

M2 Natural Community Conservation Plan/Habitat Conservation Plan– 2019 Annual Report

2020

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Acronyms and Definitions

ACOE – Army Corps of Engineers

CAC – Citizen Advisory Committee

Caltrans – California Department of Transportation

CCC – California Coastal Commission

CCF – California Community Foundation

CDFW – California Department of Fish and Wildlife

CEs – Conservation Easements

CHSP – Chino Hills State Park

CNDDB – California Natural Diversity Database

COI – Certificate of Inclusion

CSS – Coastal Sage Scrub

ECR – Environmental Commitment Report

EFM – Endowment Fund Manager

EMP – Environmental Mitigation Program

EOC – Environmental Oversight Committee. The EOC is made up of two OCTA Board members and representatives from Caltrans, the Wildlife Agencies, ACOE, environmental groups, and the public. The EOC makes recommendations on the allocation of environmental freeway mitigation funds and monitors the execution of a master agreements between OCTA and state and federal resource agencies.

ESA – Endangered Species Act

FMP – Fire Management Plan

GIS – geographic information system

GLA – Glen Lukos Associates

GSOB – Gold Spotted Oak Borer (beetle)

HCP – Habitat Conservation Plan

HMMP – Habitat Mitigation Monitoring Plan

I – Interstate

IA – Implementing Agreement

IRC – Irvine Ranch Conservancy

ISHB – Invasive shot hole borer

ISMP – Invasive Species Management Plan

M2 – The renewed Measure M (or Measure M2)

M2 NCCP/HCP – OCTA M2 Natural Communities Conservation Plan / Habitat Conservation Plan adopted on November 2017. Also referred as Plan.

NCC – Natural Communities Coalition

NCCP – Natural Community Conservation Plan

NCCPA – Natural Community Conservation Plan Act

OC – Orange County

OC Parks – Orange County Parks

OCTA – Orange County Transportation Authority

RMP – Resource Management Plan

SARP – Santa Ana River Mainstem Project

SCAG – Southern California Association of Governments

SR – State Route

TCA – Transportation Corridor Agencies

TOC – Taxpayer Oversight Committee

UCI – University of California Irvine

USFS – United States Forest Service

USFWS – U.S. Fish and Wildlife Service

Wildlife Agencies – the California Department of Fish and Wildlife (CDFW) and U.S. Fish and Wildlife Service (USFWS), collectively referred to as the Wildlife Agencies

Executive Summary

This is the second Annual Report for the Orange County Transportation Authority (OCTA) M2 Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP or Plan), covering all activities between January 1, 2019 and December 31, 2019. This report summarizes the tracking of impacts associated with covered freeway improvement projects and other management and monitoring activities on Preserves (Covered Activities), status and activities on the OCTA Preserves, progress on the implementation of OCTA-funded restoration projects, and additional Plan administration and public outreach activities. This Annual Report has been reviewed and approved by the California Department of Fish and Wildlife (CDFW) and U.S. Fish and Wildlife Service (USFWS), collectively referred to as the Wildlife Agencies. In addition, this Annual Report is presented to the OCTA Environmental Oversight Committee (EOC) and is available for a public review.

Tracking Impacts from Covered Activities

OCTA keeps an accounting of the Plan-to-date impacts on habitat types from all covered freeway improvement projects to ensure impacts stay within the caps established within the Plan. To date, a total of **9.2 acres of habitat impacts have been authorized relative to a cap of 141.0 acres**. In addition, OCTA uses a consistency determination checklist to evaluate how and when avoidance and minimization measures are implemented on covered freeway improvement projects. Four projects (D, F, G, I) had consistency determinations drafted, modified, or completed within the timeframe of this Annual Report. Other tracking requirements include:

- *Tracking for Covered Plant Species Policy* – OCTA tracks the credits for covered plant species protection (on Preserves) and restoration/enhancement (restoration projects) relative to allowable impacts. The Plan-to-date balance for each plant species is net positive (intermediate mariposa lily [+1303], many-stemmed dudleya [+180], southern tarplant [+8,377 + 1 acre]).
- *Tracking Impacts on Habitat Types Resulting from Covered Activities within Preserves* – The Plan establishes a cap that no more than 13 acres (approximately 1%) of the natural habitat within the OCTA Preserves will be impacted by Preserve management activities. To date, no measurable permanent impacts have been recorded on the Preserves.
- *Maintaining Rough Proportionality* – The Plan requires implementation of conservation measures roughly proportional in time and extent to impacts on natural communities and Covered Species. To date, two restoration projects, Big Bend and City Parcel, have received sign-off from the Wildlife Agencies as meeting their success criteria and have achieved conservation credits that keeps the Plan ahead of allowable impacts.

