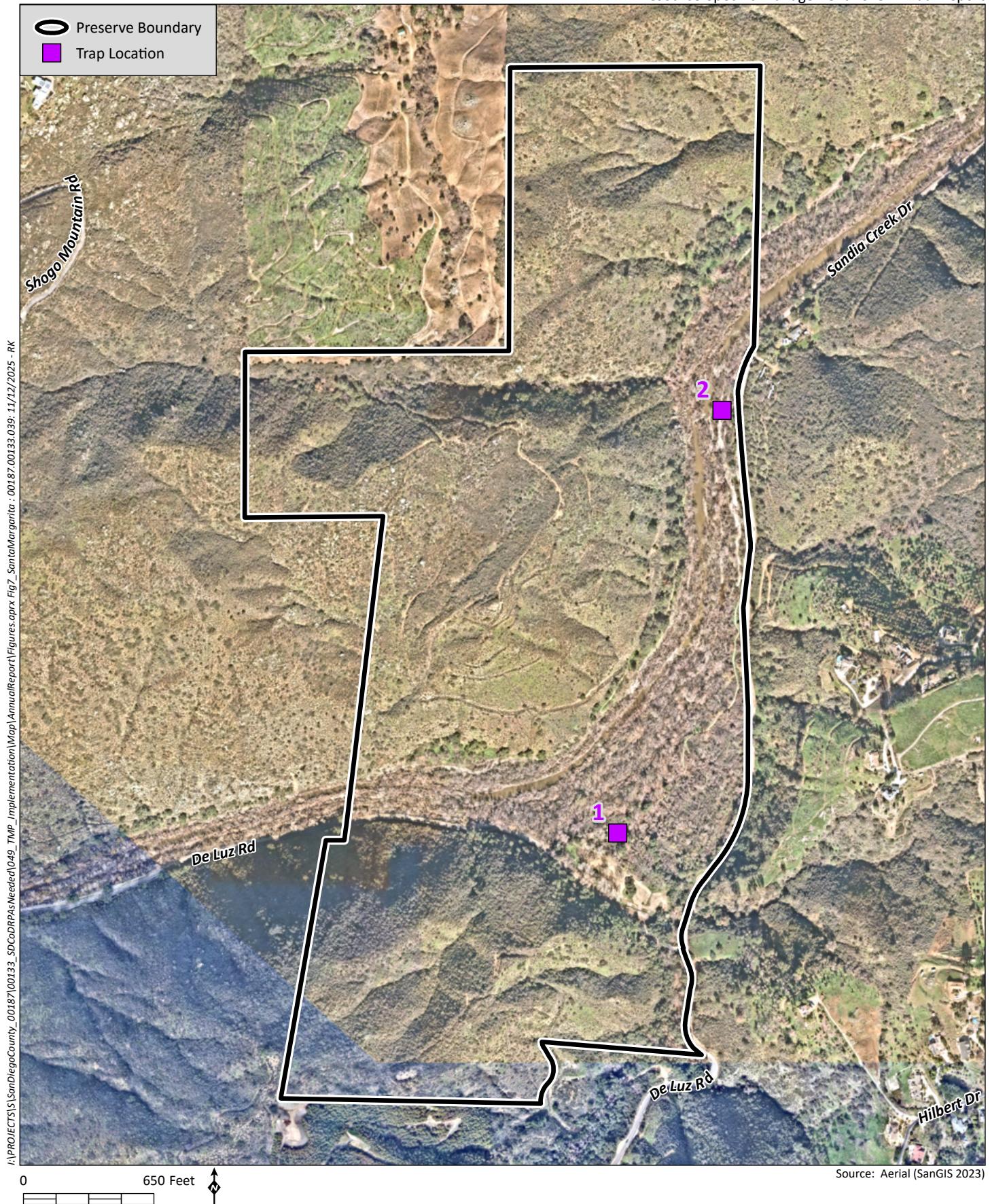












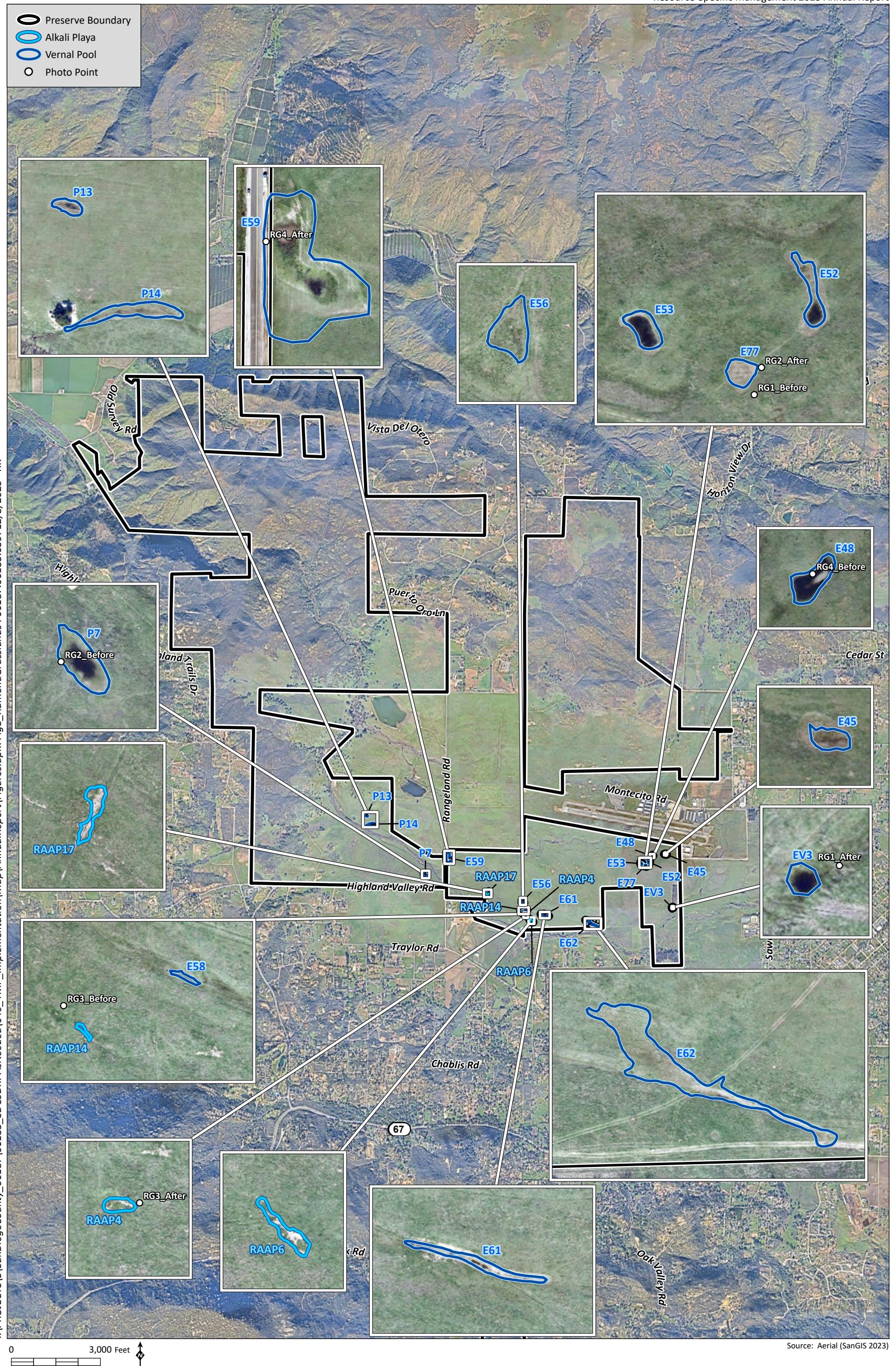


Table 2
RARE PLANT MANAGEMENT SUMMARY

Species	County Park/Preserve	Management Dates	Acres Managed
San Miguel Savory	Boulder Oaks	June 25	0.55
Otay Tarplant	Furby-North	June 25 and August 19	0.30
Orcutt's Bird's-Beak	Tijuana River Valley Regional	June 30 and August 20	0.35
Variegated Dudleya	Lusardi Creek	July 1 and August 18	0.75

3.2.1 San Miguel Savory Focused Management

The control of invasive non-native plant species is a primary concern for San Miguel savory (*Clinopodium chandleri*) management. The TMP recommends that overall invasive non-native plant cover be kept to less than 20 percent (ESA and ICF 2022). Focused management was conducted in response to 2024 TMP monitoring results and adaptive management recommendations for Boulder Oaks County Preserve (ESA 2025), and is detailed in Table 3, *Boulder Oaks County Preserve San Miguel Monitoring Schedule*.

HELIX biologist Holly McMullen flagged San Miguel savory individuals on June 20, 2025, in preparation for focused management. HELIX crews conducted focused management for San Miguel savory at the Boulder Oaks County Preserve within the BOCLCH02 monitoring plot maximum extent and an additional area northwest of the monitoring plot's maximum extent (Figure 2). A total of 0.55 acre was managed on June 25, 2025, to prevent the encroachment of invasive non-native perennial veldtgrass (*Ehrharta calycina*) and other non-native grasses on the San Miguel savory population. HELIX biologist Nate Kolberg met the HELIX crew on-site on June 25, 2025, to orient the field crew, identify and discuss San Miguel savory avoidance strategies, and provide management recommendations. Non-native plants within 18 inches of San Miguel savory plants and the additional management area were carefully removed by hand. All non-native biomass was manually collected, bagged, and properly disposed of at an approved off-site facility. HELIX biologist Alexander Walsh conducted a post-maintenance visit on July 2, 2025.

Table 3
BOULDER OAKS COUNTY PRESERVE
SAN MIGUEL SAVORY MONITORING SCHEDULE

Date	Task	HELIX Biologist
June 20, 2025	Pre-maintenance site visit	Holly McMullen
June 25, 2025	Maintenance monitoring	Nate Kolberg
July 2, 2025	Post-maintenance site visit	Alexander Walsh

3.2.2 Otay Tarplant Focused Management

The control of invasive non-native plant species is a primary concern for managing the Otay tarplant (*Deinandra conjugens*). The TMP recommends that overall invasive non-native plant cover be kept to less than 20 percent and thatch be removed (ESA and ICF 2022). Focused management was conducted in response to 2024 TMP monitoring results and adaptive management recommendations for Furby-North County Preserve (ESA 2025), and is detailed in Table 4, *Furby-North County Preserve Otay Tarplant Schedule*.