OCTA Preserves

OCTA acquired seven properties resulting in the protection of 1,236[1] acres of natural habitat (see Figure 1). In all instances, the seven Preserves are located within priority conservation areas and immediately adjacent to other protected lands. These Preserves add to the protection of large blocks of natural open space in areas important for regional conservation. OCTA has completed Resource Management Plans (RMPs) for each Preserve that includes Preserve-specific goals and objectives and define an appropriate level of public access and trail use consistent with protection of biological resources. It is anticipated that Conservation Easements will be completed and recorded in the near future. Currently each Preserve is being managed by OCTA. OCTA is working to identify and transition to long-term Preserve Managers in the near future. OCTA has contracted with the following consulting firms to support Preserve management: (1) Glenn Lukos Associates to provide biological monitoring, prepare invasive species management plans, and assist with public outreach events, (2) RECON Environmental to support general Preserve stewardship including maintenance of access roads, tree trimming, and control of public access, (3) Wildland Res Mgt to complete Fire Management Plans (FMPs), and (4) ICF to assist with general program needs including the development of the Conservation Easements. OCTA has hosted numerous Preserve-specific outreach events to educate the public about property value and access and plans to continue this process in the near term as part of a managed access approach. No fires or major events have occurred on the Preserves in 2019, although a level of trespassing and vandalism continues to occur requiring ongoing monitoring and enforcement.

OCTA-Funded Restoration Projects

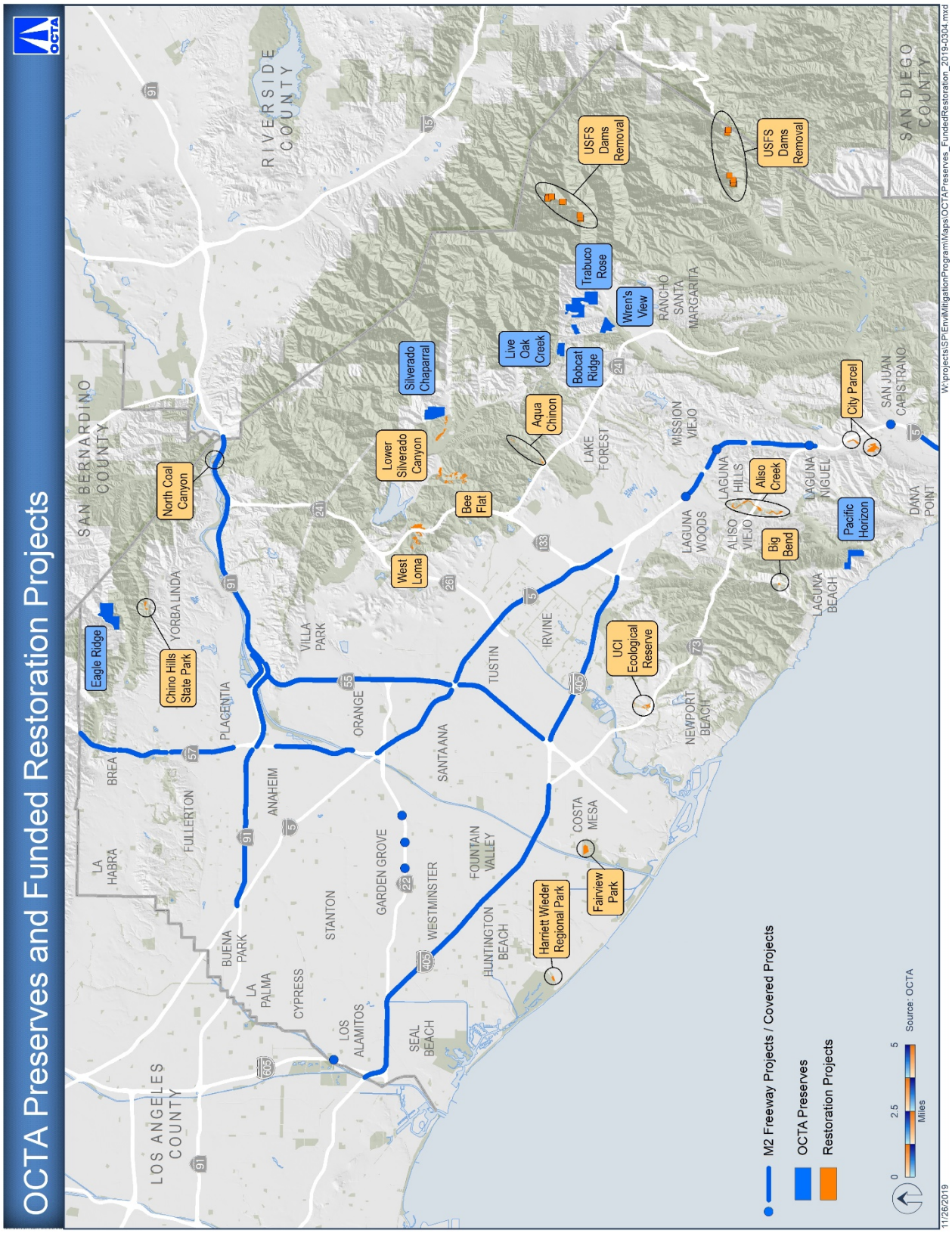
OCTA has approved funding for 11 restoration projects and a check dam removal project that will result in over 350 acres of restored habitats and improvement to habitat functions for Covered Species. The restoration projects occur throughout the Plan Area in core habitat areas and within key habitat linkages and riparian corridors (see Figure 1). The restoration projects are on lands that are currently managed and will enhance habitat for Covered Species. OCTA is working with the restoration project sponsors to complete implementation and monitoring of the restoration activities and achieve sign-off from the Wildlife Agencies that the restoration projects meet their success criteria. Each restoration project is at different stages of the process. To date, 2 of the 11 restoration projects have obtained sign-off.

Additional Conditions for Coverage

As part of the Conservation Analysis (Chapter 6) in the Plan, there were two Covered Species, arroyo chub and many-stemmed dudleya, noted for additional conditions for coverage above and beyond the acquisition of the OCTA Preserves and funding of restoration projects. In 2017, the EOC and Wildlife Agencies approved OCTA to fund the United States Forest Service Dam Removal restoration project that, when complete, will satisfy the conditions for coverage of arroyo chub. OCTA is currently taking steps to protect and enhance an existing population of many-stemmed dudleya on the Pacific Horizon

[1] The acreage of natural habitat preserved is based on best available information using during the preparation of RMPs and may be slightly different from acreages reported in the M2 NCCP/HCP.

Figure 1 – OCTA M2 NCCP/HCP Preserves and Funded Restoration Projects



Preserve with the hope that it will expand to help meet or will meet the criteria needed to achieve coverage for many-stemmed dudleya.

Public Outreach

OCTA has been committed to transparency in how the M2 funds have been and are being used to implement the Plan and the broader Environmental Mitigation Program (EMP). OCTA has conducted a variety of public outreach activities aimed at informing and engaging the public on the overall EMP as well as Preserve-specific issues and events. These have included public meetings during the preparation of the Preserve RMPs, maintaining a website with information and documents related to the program, and engaging in various outreach efforts and encouraging volunteer programs. In 2019, OCTA participated in 31 EMP public outreach events and meetings and 9 Preserve-specific public outreach events.

Plan Funding

The primary source of funding for the Plan will derive from the M2 transportation sales tax designed to raise money to improve Orange County's transportation system. As part of the M2 sales tax initiative, at least 5% of the revenues from the freeway program will be set aside for the M2 EMP revenues. There are sufficient funds available through the M2 EMP to cover the development and implementation of the Plan. OCTA is currently in a 12-15 year process to accumulate and establish an endowment that will provide a long-term funding source to cover ongoing Preserve management and monitoring, adaptive management, and responses to changed circumstances, in perpetuity. In the short-term, the current M2 EMP revenue stream is used to cover Plan implementation and administration.

Plan Administration

OCTA is responsible for implementing the Plan and staffing an NCCP/HCP Administrator position. OCTA has designated Lesley Hill as the NCCP/HCP Administrator. Her role includes overseeing Preserve management and monitoring, coordinating with restoration project sponsors, serving as the primary point of contact with the Wildlife Agencies, ensuring avoidance and minimization measures are implemented pursuant to the Plan, tracking impacts and conservation, assisting with public outreach, and preparing this Annual Report.

The Plan outlines how modifications, Minor Amendments, and Major Amendments can be made to the Plan. This Annual Report summarizes Plan modifications that have been made in collaboration with the Wildlife Agencies that address revisions to restoration project design plans and sponsors, minor Preserve boundary adjustments, and approval of a new restoration project since Plan approval. No Minor or Major Amendments are proposed.

Chapter 1
Background and Introduction

1.1 Background

In 2006, Orange County voters approved the renewal of Measure M, effectively extending the half cent sales tax to provide funding for transportation projects and programs in the county. As part of the renewed Measure M (or Measure M2), a portion of the M2 freeway program revenues were set aside for the M2 Environmental Mitigation Program (EMP) to provide funding for programmatic mitigation to offset impacts from the freeway projects in the 13 freeway segments covered by Measure M2. In 2017, Measure M2 was rebranded as OC Go. The Orange County Transportation Authority (OCTA) prepared a Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP or Plan) as a mechanism to offset potential project-related effects on threatened and endangered species and their habitats in a comprehensive manner. The Plan achieves higher-value conservation than what would be expected through project-by-project mitigation in exchange for a streamlined project review and permitting process for the Measure M2 freeway program as a whole.