Ms. McMullen flagged Otay tarplant individuals on June 19, 2025, and August 12, 2025, in preparation for two focused management events. HELIX crews conducted focused management for Otay tarplant at the Furby-North County Preserve within the DECO13_3OMEA026_1 monitoring plot maximum extent. A total of 0.30 acre was managed on June 25, 2025, and August 19, 2025 (Figure 3). HELIX biologist Kyra Amini met with HELIX crews on-site on June 25, 2025, and Shelly Vogel on August 19, 2025, to orient the field crew, identify and discuss Otay tarplant avoidance strategies, and provide management recommendations. Management consisted of carefully hand-pulling invasive non-native grasses and herbs within approximately 18 inches of the Otay tarplant, including soft brome (*Bromus hordeaceus*), pepperweed (*Lepidium latifolium*), and tocalote (*Centaurea melitensis*). The non-native biomass was manually collected, bagged, and properly disposed of at an approved off-site facility. Ms. Amini conducted the post-maintenance visit for the first maintenance event on July 2, 2025, and HELIX biologist Olivia Brackin conducted the post-maintenance visit for the second maintenance event on September 2, 2025.

Table 4
FURBY-NORTH COUNTY PRESERVE
OTAY TARPLANT MONITORING SCHEDULE

Date	Task	HELIX Biologist
June 19, 2025	Pre-maintenance site visit	Holly McMullen
June 25, 2025	Maintenance monitoring	Kyra Amini
July 2, 2025	Post-maintenance site visit	Kyra Amini
August 12, 2025	Pre-maintenance site visit	Holly McMullen
August 19, 2025	Maintenance monitoring	Shelly Vogel
September 2, 2025	Post-maintenance site visit	Olivia Brackin

3.2.3 Orcutt's Bird's-Beak Focused Management

The control of invasive non-native plant species is a primary concern for Orcutt's bird's-beak (*Dicranostegia orcuttiana*) management. The TMP recommends invasive non-native grasses and forbs control within suitable Orcutt's bird's-beak habitat (ESA and ICF 2022), and the San Diego Management and Monitoring Program (SDMMP) recommends controlling invasive non-native plant species to less than 20 percent cover (AECOM et al. 2021). Focused management was conducted in response to 2024 TMP monitoring results and adaptive management recommendations for Tijuana River Valley Regional Park (ESA 2025) and is detailed in Table 5, *Tijuana River Valley Regional Park Orcutt's Bird's-Beak Monitoring Schedule*.

Ms. McMullen flagged Orcutt's bird's-beak individuals on June 23, 2025, at monitoring plot COOR7_1TIRI009_1 in preparation for management activities (Figure 4). On June 30, 2025, Ms. Vogel met the HELIX crew on-site at monitoring plot COOR7_1TIRI009_1 to orient the field crew, identify and discuss Orcutt's bird's-beak avoidance strategies, and provide management recommendations. Management was not conducted at monitoring plot COOR7_1SMGU006_1 on June 30, 2024, due to access issues. Management consisted of carefully hand-pulling invasive non-native grasses and herbs, including tocalote and non-native brome grasses (*Bromus* spp.), adjacent to Orcutt's bird's-beak individuals. On August 13, 2025, Ms. McMullen conducted a combined post-maintenance and pre-maintenance visit at plots COOR7_1TIRI009_1 and COOR7_1SMGU006_1. On August 20, 2025, Ms. Vogel met with the HELIX crew on-site to provide guidance and management recommendations. Management occurred at both monitoring plots but was focused on plot COOR7_1TIRI006_1 since it was not previously maintained. Management consisted of carefully hand-pulling invasive non-native grasses

and herbs, including Russian thistle (*Salsola tragus*) and Australian saltbush (*Atriplex semibaccata*), next to Orcutt's bird's-beak individuals. The biomass was manually collected, bagged, and properly disposed of at an approved off-site facility. Ms. Brackin conducted a post-maintenance visit on September 5, 2025.

Table 5
TIJUANA RIVER VALLEY REGIONAL PARK
ORCUTT'S BIRD'S-BEAK MONITORING SCHEDULE

Date	Task	HELIX Biologist
June 23, 2025	Pre-maintenance site visit	Holly McMullen
June 30, 2025	Maintenance monitoring	Shelly Vogel
August 13, 2025	Post- and pre-maintenance site visit	Holly McMullen
August 20, 2025	Maintenance monitoring	Shelly Vogel
September 5, 2025	Post-maintenance site visit	Olivia Brackin

3.2.4 Variegated Dudleya Focused Management

The control of invasive non-native plant species is a primary concern for variegated dudleya (*Dudleya variegata*) management. The TMP recommends maintaining less than 20 percent ground cover of invasive non-native plant species in the vicinity of variegated dudleya populations (ESA and ICF 2022). Focused management was conducted in response to 2024 TMP monitoring results and adaptive management recommendations for Lusardi Creek County Preserve (ESA 2025) and is detailed in Table 6, *Lusardi Creek County Preserve Variegated Dudleya Monitoring Schedule*.

Ms. McMullen flagged variegated dudleya individuals on June 24, 2025, and August 6, 2025, at three herbivory enclosures in preparation for management activities. HELIX conducted non-native species management near variegated dudleya at Lusardi Creek County Preserve on July 1, 2025, and August 18, 2025, within and around the three herbivory enclosures for a total of a 0.75-acre management area (Figure 5). Ms. Vogel met with HELIX maintenance staff to orient the field crew, identify and discuss variegated dudleya avoidance strategies, and provide management recommendations. Management consisted of hand-pulling invasive non-native plant species within the three herbivory enclosures to reduce the amount of standing biomass from invasive non-native plants and encourage native plant recruitment. No herbicide was applied during maintenance. All biomass was manually collected, bagged, and properly disposed of at an approved off-site facility. On September 4, 2025, HELIX biologist Jonathan Mercado conducted a post-maintenance visit to document the effectiveness of the maintenance visits.

Table 6
LUSARDI CREEK COUNTY PRESERVE
VARIEGATED DUDLEYA MONITORING SCHEDULE

Date	Task	HELIX Biologist
June 24, 2025	Pre-maintenance site visit	Holly McMullen
July 1, 2025	Maintenance monitoring	Shelly Vogel
August 6, 2025	Post and pre-maintenance site visit	Holly McMullen
August 18, 2025	Maintenance monitoring	Shelly Vogel
September 4, 2025	Post-maintenance site visit	Jonathan Mercado

3.3 HARBISON'S DUN SKIPPER FOCUSED MANAGEMENT

Focused management for Harbison's dun skipper was conducted in response to 2024 TMP adaptive management recommendations for Hellhole Canyon County Preserve (ESA 2025) and is detailed in Table 7, *Hellhole Canyon County Preserve Harbison's Dun Skipper Monitoring Schedule*. On August 4, 2025, Ms. McMullen visited the Harbison's dun skipper management sites, which were previously seeded in November 2024, to check for germination of native nectar plant species, and mapped areas that would benefit from additional seeding. It was determined that the 2024 seeded management areas contained few nectar sources, and additional seeding would be required to increase nectar sources for Harbison's dun skipper.

HELIX crews conducted maintenance at Hellhole Canyon County Preserve on October 23, 2025. HELIX biologist Olivia Brackin oriented the crew by walking the 2024 management areas (Figure 6, Management Area 1-6) and new 2025 management areas (Figure 6, Management Area 7 and 8), delineated seeding areas based on proximity to San Diego sedge (*Carex spissa*) and presence of grassy open habitat where seed could establish, discussed native habitat avoidance strategies, and identified appropriate native mulch material. Once areas were delineated, HELIX crews removed non-native grasses and forbs using hand tools and line-trimmers in all management areas. Native plants were carefully avoided and left in place. Seeding occurred with local native nectar sources along Hell Creek within the newly mapped management areas, and reseeding occurred in select 2024 management areas. The seed was lightly raked into the top 0.25 inch of soil. Once the seed was applied, the seeded areas were covered with light, natural organic mulch (less than 80 percent cover) sourced from the surrounding habitat.

Table 7
HELLHOLE CANYON COUNTY PRESERVE
HARBISON'S DUN SKIPPER MONITORING SCHEDULE

Date	Task	HELIX Biologist
August 4, 2025	Pre-maintenance site visit	Holly McMullen
October 23, 2025	Maintenance monitoring	Olivia Brackin

3.4 LEAST BELL'S VIREO FOCUSED MANAGEMENT

3.4.1 Brown-Headed Cowbird Trapping

A brown-headed cowbird trapping program was implemented on Santa Margarita County Preserve in 2022 to reduce the threat and impact of brown-headed cowbird brood parasitism on least Bell's vireo (*Vireo bellii pusillus*). The trapping program was initiated in response to detections of least Bell's vireo nest parasitism incidentally observed during 2021 TMP surveys (ESA 2022) and was recommended to continue based on 2022 and 2023 brown-headed cowbird trapping results (ESA 2023; ESA 2024b). TW Biological Services, LLC, conducted brown-headed cowbird trapping in 2025. The methods and results of this trapping effort are documented in Appendix B, *Santa Margarita County Preserve Brown-Headed Cowbird Trapping Program 2025*.

TW Biological Services, LLC, personnel installed and assembled two traps on June 8, 2025, in the same general locations as those in 2022, 2023, and 2024: along the Santa Margarita River within riparian habitat that provides suitable nesting habitat for least Bell's vireo within the preserve (Figure 7). Trap 1

was located approximately 0.12 mile northwest of the intersection of De Luz Road and Sandia Creek Drive. This trap was placed adjacent to a trail at the north end of the preserve's staging area. Trap 2 was placed approximately 0.5 mile north of the De Luz Road/Sandia Creek Drive intersection, a short distance west of the road (Appendix B, Figure A-2 *Trap Locations*). Both traps were placed within riparian habitat.