1.2 Introduction

The purpose of this document is to provide an update on the status of the Plan implementation activities that have occurred during the reporting period for this Annual Report. This Annual Report includes all Plan implementation undertaken in 2019. The information in this report will be used in compliance monitoring to determine if OCTA is properly implementing the M2 NCCP/HCP pursuant to relevant regulations and permit conditions. Annual tracking and reporting of the Plan implementation activities is required by Section 8.4 of the Plan; Section 10.1 of the Implementing Agreement, dated November 2016; the Federal Fish and Wildlife 10(a)(1)(B) Permit No. TE32842C-0, dated June 19, 2017; and the NCCP Permit No. 2835-2017-001-05, dated June 19, 2017.

1.3 Compliance Matrix

To satisfy the terms and conditions of the state and federal take authorization, OCTA is required to fulfill the obligations outlined in the Plan and Implementing Agreement (IA). Implementation tasks associated with these regulations are completed or ongoing, as described in Table 1-1. This table summarizes the compliance actions, identifies the Plan sections, briefly describes the compliance requirement, and summarizes the steps OCTA is currently taking. The compliance actions are described in greater detail later in this report.

Table 1-1. M2 NCCP/HCP Compliance Matrix

Compliance Action	Plan Section Reference	Description	Summary of OCTA Compliance	Annual Report Section Reference
Tracking Impacts	5.8.1, 7.1	The NCCP/HCP Administrator will be responsible for collecting and maintaining information that tracks impacts on natural resources resulting from covered freeway improvement projects and other management and monitoring activities on Preserves (Covered Activities) to ensure that the amount of impacts that ultimately occur under the Plan stays below the amount of impacts estimated during Plan development.	OCTA has developed procedures and approaches to track project impacts to ensure they are consistent with the Plan.	Chapter 2
Freeway Improvement Projects	5.8.1.1	The NCCP/HCP Administrator will be responsible for tracking the status of covered freeway improvement projects.	OCTA maintains a table summarizing the status of the M2 freeway improvement projects.	2.1.1
Habitat Types	5.8.1.1, Appendix F	OCTA will record the acres of direct and temporary impacts to natural communities using detailed vegetation mapping completed as part of pre-construction field surveys. The detailed vegetation mapping will be cross-walked and aggregated into the major vegetation types using the Plan. Impacts on natural communities from covered	OCTA has established methods to track the amount of habitat impacts from each covered freeway improvement project. The spreadsheet tracks the cumulative amount of habitat types relative to caps established under the M2 NCCP/HCP.	2.1.2

Compliance Action	Plan Section Reference	Description	Summary of OCTA Compliance	Annual Report Section Reference
		freeway improvement projects will be measured against caps on impacts on individual habitat types and overall habitat.		
Avoidance and Minimization Measures	5.8.1.1	Based on the project-specific biological surveys, OCTA will ensure covered freeway improvement projects include avoidance and minimization measures into project design per guidelines and criteria included in the Plan.	OCTA has developed a consistency determination checklist used to evaluate how and when avoidance and minimization measures are implemented on covered freeway improvement projects. These checklists are submitted to the Wildlife Agencies for review and approval and measures are then included in the Certificate of Inclusion for the project.	2.1.3
Covered Plant Species	5.6.2.2, 5.8.1.2	To ensure any actual impacts on covered plant species are properly addressed, OCTA will implement a Covered Plant Species Policy that will involve the evaluation of impacts based on project-specific field surveys. The policy will also set forth mitigation of impacts using credits determined through field surveys of Preserves and actions taken to enhance, restore, and create populations of covered plant species as part of restoration projects approved for funding	OCTA has established a ledger to track credits and debits for covered plant species.	2.2

Compliance Action	Plan Section Reference	Description	Summary of OCTA Compliance	Annual Report Section Reference
		by OCTA. This policy will require OCTA to maintain a ledger-type accounting system to track credits and debits.		
Preserve Management	5.8.1.3	The Plan establishes that no more than 13 acres (approximately 1%) of the natural habitat within the Preserves will be impacted by Preserve management activities. OCTA and Preserve Managers will track any activities resulting in more than 0.1 acre of new direct effects on natural habitat within the Preserves and record this information in a ledger that will be submitted to the Wildlife Agencies as part of the Plan's Annual Report.	OCTA has established a process to track and monitor any Preserve management activities that would result in permanent impacts more than 0.1 acres. A ledger has been created. To date, no permanent impacts have been recorded on the Preserves.	2.3
Maintain Rough Proportionality	5.8.2	The Plan specifies that conservation measures must be implemented roughly proportional in time and extent to the impacts on habitat authorized under the Plan. Conservation measures are measured once conservation easements are recorded on Preserves and when restoration projects are signed off as meeting their success criteria.	OCTA is tracking the progress of the implementation of conservation measures relative to impacts associated with Covered Activities. The Big Bend and City Parcel restoration projects have been signed off, and the habitat credits from these restoration projects are sufficient to be ahead of impacts to date.	2.4