TW Biological Services, LLC, personnel activated traps on June 8, 2025. On activation, the traps were furnished with fresh water, seed, perches, shade, and live decoy cowbirds. The right primary wing feathers of both male and female decoy cowbirds were clipped for identification and prevention of accidental escape or release back into the wild. This practice also greatly diminishes their likelihood of survival in the wild should they escape. A sign was placed on each trap providing trap information and contact phone numbers. Global Positioning System (GPS) coordinates for trap locations were recorded.

Traps were checked daily, during daylight hours, from June 8 to July 15, 2024. This was done to record trap capture events, release non-target wildlife species incidentally captured, add or remove cowbirds to maintain the 2:3 (male:female) decoy ratio, provide fresh seed and water, and repair trap damage, if needed. Information recorded for all newly captured cowbirds included capture location, date, sex, and age. Newly captured cowbirds not used as decoys were removed daily and humanely euthanized off-site. All other non-target birds captured were released unharmed at the trap sites. On July 15, 2025, both traps were deactivated and later dismantled and removed from the preserve on July 18, 2025.

3.5 VERNAL POOLS AND ALKALI PLAYAS FOCUSED MANAGEMENT

Vernal pools and alkali playas at Ramona Grasslands County Preserve are primarily threatened by invasive non-native plants, altered hydrology, and cattle-related effects from grazing. A total of 71 vernal pools, one vernal swale (Cagney swale), and 23 alkali playas (playas) were mapped within the Ramona Grasslands County Preserve boundaries during baseline biological surveys (Conservation Biology Institute 2007). The pools and playas associated with the Ramona Grasslands County Preserve are broken into several groups. The Ramona Airport mitigation pools are in the southeast portion of the preserve, conserved as mitigation for the Ramona Airport Runway Expansion Project. The Oak Country pools are in the southwest portion of the preserve, formerly known as Oak Country. The Cagney pools are in the southeast portion of the preserve, formerly known as the Cagney parcel. The Cumming Ranch pools are located to the east of the preserve within the Cumming Ranch open space. The Hardy pools are in the southeast area of the southeast portion of the preserve, formerly known as Hardy Ranch. The alkali playas are in the southeast portion of the preserve, formerly known as the Cagney parcel.

Of the 71 vernal pools in the preserve, 15 vernal pools and 4 alkali playas within Ramona Airport mitigation, Oak Country, Cagney, Cumming Ranch, and Hardy pools were prioritized for maintenance: p13, p14, p7, e59, e56, e58, e61, e62, e63, e53, e77, e52, e48, e45, and ev3, and alkali playas raap4, raap6, raap14, and raap17 (Figure 8). To ensure the persistence of vernal pool and alkali playa habitat at Ramona Grasslands County Preserve, invasive non-native plant control was conducted by HELIX maintenance staff with the guidance of a HELIX biologist.

On July 2, 2025, Ms. McMullen conducted a pre-maintenance visit to provide management recommendations to the HELIX crew, as detailed in Table 8, *Ramona Grasslands County Preserve Vernal Pools and Alkali Playas Monitoring Schedule*. On July 9, 2025, Ms. McMullen met up with maintenance staff at the site to orient the field crew, identify native species for avoidance, invasive non-native plant species for removal, and provide overall management recommendations. On July 9, 10, 11, and 14,

2025, maintenance was conducted on the prioritized vernal pools. Management consisted of hand-pulling and weed-whipping non-native forbs and grasses within the pool boundaries, and weed-whipped a three- to ten-foot buffer around the pools. HELIX staff manually removed slender wild oat (*Avena barbata*), ripgut brome (*Bromus diandrus*), cheatgrass (*Bromus tectorum*), common stork's-bill (*Erodium cicutarium*), curly dock (*Rumex crispus*), short-pod mustard (*Hirschfeldia incana*), and Australian saltbush. On July 15, 2025, Ms. McMullen conducted a post-maintenance visit to document the effectiveness of the maintenance visits. On August 5, 2025, Ms. McMullen conducted a pre-maintenance visit and determined that a second maintenance visit was not needed due to the high percentage of bare ground and the lack of invasive non-native plant species.

Table 8
RAMONA GRASSLAND COUNTY PRESERVE
VERNAL POOLS AND ALKALI PLAYAS MONITORING SCHEDULE

Date	Task	HELIX Biologist
July 2, 2025	Pre-maintenance site visit	Holly McMullen
July 9, 2025	Maintenance monitoring	Holly McMullen
July 15, 2025	Post-Maintenance	Holly McMullen
August 5, 2025	Pre-maintenance site visit	Holly McMullen

4.0 RESULTS AND DISCUSSION

4.1 RARE PLANT FOCUSED MANAGEMENT

Rare plant focused management was conducted at eight permanent monitoring plots at four preserves in 2025. Rare plant management consisted of two San Miguel savory monitoring plots at Boulder Oaks County Preserve, one Otay tarplant monitoring plot at Furby-North County Preserve, four Orcutt's bird's-beak monitoring plots at Tijuana River Valley Regional Park, and one variegated dudleya monitoring plot at Lusardi Creek County Preserve. Maintenance results and management recommendations are provided below. Representative photographs of the maintained areas, before and after maintenance, are provided in Appendix A, *Representative Photographs*. The results of 2025 focused management actions, TMP management goals and objectives, and the adaptive management actions outlined in the TMP were used to develop the following recommendations for each rare plant species, which are included below.

4.1.1 San Miguel Savory - Boulder Oaks County Preserve Focused Management

Focused management occurred in 2025 in response to the presence of invasive non-native plant species detected during the 2024 monitoring efforts. Section 3.2.1 describes the management activities in detail. The TMP recommends that the overall invasive non-native plant cover be kept to less than 20 percent (ESA and ICF 2022). HELIX conducted one round of maintenance and monitoring in 2025, a pre-maintenance survey was conducted by HELIX biologist Holly McMullen on June 20, 2025, and maintenance took place on June 25, 2025, which was monitored by HELIX biologist Nate Kolberg. HELIX biologist Alexander Walsh conducted the post-maintenance visit on July 2, 2025, and found the target plant species looked healthy where surrounding non-native grasses had been managed. On-site observations demonstrated that high-priority invasive non-native grasses were detected within monitoring plot BOCLCH02. All cut biomass was manually collected, bagged, and properly disposed of at

an approved off-site facility. No herbicide was used. Representative photographs of focused management are provided in Appendix A.

Adaptive Management Recommendation

- **Continue to conduct focused invasive non-native grass removal within and around BOCLCH02.** To limit the expansion of invasive grass species and ensure the persistence of San Miguel savory at Boulder Oaks County Preserve, it is recommended that invasive non-native grass control be continued within monitoring plot BOCLCH02 by qualified restoration specialists. In addition, treatment should continue to include areas around monitoring plot BOCLCH02, and west and east of the dirt access road, to prevent encroachment of perennial veldtgrass (*Ehrharta calycina*), which is known to occur within the preserve. Herbicide applications should be conducted along the dirt access road when invasive non-native grasses have reached two to three inches in height and are readily identifiable during the peak of the growing season. Where the use of herbicide is appropriate (no risk of impact to San Miguel savory), glyphosate and imazapyr are the most effective herbicides to use on perennial veldtgrass. The most effective non-chemical control of perennial veldtgrass is tarping. Tarping involves using heavy plastic, polypropylene, or other light-blocking material to cover the ground to prevent weed growth. Because tarps must be left in place for several months to be effective, this method is most practical for small areas and to stop an isolated infestation or to contain a part of a localized weed patch to prevent expansion while the rest is treated (University of California Agriculture and Natural Resources [UCANR] 2025). Surveys for San Miguel savory should be conducted between March and July, when this species is readily identifiable, before installing tarps to avoid impacting this sensitive species. Where tarping is inappropriate, hand weeding, which should include removing all parts of the plant, should occur within the monitoring plot.

4.1.2 Otay Tarplant - Furby-North County Preserve Focused Management

Focused management occurred in 2025 in response to the high thatch and invasive non-native plant cover observed in 2024. As previously described in Section 3.2.2, management consisted of hand-pulling invasive non-native grasses and herbs adjacent to Otay tarplant individuals, followed by line trimming invasive non-native grasses and thatch removal, outside of hand-weeded areas. No herbicide was used. Representative photographs of focused management are provided in Appendix A. The TMP recommends that overall invasive non-native plant cover be less than 20 percent, and thatch be removed (ESA and ICF 2022). Although HELIX did not conduct monitoring at plots DECO13_3OMEA026_1 and DECO13_3OMEA40_1 in 2025, observations made by biologists during maintenance events indicate that invasive non-native plant cover is greater than 20 percent. Post-maintenance observations indicated that cover by non-native grasses had decreased overall, but future management will still be required. Although total cover was reduced during the weeding event in 2025, the established weed seed bank on-site will likely result in cover that continues to be higher than 20 percent.

Adaptive Management Recommendation

- **Continue focused invasive non-native plant species and thatch removal.** To help ensure the persistence of Otay tarplant at Furby-North County Preserve, it is recommended that thatch removal and invasive non-native plant control be continued by qualified restoration specialists. Thatch removal should be implemented with line trimmers and rakes; debris should be hauled out and disposed of off-site at a county landfill. The focus of invasive non-native plant species

removal should be non-native grasses, including ripgut brome, and forbs, including pepperweed and tocalote. To effectively remove ripgut brome without the use of chemicals, whole plant removal and tarping are most effective. In situations where chemical control can be used (no risk of impact to Otay tarplant) several herbicides are effective against ripgut brome, including dithiopyr, fluazifop, glufosinate, glyphosate, imazapyr, indaziflam, and rimsulfuron. The most effective way to remove pepperweed without chemicals is tarping. Surveys for Otay tarplant should be conducted between May and June, when this species is readily identifiable, before installing tarps to avoid impacting this sensitive species. When herbicides are appropriate (no risk of impact to Otay tarplant), pepperweed responds best to chlorsulfuron, glyphosate, and imazapyr. The most effective non-chemical means of removal for tocalote are whole plant removal and mulching. Mulch is a protective covering that is spread on the ground to reduce evaporation, maintain even soil temperature, prevent erosion, control weeds, and enrich the soil. Mulches are generally derived from fresh or composted plant materials such as wood chips, bark, straw, paper, nut shells, rice hulls, or other readily available materials. Inorganic mulches include gravel and polypropylene cloth. However, application of mulch is counter to thatch removal, which benefits Otay tarplant, so this method is best applied to stands of tocalote in areas outside the known extent of the Otay tarplant population. When chemical treatment is acceptable (no risk of impact to Otay tarplant), tocalote responds best to several herbicides, including 2, 4-D, aminopyralid, chlorsulfuron, clopyralid, glyphosate, imazapyr, and triclopyr (UCANR 2025).

4.1.3 Orcutt's Bird's-Beak - Tijuana River Valley Regional Park Focused Management

Focused management occurred in 2025 in response to high thatch cover detected in 2024. As previously described in Section 3.2.3, management in 2025 consisted of carefully hand-pulling invasive non-native grasses and herbs adjacent to Orcutt's bird's-beak individuals. All biomass was manually collected, bagged, and properly disposed of at an approved off-site facility. No herbicide was used. Representative photographs of focused management are provided in Appendix A. The September 5, 2025, post-maintenance visit determined that the maintenance was effective in decreasing overall non-native plant cover in areas adjacent to Orcutt's bird's-beak. The TMP recommends control of invasive non-native grasses and forbs within suitable habitat (ESA and ICF 2022), and SDMMP recommends controlling invasive non-native plant species to less than 20 percent cover. In 2025, HELIX did not evaluate non-native plant cover at monitoring plots COOR7_1TIRI009_1 and COOR7_1SMGU006_1. However, based on observations made by the biologist on-site during maintenance and the likelihood of invasive non-native plants in the seedbank on-site, continued maintenance is recommended.

Adaptive Management Recommendations

- Conduct focused invasive non-native plant species removal to ensure the persistence of Orcutt's bird's-beak at the Tijuana River Valley Regional Park. Invasive plants within the monitoring plots included brome grass, Russian thistle (*Salsola australis*), and Australian saltbush. Control of brome grasses is best achieved by whole plant removal. Effective chemical control can be achieved with dithiopyr, glyphosate, indaziflam, and rimsulfuron. Control of Russian thistle is best achieved by grubbing and whole plant removal. Russian thistle responds well to most herbicides, including aminocyclopyrachlor, chlorsulfuron, flumioxazin, glufosinate, glyphosate, imazamox, imazapyr, indaziflam, isoxaben, and triclopyr. Australian saltbush responds best to tarping and whole plant removal. Effective chemical controls include aminocyclopyrachlor,

fluroxypyr, glyphosate, imazamox, and triclopyr. Surveys for Orcutt's bird's-beak should be conducted between April and July, when this species is readily identifiable, before installing tarps to avoid impacting this sensitive species. Chemical herbicides should not be used to control any of these invasive species if there is potential for negative impacts to Orcutt's bird's-beak.

- Additional Orcutt's bird's-beak plants were detected during a 2021 discovery survey performed by AECOM and CBI. If new monitoring plots have been established, evaluate the need for a maintenance program for these areas. Initiate maintenance, if needed.

4.1.4 Variegated Dudleya - Lusardi Creek County Preserve Focused Management

Focused management occurred in 2025 in response to the high thatch and invasive non-native plant cover observed in 2024. Management consisted of carefully hand-removing invasive non-native plants within the herbivory fencing and surrounding the monitoring plot. Due to the maintenance efforts occurring late in the season and waiting to avoid the spread of dried non-native grass seed heads, maintenance was prioritized to be within the herbivory fencing, and any maintenance conducted around the herbivory fencing was focused within 18 inches of any dudleya. The fencing itself was largely intact but required reattaching the fencing material to the posts to stand upright again. Fencing was repaired on August 18, 2025. All fences were in good condition following the second maintenance event.

Invasive non-native plant cover consisted primarily of purple false brome (*Brachypodium distachyon*), tufted wallaby grass (*Rytidosperma caespitosum*), artichoke thistle (*Cynara cardunculus*), and other non-native brome grasses. As described in Section 3.2.4, all cut biomass was manually collected, bagged, and properly disposed of at an approved off-site facility. No herbicide was used. Representative photographs of focused management are provided in Appendix A. The TMP recommends invasive non-native plant cover be kept to less than 20 percent (ESA and ICF 2022). Total invasive non-native plant cover within the monitoring plot was not measured by HELIX in 2025; however, based on observations during 2025 maintenance activities, continued invasive non-native plant removal will be required.

Adaptive Management Recommendations

- **Conduct focused invasive non-native plant species removal.** To ensure the persistence of variegated dudleya at Lusardi Creek County Preserve, it is recommended that invasive non-native plant control and thatch removal be continued by a qualified restoration specialist. Invasive non-native plant species within the previously installed herbivory fencing and any invasive non-native plants within 18 inches of variegated dudleya plants should be carefully pulled by hand. Invasive non-native plants within the management area, but outside of the herbivory fencing, can be trimmed with a mechanical weed trimmer down to one to two inches from the ground. All biomass should be manually collected, bagged, and properly disposed of at an approved off-site facility. Conditions of the previously installed herbivory fencing and fence posts should be checked and repaired as necessary during management. Purple false brome, tufted wallaby grass, artichoke thistle, and non-native brome grasses should be targeted for removal and treatment to prevent future spread and encroachment into the variegated dudleya population. Control of brome grasses is best achieved by whole plant removal. Effective chemical control can be achieved with dithiopyr, glyphosate, indaziflam, and rimsulfuron. Purple false brome removal is most effective with whole plant removal or grubbing with a hoe.

Effective herbicides to combat purple false brome include fluazifop, glyphosate, and indaziflam. Tufted wallaby grass removal is most successfully achieved by tarping and whole plant removal. The most effective herbicides for use on tufted wallaby grass are glyphosate and imazapyr. Artichoke thistle can be most effectively removed by tarping. The most effective chemical control agents against artichoke thistle are aminopyralid, clopyralid, glufosinate, glyphosate, imazapyr, and triclopyr. Control of Russian thistle is best achieved by grubbing and whole plant removal. Russian thistle responds well to most herbicides, including aminocyclopyrachlor, chlorsulfuron, flumioxazin, glufosinate, glyphosate, imazamox, imazapyr, indaziflam, isoxaben, and triclopyr. Surveys for variegated dudleya should be conducted between April and June, when this species is readily identifiable, before installing tarps to avoid impacting this sensitive species. Chemical herbicides should not be used to control any of these invasive plant species if there is potential for negative impacts to variegated dudleya.

4.2 SENSITIVE ANIMAL FOCUSED MANAGEMENT

Sensitive animal focused management was conducted at two preserves in 2025. Sensitive animal focused management occurred for Harbison's dun skipper at Hellhole Canyon County Preserve and for least Bell's vireo at Santa Margarita County Preserve. Management results and recommendations are provided below. The results of 2025 focused management, TMP management goals and objectives, and the adaptive management actions outlined in the TMP were used to develop the recommendations included below.

4.2.1 Harbison's Dun Skipper - Hellhole Canyon County Preserve Focused Management

Focused management for Harbison's dun skipper occurred in 2025 in response to 2024 adaptive management recommendations. As described in Section 3.3, Ms. McMullen was on-site on August 4, 2025, to check for germination of native nectar plant species in areas seeded in 2023 and 2024 and identify and map any additional management areas. Most of the management areas surveyed contained few nectar sources and lacked a diverse plant community. Management Area 6 had abundant buckwheat (*Eriogonum fasciculatum*) surrounding the management area, but none inside it. Management Area 8 had many buckwheat plants present but no other nectar sources. Management Area 1 had one chaparral mallow (*Malacothamnus fasciculatus*) shrub and a few smaller shrubs present, but no other nectar sources. Management Area 3 had numerous narrowleaf milkweed (*Asclepias fascicularis*) seedlings but no other nectar sources. Due to the limited diversity and abundance of nectar sources, HELIX reseeded all management areas. Since the vegetation observed was largely native, invasive non-native plant species control was not performed.

The nectar source plant species included in Table 9, *Harbison's Dun Skipper Habitat Enhancement Seed Palette*, were installed on October 23, 2025. The crew conducted maintenance activities that included the removal of invasive plants and grasses, primarily brome and oat (*Avena* spp.), using weed whips and rakes.

Table 9
HARBISON'S DUN SKIPPER HABITAT ENHANCEMENT SEED PALETTE

Scientific Name	Common Name	Hellhole Canyon County Preserve				Source	Lbs./acre	Total Lbs. of Seed	NOTES				
		Management Areas											
		1 and 2 (0.07ac)	3,6,7 (0.32ac)	4 and 5 (0.02ac)	8 (0.8ac)								
2025 Seed Palette													
<i>Asclepias fascicularis</i>	narrowleaf milkweed	0.11	0.48*	0.03	1.20	Farm Production ¹	1.50	1.82	Prefers upland/wetland transitional, woodland and grassland. *Seed less in management area 3, already numerous <i>Asclepias fascicularis</i> within the management area.				
<i>Calystegia macrostegia intermedia</i>	island false morning glory	0.04	0.16	-	0.40	San Diego	0.50	0.60	Appropriate for all upland habitat				
<i>Malacothamnus fasciculatus</i>	chaparral bushmallow	0.14	0.64	-	1.6	Oceanside	2.00	2.38	Sage scrub, chaparral, and woodland habitat Typically requires pre-treatment, such as burning				
<i>Carex spissa</i>	San Diego sedge	0.04	0.16	0.01	-	San Diego	0.50	0.21	Host plant				
<i>Eriogonum fasciculatum</i>	California buckwheat	-	-	-	3.2	San Diego	5.00	3.2	Sage scrub, grassland, upland communities				
<i>Eriophyllum confertiflorum</i>	golden yarrow	0.07	0.32	-	0.80	Farm Production ¹	1.00	1.19	Many upland communities				
<i>Heliotropium curassavicum</i>	salt heliotrope	0.14	0.64	0.04	-	San Diego	2.00	0.82	Forest, woodland, chaparral, grassland, and riparian communities				

Scientific Name	Common Name	Hellhole Canyon County Preserve				Source	Lbs./acre	Total Lbs. of Seed	NOTES				
		Management Areas											
		1 and 2 (0.07ac)	3,6,7 (0.32ac)	4 and 5 (0.02ac)	8 (0.8ac)								
		0.07	0.02	0.02	0.80								
<i>Rosa californica</i>	California rose					Pine Valley	1.00	0.91	Forest, woodland, chaparral, grassland, and riparian communities				
<i>Salvia mellifera</i>	black sage	-	-	-	1.60	San Diego	2.00	1.60	Sage scrub, grassland, upland communities				
Total Lbs. per Management Area		0.60	2.42	0.10	9.60								
Overall Total Lbs.								12.72					

¹ Source seeds are produced from crops cultivated specifically for harvesting and commercial sale, rather than being hand-collected from the field.