Compliance Action	Plan Section Reference	Description	Summary of OCTA Compliance	Annual Report Section Reference
Oversight of M2 Preserve Management and Monitoring	5.4, 7.1, 7.2			Chapter 3
Acquisition	5.4	The acquisition of habitat Preserves was a key component of the Plan conservation strategy. Prior to the Plan being completed, OCTA selected and acquired seven Preserves with approximately 1,236 [a] acres of natural habitat. The locations of the Preserves across the Plan Area are shown on Figure 1. The selection of the Preserves, completed in coordination with the Environmental Oversight Committee (EOC) and Wildlife Agencies, was designed to meet the biological goals and objectives of the Plan while also contributing to the collective goals of the existing regional network of protected areas within the Plan Area.	The collection of Preserves acquired by OCTA in the Trabuco Canyon area has created a substantial block of conservation in an area that did not previously exist as protected open space. The Preserves in Laguna Beach (Pacific Horizon), Brea (Eagle Ridge), and Silverado Canyon area (Silverado Chaparral) add to blocks of existing protected open space in Orange County. These Preserves provide for the protection of diverse habitats across the Plan Area.	3.2
Initial Reconnaissance and Baseline Surveys	7.2.7.4	Baseline monitoring establishes conditions at a given point in time. It is a one-time event that characterizes the status of conserved resources, as well as threats and stressors, for planning or future comparisons.	For each of the seven Preserves, OCTA contracted with Bonterra Psomas to complete baseline biological surveys that included detailed vegetation mapping and focused surveys of Covered Species.	3.2 and summarized in the 2018 First Annual Report
Preparation of RMPs	7.2.4	A Resource Management Plan (RMP) will be developed for	OCTA has completed RMPs for all seven Preserves. Each	3.2

Compliance Action	Plan Section Reference	Description	Summary of OCTA Compliance	Annual Report Section Reference
		each Preserve that will include Preserve-specific goals and objectives relating to natural communities, Covered Species, and other ecosystem function(s), which demonstrate how the Preserve supports the overall goals and objectives of the OCTA NCCP/HCP.	RMP was reviewed and approved by the Wildlife Agencies. Draft RMPs were circulated for public review and OCTA held public workshops to obtain input. The Final RMPs are posted on the OCTA EMP website. The RMPs will be reviewed every 5 years and updated as necessary to prioritize management actions based on the changing Preserve needs.	
Recording of Conservation Easements (CEs)	7.2.4.1	Conservation easements will be recorded for each Preserve that will provide a legal mechanism to ensure each Preserve is maintained and managed in perpetuity as a habitat Preserve. Conservation easements will be recorded not later than 2 years from permit issuance. Conservation easements for each Preserve will be held by appropriate entities, depending upon the Preserve Manager.	OCTA is currently working on the preparation of conservation easements for each Preserve and anticipates these will be finalized in the near future.	3.2
Identification of Preserve Manager	8.2.1.2	For each Preserve, a long-term Preserve Manager will be identified.	OCTA is currently serving as the Preserve Manager for each Preserve. OCTA has contracted with firms (RECON and Glenn Lukos Associates [GLA]) to provide Preserve management and	3.2

Compliance Action	Plan Section Reference	Description	Summary of OCTA Compliance	Annual Report Section Reference
			monitoring assistance. High Level Security Services (HLSS) as well as Orange County Sheriff are providing security services for OCTA. OCTA will transition to a long-term Preserve Manager for each Preserve in the near future.	
General Stewardship and Preserve Management	7.2.5	The M2 NCCP/HCP includes guidelines for management of Preserves. These guidelines are meant to describe the range of management activities that could be needed, depending on a variety of Preserve-specific conditions.	OCTA has completed RMPs for each Preserve that define the Preserve-specific management activities. OCTA is currently serving as the Preserve Manager for each Preserve and has contracted with firms (RECON, GLA and HLSS), to provide Preserve management assistance.	3.2, Appendix C and D
Public Access Policy and Enforcement	7.2.5.7, 7.2.5.8	The primary purpose of acquiring the Preserves is to meet the biological requirements of the NCCP/HCP; however, the Preserves provide additional benefits, such as opportunities for passive recreation. Passive recreational use in the Preserves will be managed to be consistent with the protection and enhancement of biological resources.	For each Preserve, a public access approach was developed for the RMPs that addressed recreation and allowable uses that are compatible with the biological goals and objectives of the Plan. The RMPs were reviewed and approved by the Wildlife Agencies. OCTA conducts public hikes and equestrian rides at designated Preserves.	3.2, 6.1.2
Invasive Species Control Plan and Implementation	7.2.5.1	The control of invasive nonnative plant species is one of the most important	Invasive Species Management Plans were completed and approved by	3.2, Appendix C and D

Compliance Action	Plan Section Reference	Description	Summary of OCTA Compliance	Annual Report Section Reference
		components of Preserve management because these species can aggressively out-compete native species, thereby reducing habitat quality within a Preserve.	the Wildlife Agencies for each Preserve. These Plans (authored by GLA) include detailed mapping for existing invasive species and prioritization for invasive species treatment actions. OCTA has begun the implementation of invasive species control on the Trabuco Rose Preserve.	
Fire Management Plan and Fire Response	7.2.5.9	The Plan outlines the requirement for the preparation of a Fire Management Plans (FMPs) for each Preserve.	OCTA has contracted with Wildland Res Mgt to complete a FMP for each Preserve. Draft FMPs are anticipated to be completed in 2020. The FMPs will establish policies and approaches to maximize protection of biological resources during fire suppression activities, to the degree feasible. In 2016, there was a 1.5-acre fire on the Eagle Ridge Preserve. The fire was extinguished quickly and the burn area recovered. No fires within the OCTA Preserves have occurred during the period covered by this Annual Report.	3.2
Biological (Effectiveness) Monitoring	7.2.7.4 Table 7-1	Effectiveness monitoring assesses status and trends, as well as threats and stressors, and requires biological expertise. Effectiveness	OCTA has been completing surveys for Covered Species and their habitat within the Preserves based on schedules set forth in the	3.2, Appendix C

Compliance Action	Plan Section Reference	Description	Summary of OCTA Compliance	Annual Report Section Reference
		monitoring will be completed following the frequency and survey protocols listed in Table 7-1 of the M2 NCCP/HCP in perpetuity.	RMPs. In 2019, OCTA (GLA) also mapped cactus scrub habitat on all of the Preserves to identify key habitat areas for cactus wren, and for use in the management of sensitive resources in the context of fire management.	
Adaptive Management	7.2.7	The Plan sets forth the expectation and outlines an approach for the Preserves to be managed using an adaptive management strategy. Adaptive management provides a strategy to improve future management actions through monitoring to evaluate management effectiveness.	For each Preserve, OCTA has identified key issues for a focused adaptive management approach as part of the RMP development. These key issues are included as tasks in the monitoring and management of the Preserves.	3.2
Changed Circumstances	8.6.2	Changed Circumstances are defined as those events (flood; fire; drought; invasion by exotic species or disease; toxic spills, vandalism, encroachment, and other illegal human activity; and listing of non-Covered Species) that may affect a species or geographic area covered by this Plan that can reasonably be foreseen by OCTA and the Wildlife Agencies during planning and development of the Plan.	The Plan outlines how Changed Circumstances will be addressed should they occur. During the time period covered by this Annual Report, no events warranting a Changed Circumstance has occurred.	3.2

Compliance Action	Plan Section Reference	Description	Summary of OCTA Compliance	Annual Report Section Reference
Bi-annual Meeting of Preserve Managers	7.1, 7.2.7.6	OCTA will host bi-annual meetings involving the Preserve Managers, Monitoring Biologists, the NCCP/HCP Administrator, and the Wildlife Agencies where implementation, policy, and technical issues of Preserve management will be addressed.	Because OCTA is functioning as the Preserve Manager each of the Preserves, the bi-annual meetings have not been initiated to date. OCTA has been coordinating closely with the Wildlife Agencies on Preserve activity.	N/A
Regional Monitoring	7.2.2	OCTA is not responsible for conducting regional monitoring outside of their specific Preserves but will contribute monitoring data collected at OCTA Preserves in a format that can be integrated with regional monitoring databases as appropriate.	OCTA is continuing to coordinate and collaborate with other regional management and monitoring programs to stay abreast of regional monitoring issues. OCTA has shared monitoring results with other regional entities.	6.1.3
Tracking and Facilitation of M2 Restoration Project Implementation	5.5, 7.1	A key component of the M2 NCCP/HCP conservation strategy was OCTA funding restoration projects throughout the Plan Area. OCTA has funded 11 restoration projects, totaling approximately 357 acres of restored habitats, and a dam removal project. The restoration projects will enhance habitat for Covered Species.	OCTA has been providing oversight of the Restoration Project sponsors to ensure the restoration projects meet the following criteria: (1) the restored habitat meets success criteria identified in final restoration plans approved by the Wildlife Agencies; (2) the restoration project area is conserved through a conservation easement, deed restriction, or other mechanism approved by the Wildlife Agencies; and (3) the	4.1, 4.2