Adaptive Management Recommendations

- Monitor/maintain nectar source seeded areas along Hell Creek. Management Areas that were seeded with potential native nectar sources in 2025 should be monitored in 2026 to assess seeding success, document site conditions and potential nectaring Harbison's dun skipper individuals (flight season May-July), and implement as needed follow-up management activities, such as hand weeding and additional seeding. Seeding considerations include the following:
 - Potential native nectar sources can include morning glory (*Calystegia macrostegia intermedia*), hedge nettle (*Stachys rigida*), cobweb thistle (*Cirsium occidentale*), loosestrife (*Lythrum* spp.), narrowleaf milkweed, golden yarrow (*Eriophyllum confertiflorum*), and chaparral bushmallow (Marschalek and Deutschman 2015, 2016; Faulkner and Klein 2012).
 - Survey preserve for locations that are wet enough to support San Diego sedge. Install in locations wet enough to support it, where it is not already present.
 - Document the seed source (collection location) and confirm it is ecologically appropriate for Hellhole Canyon County Preserve. Seed may be rejected based on its source.
 - Document seed purity and germination percentages to determine pure live seed quantity.
 - Apply seed in the fall, before the first rains (e.g., November). Seed applied at other times of the year are more likely to be lost to predation and/or not receive sufficient rainfall to support germination and survival of seedlings.
 - Prepare seeding areas in willow riparian and oak riparian woodland areas by thinning thatch and reducing weed presence/competition, as needed. The optimal seeding condition is to provide seed direct contact with the soil and spaced to grow while retaining some organic debris (e.g., organic mulch) and existing native plants.
 - Apply seed by hand. Select a method (e.g., hand application or belly spreader) based on the quantity of seed and size of seeding areas. Lightly rake seed into the top 0.25 inch of soil and provide light natural organic mulch cover (less than 80 percent cover to provide light and space for germination).
 - Apply species in ecologically appropriate areas (e.g., closer or further from the creek) within willow riparian and oak riparian woodland areas. Depending on species and habitat conditions, species may be seeded together or in separate locations.
 - Document date of application, species, and quantities of seed applied, and locations via GPS coordinates.
- Coordinate with other entities before conducting management. Future monitoring for Harbison's dun skipper should be coordinated with Dr. Daniel Marschalek at the University of Central Missouri to provide cumulative adaptive management recommendations and provide transparency on implemented management activities.

4.2.2 Least Bell's Vireo/Brown-Headed Cowbird Trapping - Santa Margarita County Preserve

The two trap locations are depicted in Figure 7. A total of 15 brown-headed cowbirds were captured within Santa Margarita County Preserve from June 8 through July 15, 2025. This included seven adult males, six adult females, and two juveniles. There were 76 actual trap days out of a potential of 76. Total trap days are calculated by multiplying the number of traps by the number of days they are in operation, then subtracting the number of days individual traps are inactive for various reasons, such as vandalism. There were 0.20 cowbirds captured per trap day in 2025. The ratio of male to female captures was 0.16:1. Trapping results for each trap location are summarized below in Table 10, *Brown-Headed Cowbird Trapping Results in Santa Margarita County Preserve*. One non-target species, a house finch (*Haemorhous mexicanus*), was captured in Trap 1 and was released from the trap site unharmed on the same day. Detailed trapping methods and results are provided in Appendix B.

Table 10
BROWN-HEADED COWBIRD TRAPPING RESULTS IN SANTA MARGARITA COUNTY PRESERVE

Trap Number	Brown-Headed Cowbirds Captured			
	Adult Male	Adult Female	Juvenile	Total
1	2	4	1	7
2	5	2	1	8
Total	7	6	2	15

Adaptive Management Recommendations

- **Continue brown-headed cowbird trapping program.** The brown-headed cowbird trapping effort in 2025 successfully captured 15 cowbirds at a rate of 0.2 cowbirds captured per trap day within 76 trap days. In 2024, 11 cowbirds were captured at a rate of 0.06 per trap day within 181 trap days. There was a significantly higher capture rate in 2025 compared to previous years, despite the shorter trapping period. Continued program implementation should occur as follows:
 - Implement brown-headed cowbird trapping within the Santa Margarita County Preserve during the least Bell's vireo breeding season.
 - Evaluate the trapping program annually over a two- to five-year period (in 2027, or before) to determine trends in (1) cowbird captures, (2) brood parasitism, and (3) least Bell's vireo nesting success.
 - Establish thresholds for the density of cowbird females and the allowable level of parasitism for least Bell's vireo to guide the cowbird trapping program (Parker et al. 2022).
 - Partner with adjacent land managers in the area to provide trapping in suitable habitat to improve catch rates and decrease parasitism impacts to least Bell's vireo and songbird species in the area.
- **Collaborate with partner agencies and land managers.** Coordination with adjacent land managers is essential to managing brown-headed cowbirds in the area. Partnering with land managers both upstream and downstream of the preserve will vastly increase the efficiency of the cowbird trapping

program. Brown-headed cowbird traps are generally spaced at least a mile apart for trap efficiency, as traps placed closer together do not equate to higher trapping rates.

4.3 HABITAT FOCUSED MANAGEMENT

In 2025, habitat-focused management occurred in Ramona Grasslands County Preserve and focused on vernal pools and alkali playas.

4.3.1 Vernal Pools and Alkali Playas- Ramona Grasslands County Preserve Focused Management

Based on 2024 adaptive management recommendations, focused invasive non-native plant management was performed at 15 vernal pools (p13, p14, p7, e59, e56, e58, e61, e62, e63, e53, e77, e52, e48, e45, and ev3) and 4 alkali playas (raap4, raap6, raap14, and raap17). Management consisted of carefully hand-pulling target invasive non-native plants within the vernal pool boundaries and line-trimming a three-foot buffer around the pool margins. All cut biomass was manually collected, bagged, and properly disposed of at an approved off-site facility. Representative photographs of focused management are provided in Appendix A. The TMP recommends that overall invasive non-native plant cover be kept to less than 20 percent (ESA and ICF 2022). On-site observations by HELIX biologists in 2025 indicated that invasive non-native perennial grasses were prevalent throughout the management areas and will likely require additional management in 2026.

Adaptive Management Recommendations

Continue focused invasive non-native plant management. The TMP recommends that the overall invasive non-native plant cover within vernal pool basins be kept to less than 20 percent (ESA and ICF 2022). To limit the expansion of non-native grasses and ensure the persistence of vernal pool and alkaline playa habitat at Ramona Grasslands County Preserve, it is recommended that invasive non-native plant control be continued within p13, p14, p7, e59, e56, e58, e61, e62, e63, e53, e77, e52, e48, e45, ev3, raap4, raap6, raap14, and raap17 by a qualified restoration specialist, with a focus on treatment of perennial non-native grasses. Control of slender wild oat is best achieved by whole plant removal. Effective herbicides include glyphosate and imazapyr. These herbicides can be safe for aquatic environments, depending upon the formulation. Control of brome grasses, including ripgut brome and cheatgrass, is also best achieved by whole plant removal. Effective chemical control can be achieved with glyphosate (UCANR 2025). This herbicide can be safe for aquatic environments, depending upon the formulation. Chemical herbicides should not be used to control any of these invasive species if there is potential for negative impacts to native vernal pool and alkali playa plant species. Management should continue to occur twice a year, once just after the pool and playa basins have dried and the soil surface becomes firm, and again later in the season before invasive non-native plants have set seed. Invasive non-native grasses should be manually cut at the base and removed by hand to minimize soil disturbance. Sensitive plants or vernal pool/alkali playa indicator plant species should be flagged before the start of maintenance. A follow-up maintenance visit should be performed during the dry phase, after native plant species have set seed, to fully remove any invasive non-native plant biomass remaining by hand to prevent the removal of native seed material. Thatch removal should be done by hand and by lightly raking in basins and around the pool margins to minimize soils disturbance. At the County's discretion, an aquatic-safe herbicide may be used after the first maintenance visit in accordance with the TMP (ESA and ICF 2022).

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Appendix A

Representative Photographs



Boulder Oaks Preserve, Before Maintenance
June 20, 2025 (BO1_Before)



Boulder Oaks Preserve, Before Maintenance
June 20, 2025 (BO2_Before)



Boulder Oaks Preserve, Before Maintenance
June 20, 2025 (BO3_Before)



Boulder Oaks Preserve, Before Maintenance
June 20, 2025 (BO4_Before)



Boulder Oaks Preserve, After Maintenance
July 2, 2025 (BO1_After)



Boulder Oaks Preserve, After Maintenance
July 2, 2025 (BO2_After)



Boulder Oaks Preserve, After Maintenance
July 2, 2025 (BO3_After)



Boulder Oaks Preserve, After Maintenance
July 2, 2025 (BO4_After)



Furby-North Preserve, Before Maintenance
June 19, 2025 (FN1_Before)



Furby-North Preserve, Before Maintenance
June 19, 2025 (FN2_Before)



Furby-North Preserve, Before Maintenance
June 19, 2025 (FN3_Before)



Furby-North Preserve, Before Maintenance
June 19, 2025 (FN4_Before)



Furby-North Preserve, After Maintenance
July 2, 2025 (FN1_After)



Furby-North Preserve, After Maintenance
July 2, 2025 (FN2_After)



Furby-North Preserve, After Maintenance
July 2, 2025 (FN3_After)



Furby-North Preserve, After Maintenance
July 2, 2025 (FN4_After)



Tijuana River Valley Regional Park, Before Maintenance
June 23, 2025 (TRV1_Before)



Tijuana River Valley Regional Park, Before Maintenance
June 23, 2025 (TRV2_Before)



Tijuana River Valley Regional Park, Before Maintenance
June 23, 2025 (TRV3_Before)



Tijuana River Valley Regional Park, Before Maintenance
June 23, 2025 (TRV4_Before)



Tijuana River Valley Regional Park, After Maintenance
August 13, 2025 (TRV1_After)



Tijuana River Valley Regional Park, After Maintenance
August 13, 2025 (TRV2_After)



Tijuana River Valley Regional Park, After Maintenance
August 13, 2025 (TRV3_After)



Tijuana River Valley Regional Park, After Maintenance
August 13, 2025 (TRV4_After)



Lusardi Creek Preserve, Before Maintenance
June 24, 2025 (LC1_Before)



Lusardi Creek Preserve, Before Maintenance
June 24, 2025 (LC2_Before)



Lusardi Creek Preserve, Before Maintenance
June 24, 2025 (LC3_Before)



Lusardi Creek Preserve, Before Maintenance
June 24, 2025 (LC4_Before)



Lusardi Creek Preserve, After Maintenance
September 4, 2025 (LC1_After)



Lusardi Creek Preserve, After Maintenance
September 4, 2025 (LC2_After)



Lusardi Creek Preserve, After Maintenance
September 4, 2025 (LC3_After)



Lusardi Creek Preserve, After Maintenance
September 4, 2025 (LC4_After)



Ramona Grasslands Preserve, Before Maintenance
July 2, 2025 (RG1_Before)



Ramona Grasslands Preserve, Before Maintenance
July 2, 2025 (RG2_Before)



Ramona Grasslands Preserve, Before Maintenance
July 2, 2025 (RG3_Before)



Ramona Grasslands Preserve, Before Maintenance
July 2, 2025 (RG4_Before)



Ramona Grasslands Preserve, After Maintenance
July 15, 2025 (RG1_After)



Ramona Grasslands Preserve, After Maintenance
July 15, 2025 (RG2_After)



Ramona Grasslands Preserve, After Maintenance
July 15, 2025 (RG3_After)



Ramona Grasslands Preserve, After Maintenance
July 15, 2025 (RG4_After)



Hellhole Canyon Preserve, Before Maintenance
August 4, 2025 (HC1_Before)



Hellhole Canyon Preserve, During Maintenance
October 23, 2025 (HC2_Before)



Hellhole Canyon Preserve, During Maintenance
October 23, 2025 (HC3_Before)



Hellhole Canyon Preserve, During Maintenance
October 23, 2025 (HC4_Before)



Hellhole Canyon Preserve, After Maintenance
October 23, 2025 (HC1_After)



Hellhole Canyon Preserve, After Maintenance
October 23, 2025 (HC2_After)



Hellhole Canyon Preserve, After Maintenance
October 23, 2025 (HC3_After)



Hellhole Canyon Preserve, After Maintenance
October 23, 2025 (HC4_After)

Appendix B

2025 Cowbird Report

SANTA MARGARITA COUNTY PRESERVE BROWN-HEADED COWBIRD TRAPPING PROGRAM 2025

PREPARED FOR
**COUNTY OF SAN DIEGO DEPARTMENT OF PARKS AND RECREATION
5510 OVERLAND AVENUE, SUITE 270
SAN DIEGO, CA 92123**



SEPTEMBER 2025

SANTA MARGARITA COUNTY PRESERVE BROWN-HEADED COWBIRD TRAPPING PROGRAM 2025

PREPARED FOR

**COUNTY OF SAN DIEGO DEPARTMENT OF PARKS AND RECREATION
5510 OVERLAND AVENUE, SUITE 270
SAN DIEGO, CA 92123**

PREPARED BY

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UNDER SUBCONTRACT TO

**Helix Environmental Planning
7578 El Cajon Boulevard
La Mesa, CA 91942**

Project No. SMCP-01-25

SEPTEMBER 2025

**SANTA MARGARITA COUNTY PRESERVE
BROWN-HEADED COWBIRD TRAPPING PROGRAM 2025**

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EXECUTIVE SUMMARY

A brown-headed cowbird (*Molothrus ater*) trapping program was implemented on Santa Margarita County Preserve (Preserve), San Diego County, California, in 2022, to reduce the threat and impact of brown-headed cowbird brood parasitism on least Bell's vireo (*Vireo bellii pusillus*). The trapping program was initiated in 2022 in response to detections of least Bell's vireo nest parasitism incidentally observed during 2021 Targeted Monitoring Plan (TMP) surveys (ESA 2022). Trapping continued in 2023 and 2024 based on 2022 and 2023 brown-headed cowbird trappings results (ESA 2023, 2024) and was recommended to continue in 2025 based on 2024 brown-headed cowbird trapping results (ESA 2025). The trapping program is consistent with the TMP's management goals and objectives for least Bell's vireo (ESA and ICF 2022).

A total of two brown-headed cowbird traps were operated along the Santa Margarita River within the Preserve in 2025. Traps were placed within riparian habitat that provides suitable nesting habitat for the vireo.

A total of fifteen brown-headed cowbirds were removed from the project area between June 8 and July 15, 2025. Captures included seven adult males, six adult females, and two juveniles. Newly captured cowbirds not used as decoys were removed daily and humanely euthanized. There was one non-target species capture event in the project area in 2025. One house finch (*Haemorhous mexicanus*) was captured in Trap #2 and was released from the trap site unharmed the same day.

1. INTRODUCTION

A brown-headed cowbird (*Molothrus ater*) trapping program was implemented beginning in 2022 within the Santa Margarita County Preserve (Preserve) on behalf of the County of San Diego Department of Parks and Recreation. The purpose of the trapping program was to reduce the threat and impact of brown-headed cowbird brood parasitism on the Preserve's least Bell's vireo (*Vireo bellii pusillus*) population. The least Bell's vireo is a federally and state endangered migratory songbird species that nests in riparian habitat within the Preserve. The least Bell's vireo is subject to reproductive pressure through nest parasitism by the brown-headed cowbird. Studies have shown that a program of cowbird trapping effectively reduces this reproductive pressure (Kus and Whitfield 2005). The trapping program was initiated in 2022 in response to detections of least Bell's vireo nest parasitism incidentally observed during 2021 Targeted Monitoring Plan (TMP) surveys (ESA 2022). Trapping continued in 2023 and 2024 based on 2022 and 2023 brown-headed cowbird trappings results (ESA 2023, 2024) and was recommended to continue in 2025 based on 2024 brown-headed cowbird trapping results (ESA 2025). The trapping program is consistent with the management goals and objectives detailed in the TMP and are as follows (ESA and ICF 2022):

Management Goal: Maintain suitable breeding habitat for least Bell's vireo and maintain vireo breeding pairs within the Santa Margarita County Preserve.

Management Objective: Control brown-headed cowbird parasitism through trapping and removal program, as necessary based on monitoring results.

2. BACKGROUND

During 2021 TMP surveys, Environmental Science Associates (ESA) biologists detected a brown-headed cowbird adult, fledgling, and egg in a least Bell's vireo nest (ESA 2022). A pair of cowbirds was observed copulating during the first survey and cowbirds were observed during five out of the eight protocol surveys (ESA 2022). While the number of observations of cowbirds was relatively low, at least 2 of 11 least Bell's vireo territories suffered direct impacts to productivity during the 2021 season (ESA 2022). These results were indicative of parasitism occurring within the Preserve. In response to these results, a brown-headed cowbird trapping program was established in 2022 within the Preserve to reduce the threat of brood parasitism on least Bell's vireo and other native songbirds.

During 2022 TMP surveys, ESA biologists did not observe direct evidence of cowbird parasitism; however, cowbirds were observed during three out of the eight protocol surveys and 20 cowbirds, including 1 juvenile, were captured during 2022 cowbird trapping, suggesting parasitism still occurred within the Preserve (ESA 2023). As a result, implementation of the cowbird trapping program was recommended to continue in 2023.

During 2023 TMP surveys, ESA biologists incidentally discovered a parasitized least Bell's vireo nest that was subsequently abandoned by the vireo pair. Additionally, cowbirds were observed during two out of the eight protocol surveys and 7 cowbirds, including 1 juvenile, were captured during 2023 cowbird trapping, suggesting parasitism still occurred within the Preserve (ESA 2024). As a result, implementation of the cowbird trapping program was recommended to continue in 2024.

During 2024 TMP surveys, no parasitized least Bell's vireo nests were found by ESA biologists; however, one parasitized song sparrow (*Melospiza melodia*) nest was incidentally detected within an active least Bell's vireo territory on April 24, 2024. Additionally, five adult brown-headed cowbirds were observed during nest monitoring and 11 adult cowbirds were captured during 2024 cowbird trapping

(ESA 2025). As a result, implementation of the cowbird trapping program was recommended to continue in 2025.

2.1 Least Bell's Vireo

The least Bell's vireo is a small migratory songbird and an obligate summer resident of riparian habitat within Southern California and northwestern Baja California, Mexico. Historically, the least Bell's vireo was considered a common breeding resident within lowland riparian habitat areas throughout California from the northern Sacramento Valley south into northwestern Baja California, Mexico (Franzreb 1989). Beginning in the mid-1900s, the least Bell's vireo experienced widespread declines due to extensive habitat destruction and brood parasitism by the brown-headed cowbird (Kus and Whitfield 2005; Goldwasser et al. 1980). With the loss of over 90 percent of the riparian habitat within the state of California and persistent pressure from cowbird parasitism, the least Bell's vireo was found in only small, localized populations within seven California counties during survey efforts conducted in 1978 (Goldwasser et al. 1980). First listed as an endangered species by the State of California in 1980, the least Bell's vireo was listed as federally endangered in 1986 with a statewide population of 291 known territories (USFWS 1998). After receiving endangered species status, intensive management efforts, including cowbird control, habitat restoration, and nest monitoring programs, were instituted to reverse the decline of the least Bell's vireo population within California. A 5-year study completed in 2006 by the U.S. Fish and Wildlife Service reported a statewide least Bell's vireo population of 2,968 known territories (USFWS 2006; USGS [unpublished data] 2006). This represents a tenfold population increase from the number that existed at the time of listing.