Compliance Action	Plan Section Reference	Description	Summary of OCTA Compliance	Annual Report Section Reference
			restoration site will be managed long-term in accordance with an existing management plan that defines the role for managing the biological values of the restoration project location.	
'Lessons learned' monitoring of restoration projects	7.3	As warranted and in consultation with the Wildlife Agencies, OCTA will conduct follow-up monitoring of restoration projects (approximately every 5 to 10 years) to evaluate the success of the restoration projects and apply 'lessons learned' to future restoration activities.	To be completed at a later date after restoration projects have been completed.	To be presented in subsequent annual reports
Additional Conditions for Coverage	6.5	As part of the Conservation Analysis (Chapter 6) in the M2 NCCP/HCP, there were two Covered Species, arroyo chub and many-stemmed dudleya, noted for additional conditions for coverage above and beyond the acquisition of the seven OCTA Preserves and funding of restoration projects.	OCTA has been working with the Wildlife Agencies to identify and implement actions to achieve coverage for arroyo chub and many-stemmed dudleya.	Chapter 5
Arroyo Chub	6.5	OCTA will implement a future restoration project focused on improving habitat conditions for arroyo chub.	OCTA has initiated the U.S. Forest Service (USFS) Dam Removal restoration project to provide conservation for arroyo chub. In 2017, the EOC and Wildlife Agencies approved moving forward with USFS Dam Removal	5.1.1, 4.2.12

Compliance Action	Plan Section Reference	Description	Summary of OCTA Compliance	Annual Report Section Reference
			project and OCTA has contracted with USFS to remove 14 dams. The restoration activities began in 2018 and are anticipated to be completed in 2020. When this project has been signed off, this condition will have been met.	
Many-stemmed Dudleya	6.5	OCTA will protect, enhance, and/or establish a major population (i.e., 500 individuals) of many-stemmed dudleya.	There is a known population (four occurrences with approximately 180 individuals) identified on the Pacific Horizon Preserve. OCTA is implementing ongoing Preserve management actions to improve habitat suitability (e.g., reduction of invasive species and minimizing recreational impacts) and will monitor results to determine if the existing population can be expanded to meet the threshold.	5.1.2, 3.2.4
Plan Funding	8.3	Both the Natural Community Conservation Plan Act (NCCPA) and Endangered Species Act (ESA) require that a conservation plan approved pursuant to the respective state or federal law must assure availability of adequate funding to implement the Plan's conservation actions.	The primary source of funding for the Plan implementation is the M2 transportation sales tax initiative, which included at least 5% for the revenues for the EMP.	Chapter 7

Compliance Action	Plan Section Reference	Description	Summary of OCTA Compliance	Annual Report Section Reference
Preserve Management	8.3.3	OCTA will establish an endowment to provide a secure and permanent funding source to cover the Preserve management (including adaptive management) cost in perpetuity.	OCTA has established a strategy to accumulate funds for an endowment to cover Preserve management over an estimated period of 10-12 years. During this accumulation phase, funding for ongoing Preserve management is covered through the M2 sales tax revenue stream.	7.1, 7.2
Effectiveness Biological Monitoring	8.3.3	OCTA will establish an endowment to provide a secure and permanent funding source to cover the effectiveness biological monitoring on the Preserves in perpetuity.	OCTA has established a strategy to accumulate funds for an endowment to cover Preserve management over an estimated period of 10-12 years. During this accumulation phase, funding for ongoing effectiveness monitoring is covered through the M2 sales tax revenue stream.	7.1, 7.2
Program Management	8.3.3	OCTA will establish an endowment to fund program management through the permit term.	OCTA will fund program management using the M2 revenue stream until 2041. Between 2041 and 2051 (end of permit term), OCTA will set aside a subfund to continue funding program management.	7.1, 7.2
Changed Circumstances	8.3.3	OCTA will establish an endowment to provide a secure and permanent funding source to cover the responses to Changed	OCTA has established a strategy to accumulate funds for an endowment to cover Preserve management over an estimated period of 10-12 years. During this	7.1, 7.2