2.2 Brown-Headed Cowbird

The brown-headed cowbird is an obligate brood parasite that lays its eggs in the nests of other songbird species and is dependent upon the host to incubate its eggs and rear its young. The cowbird is a medium-sized songbird averaging 6 to 7 inches in length with sexually dimorphic plumage. Adult males are glossy black with a brown head and neck. Females are slightly smaller than males and are dull tan to light brown with indistinct streaking on the breast. The cowbird was historically restricted to the central regions of North America and expanded in both range and abundance following the alteration of natural habitats particularly associated with the increase in agriculture and livestock production (Mayfield 1977). This species reached California in the late 1800s. Specimens (adult female and eggs) collected in 1915 represent the first documented evidence of breeding in San Diego County (Unitt 1984). The species was well established within Southern California by the 1930s (Willett 1933; Rothstein 1994). The cowbird egg-laying period is generally considered to extend from mid-April to mid-July (Robinson et al. 1993); however, cowbird parasitism of local least Bell's vireo populations has been noted as early as the first week of April (B. Kus, pers. comm. 2009). Regional observations during vireo surveys and monitoring conducted by TW Biological Services over the past two decades are consistent with this earlier timing (Sexton pers. obs.).

Songbird species or populations that have not evolved with the cowbird may be subject to significantly reduced reproductive success due to brood parasitism (Mayfield 1977). Female cowbirds can lay an average of at least 30 to 40 eggs per season, allowing a small number of cowbirds to parasitize a large number of nests (Robinson et al. 1995). When female cowbirds locate a host's nest during or shortly after egg laying, they will typically remove a host egg and replace it with one of their own. Cowbird egg incubation is shorter than that of most host species (Robinson et al. 1993) and the cowbird egg will usually hatch days before the host's eggs. Cowbird nestlings do not typically directly cause the death of host nestlings by kicking them from the nests like some other brood parasites (USFWS 2002). More commonly, nestling cowbirds divert the attention of the adults and out-compete host nestlings for food because of their earlier hatch date, faster growth rate, louder begging calls, and larger gapes compared to host nestlings (Robinson et al. 1993).

Brood parasitism combined with other impacts, such as habitat loss and fragmentation, can lead to declines and potential extirpation of host species, particularly those with an already limited population and distribution (Kus and Whitfield 2005; Mayfield 1977, Rothstein et al. 1987).

The cowbird is migratory and somewhat nomadic throughout most of its range. In areas where it is considered a year-round resident, the cowbird exhibits significant dispersal movements between breeding and wintering areas (Ortega 1998). Two subspecies of brown-headed cowbird occur in California, the dwarf cowbird (*M. a. obscurus*) and Great Basin cowbird (*M. a. artemisiae*) (Rothstein 1994; Ortega 1998). While both subspecies occur in Southern California as winter residents and spring/fall migrants, only dwarf cowbird breeds in Southern California (Fleischer and Rothstein 1988; Unitt 2004). In San Diego County, cowbird populations are at the highest levels during spring and fall migration, with peak numbers generally occurring between April 1 and May 15, and again from early August through September (TW Biological Services unpubl. data). During these periods there is considerable overlap of both migrant and breeding residents, as well as subspecies. During the breeding season, cowbirds also exhibit a wide range of movement and have been shown to commute up to 7 kilometers (km) between foraging and breeding sites (Robinson et al. 1993; Rothstein et al. 1984).

2.3 Brown-Headed Cowbird Control

Brown-headed cowbird control through breeding-season trapping is proven to be an effective method in controlling cowbirds and reducing brood parasitism of sensitive songbird populations throughout the United States; this method was initially used in the recovery efforts of the Kirtland's Warbler (*Dendroica kirtlandii*) in Michigan (Mayfield 1977). Subsequently, cowbird trapping has become an important tool in the conservation of several sensitive songbird species, including the black-capped vireo (*Vireo atricapillus*) (Eckrich et al. 1999), least Bell's vireo (Kus 1999; Kus and Whitfield 2005), and southwestern willow flycatcher (*Empidonax traillii extimus*) (Whitfield et al. 1999). A study was conducted in 2005 to evaluate the effectiveness of cowbird trapping on California least Bell's vireo populations. The study evaluated data from three California sites over a 20-year period and concluded that cowbird control reduces the incidence of parasitism and consequently increases least Bell's vireo productivity (Kus and Whitfield 2005).

3. PROJECT SITE

The Preserve is approximately 211 acres located just east of Camp Pendleton Marine Corps Base and north of the city of Fallbrook (Appendix A: Figure A-1). Trapping in 2025 was conducted along a 1.25 km section of the Santa Margarita River where it passes through the Preserve. The southerly edge of the river is bordered by De Luz Road and Sandia Creek Drive, and the northerly edge of the river is bordered by undeveloped hilly terrain that rises to the north and northwest.

4. TRAP LOCATIONS

In 2025, two traps were placed along the Santa Margarita River within the Preserve in the same general areas trapped in 2024 (Appendix A: Figure A-2). A primary consideration is to locate traps in those habitats most suitable for nesting, and to do so in a manner that provides acceptable coverage of the project area. Traps were placed within the riparian habitat, approximately 0.7 km from each other, in locations that were easily accessible by vehicle. Trap #1 was located approximately 0.2 km northwest of the intersection of De Luz Road and Sandia Creek Drive. This trap was placed adjacent to a trail at the north end of the Preserve

staging area. Trap #2 was placed approximately 0.8 km north of the De Luz Road/Sandia Creek Drive intersection a short distance west of the road. Both traps were placed within riparian habitat.

5. METHODS

TW Biological Services personnel performed trapping operations from June 8 through July 15, 2025. The two traps were delivered to the project area, assembled, and activated on June 8, 2025. Upon activation, the traps were supplied with fresh water, seed, perches, shade, and live decoy cowbirds. The right primary wing feathers of both male and female decoy cowbirds were clipped for identification and prevention of accidental escape or release back into the wild. This practice also greatly diminishes their likelihood of survival in the wild should they escape. GPS coordinates for trap locations were recorded with a Garmin 276C handheld GPS unit (Appendix B: Table B-1). Coordinates were recorded in World Geographic System 1984 (WGS 84). A sign was placed on each trap providing trap information and contact phone numbers (Appendix C).

Traps were checked daily, during daylight hours, from June 8 through July 15, 2025. This was done to record trap capture events, release non-target species incidentally captured, add or remove cowbirds to maintain the 2:3 (male:female) decoy ratio, provide fresh seed and water, and repair trap damage if needed. Information recorded for all newly captured cowbirds included capture location, date, sex, and age. Newly captured cowbirds not used as decoys were removed daily and humanely euthanized off-site. All other non-target birds captured were released unharmed at the trap sites. On July 15, 2025, both traps were deactivated and on July 18, 2025, the traps were dismantled and removed from the project area.

6. RESULTS

6.1 Brown-Headed Cowbird Captures

A total of fifteen cowbirds were captured within the Preserve between June 8 and July 15, 2025 (Table 6-1; Appendix B: Table B-2). These included seven adult males, six adult females, and two juveniles. The first adult male cowbird capture occurred on June 10, the first female cowbird capture occurred on June 17, and the first juvenile cowbird capture occurred on June 15, 2025. There were 76 actual trap days out of a potential of 76. Total trap days are calculated by multiplying the number of traps by the number of days they are in operation, then subtracting the number of days individual traps are inactive for various reasons such as vandalism. There were 0.20 cowbirds captured per trap day during the 2025 project period. The ratio of male to female captures was 1.16:1.

Table 6-1
Brown-Headed Cowbirds Captured per Trap in 2025

Trap Number	Cowbirds Captured			
	Adult Male	Adult Female	Juvenile	Total
1	2	4	1	7
2	5	2	1	8
Total	7	6	2	15

6.2 Non-Target Species

There was one non-target species capture event in the project area in 2025. One house finch was captured in Trap #2 on June 24 and was released from the trap site unharmed the same day.

6.3 Trap Vandalism

No vandalism occurred during the 2025 trapping period.

6.4 Parasitism

Least Bell's Vireo nest monitoring was not conducted in the Santa Margarita County Preserve in 2025. TW Biological Services is not aware of any parasitism data within the project area for 2025.

7. DISCUSSION AND RECOMMENDATIONS

A total of fifteen brown-headed cowbirds, including seven adult males, six adult females, and two juveniles were removed from the project area from June 8 through July 15, 2025.

Total cowbird capture numbers were 7 in Trap #1 and 8 in Trap #2 (Table 7-1). There were 0.2 captures per trap day in 2025. This is a significantly higher capture rate compared to previous years despite the short trapping period (Table 7-2).

Table 7-1
Brown-Headed Cowbirds Captured per Trap from 2022-2025

Year	Trap #1				Trap #2			
	Number of Cowbirds Removed				Number of Cowbirds Removed			
	Male	Female	Juvenile	Total	Male	Female	Juvenile	Total
2022	8	5	0	13	4	2	1	7
2023	1	0	0	1	3	2	1	6
2024	2	3	0	5	2	4	0	6
2025*	2	4	1	7	5	2	1	8

* Trapped from June 8 – July 15

Table 7-2
Brown-Headed Cowbird Capture Rates from 2022-2025

Year	Trapping Dates	Trap Days*	Total Captures	Cowbird Capture Rate (Captures/Trap Day)
2022	April 1-June 30	182	20	0.10
2023	April 1-June 30	182	7	0.03
2024	April 1-June 30	181	11	0.06
2025	June 8-July 15	76	15	0.20

*Trap Days = (D x T) – V

D= Days; T= # of traps; V= inactive trap days

Evaluating trap placement requires consideration of several elements, including the number of available traps and their effective trapping radius, locations of suitable nesting habitat, the total target area to be protected, the locations of travel corridors and foraging areas, access and physical limitations to trap placement, proximity of any nearby trapping programs, and historic locations of least Bell's vireo nest sites.

TW Biological Services considers the current general trap placement on the Preserve to be suitable with respect to overall trap distribution and proximity to least Bell's vireo nesting habitat.

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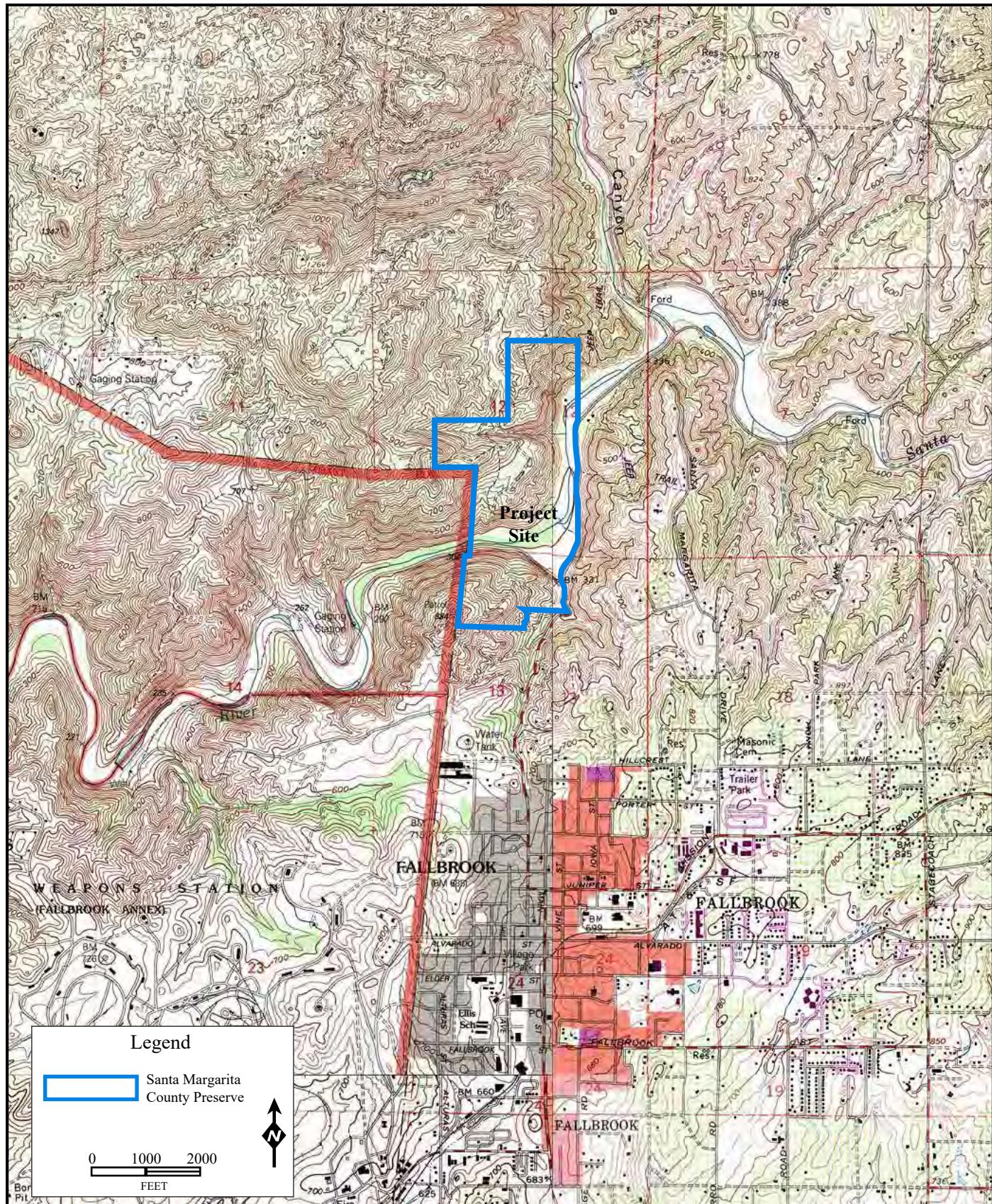
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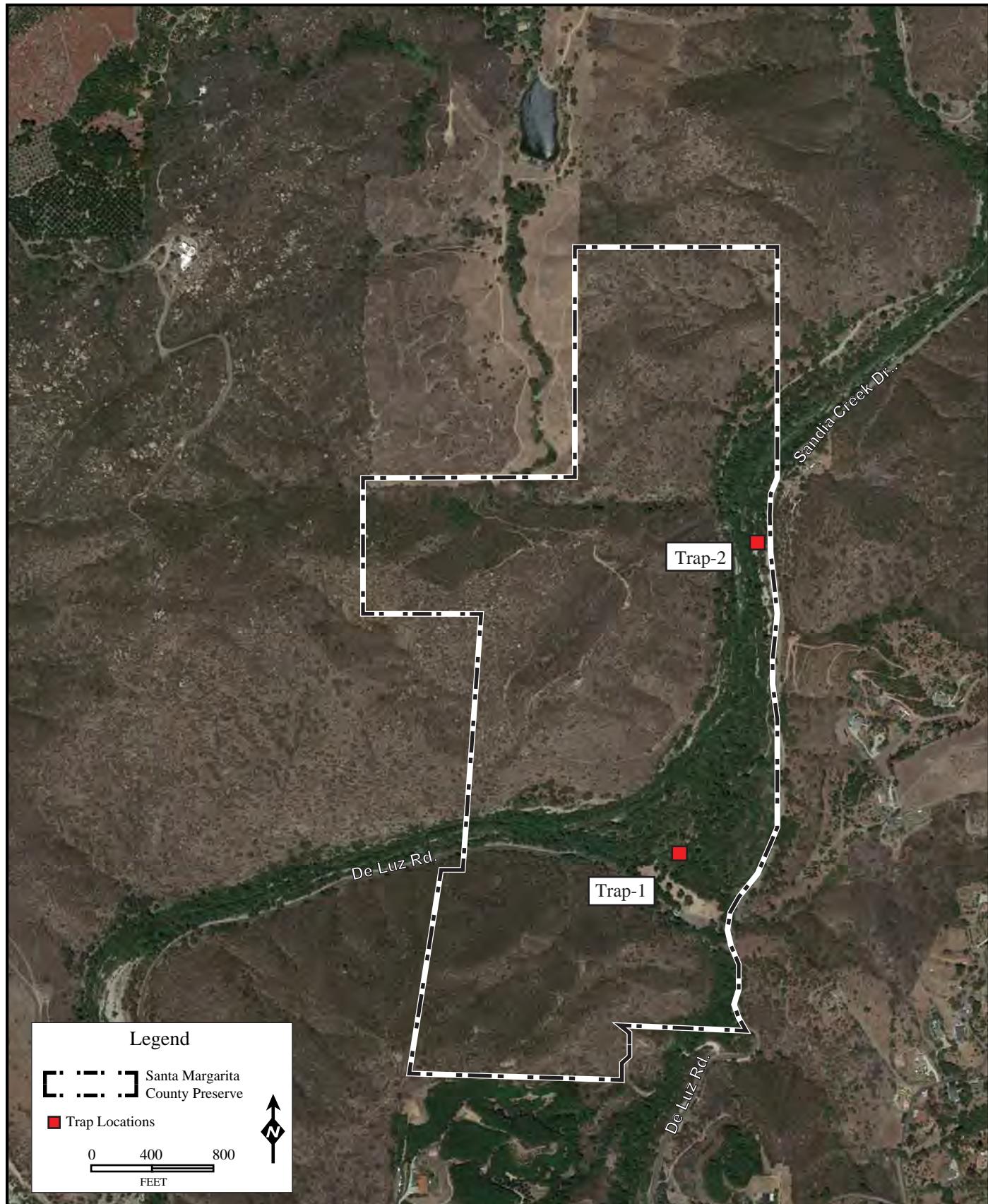
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APPENDIX A

FIGURES





 TW Biological Services	2025 SANTA MARGARITA COUNTY PRESERVE BROWN-HEADED COWBIRD TRAPPING PROJECT	Trap Locations <small>Aerial Source: Google Earth Pro. August 2021</small>	FIGURE A-2
	Project No: SMCP-01-25		

APPENDIX B

RAW DATA TABLES

TABLE B-1
Brown-Headed Cowbird Trap GPS Coordinates in 2025

Trap Number	Trap GPS Coordinates (Decimal Degrees WGS84)						
	Y-North			X-West			Elevation (feet)
	M	F	J	M	F	J	
1	33.40226			-117.25130			326
2	33.40757			-117.24954			317

TABLE B-2
Brown-Headed Cowbirds Captured per Trap per Week in 2025

Week No.	Date	Trap 1			Trap 2			Total		
		M	F	J	M	F	J	M	F	J
1	8-14 June	1	0	0	0	0	0	1	0	0
2	15-21 June	1	3	1	1	2	0	2	5	1
3	22-28 June	0	0	0	0	0	0	0	0	0
4	29 June-5 July	0	0	0	2	0	0	2	0	0
5	6-12 July	0	1	0	1	0	0	1	1	0
6	13-15 July	1	0	0	0	0	1	1	0	1
Total		3	4	1	4	2	1	7	6	2

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APPENDIX C

COWBIRD TRAP INFORMATION/DO NOT DISTURB SIGN ATTACHED TO EACH TRAP

PLEASE DO NOT DISTURB

**THIS TRAP IS OPERATED IN COOPERATION WITH THE
U.S. FISH AND WILDLIFE SERVICE
AND
CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE**

**THE OPERATION OF THIS TRAP IS PART OF A
MANAGEMENT PROGRAM FOR THE ENDANGERED
LEAST BELL'S VIREO**

**ALL TRAPPED BIRDS ARE TREATED HUMANELY IN ACCORDANCE
WITH ESTABLISHED FEDERAL AND STATE PROTOCOL.**

**FOR ADDITIONAL INFORMATION ON THE OPERATION OF THIS
TRAP PLEASE CONTACT:**

*Jennifer Sexton, TW Biological Services
(949) 463-3497*

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