Compliance Action	Plan Section Reference	Description	Summary of OCTA Compliance	Annual Report Section Reference
		Circumstances on the Preserves in perpetuity.	accumulation phase, funding for ongoing effectiveness monitoring is covered through the M2 sales tax revenue stream.	
Plan Administration				Chapter 8
NCCP/HCP Administrator	8.2.1.1	OCTA is responsible for implementing the M2 NCCP/HCP and staffing an NCCP/HCP Administrator position.	The NCCP/HCP is being implemented and administered by OCTA staff.	8.1
Minor Modifications	8.5.2	The Plan allows for minor modifications to the Plan, permits, and implementing agreement if the modifications are non-substantive and do not meet the threshold of a Minor and Major Amendment.	OCTA has coordinated with the Wildlife Agencies to identify several minor modifications up through 2018. No new minor modifications were needed in 2019.	8.2
Minor or Major Amendments	8.5.3, 8.5.4	The Plan outlines circumstances in which Minor or Major Amendments to the Plan, permits, and Implementing Agreement could be proposed by OCTA and implemented in collaboration with the Wildlife Agencies.	No Minor or Major Amendments have been proposed or implemented during the timeframe of this Annual Report.	8.3
Changed Circumstances	8.6.2	Changed Circumstances are defined as those events that may affect a species or geographic area covered by this Plan that can reasonably be foreseen by OCTA and the Wildlife Agencies during development of the Plan. Changed Circumstances for	No events meeting the criteria of a Changed Circumstance occurred during the timeframe of this Annual Report.	8.4

Compliance Action	Plan Section Reference	Description	Summary of OCTA Compliance	Annual Report Section Reference
		this Plan include the following reasonably foreseeable events: flood; fire; extended period of reduced precipitation; invasion by exotic species or disease; toxic spills, vandalism, encroachment, and other illegal human activity; and listing of non-Covered Species.		
Annual Reporting				
Annual Report	8.4	OCTA will prepare an Annual Report summarizing activities over the reporting year (January 1 to December 31). Annual reporting will involve report submittal to the Wildlife Agencies by March 1 of each calendar year (or other date as agreed upon by OCTA and the Wildlife Agencies).	This is the second Annual Report and covers all activities in 2019.	
Public Meeting	8.4	A public meeting on the report will be held within 60 days of the report submittal or in conjunction with EOC meetings.	A public meeting will be held in summer 2020 to present the Annual Report, and this document will be posted on the OCTA EMP website.	

[a] The acreage of natural habitat preserved is based on best available information using during the preparation of RMPs and may be slightly different from acreages reported in the M2 NCCP/HCP.

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Chapter 2
Tracking Impacts from Covered Activities

The primary goal of the Plan is to obtain authorization for take of Covered Species under the Natural Community Conservation Plan Act (NCCPA) and Endangered Species Act (ESA) for the implementation of covered freeway improvement projects and other management and monitoring activities on Preserves (Covered Activities). This chapter provides tracking of impacts associated with Covered Activities to ensure implementation stays within the impact caps and procedures outlined in the Plan.

2.1 Covered Freeway Improvement Projects

2.1.1 Status of OCTA M2 Freeway Improvement Projects

Freeway improvement projects covered by this Plan are defined to include all habitat or ground-disturbing impacts resulting from the M2 transportation planning and project implementation process. There are 13 discrete proposed freeway project areas in which freeway segments have been identified for coverage under the Plan. These proposed projects are designed to reduce congestion, increase capacity, and improve traffic flow of Orange County's important transportation infrastructure. The freeway improvement projects are, in all instances, along existing freeways and will include lane additions, interchange improvements, and associated facility upgrades. These freeway improvement projects do not include the construction of new freeways.

Table 2-1 summarizes the current status of the OCTA M2 freeway improvement projects. As the planning and implementation of the OCTA M2 freeway improvement projects progresses, the grouping and organization of segments may be adjusted. The list of segments may be slightly different than the set of projects and segments included in the M2 NCCP/HCP.

Table 2-1. OCTA M2 Freeway Improvement Projects Status

Project	Location	2019 Phase	Expected Construction Start Date	Anticipated Completed Construction	NCCP/HCP Notes
Ongoing:					
Project A	I- 5, SR-55 to SR-57	Construction	Ongoing	April 2021	No Covered Species No 1602 Permit Anticipated
Project B	I-5, I-405 to Yale Ave *Segment 1*	ENV	Early 2025	Late 2028	NCCP/HCP Consistency Determination Checklist (Checklist) and Certificate of Inclusion (COI) complete 1602 Permit Anticipated
	I-5, Yale Ave to SR-55 *Segment 2*		Late 2024	Early 2028	
Projects C and D [a]	I-5, Oso Pkwy to Alicia/La Paz Rd Interchange *Segment 2*	Construction	April 2019	November 2023	NCCP/HCP Checklist and COI complete 1602 Permits per segment
	I-5, Alicia Pkwy to El Toro Rd *Segment 3*	Ad/Award/Design	November 2020	October 2024	
	I-5,	Ad/Award/Design	January 2020	March 2025	

Project	Location	2019 Phase	Expected Construction Start Date	Anticipated Completed Construction	NCCP/HCP Notes
	SR-73 to Oso Pkwy/Avery Pkwy Interchange *Segment 1*				
Project D	I-5, I-5/El Toro Interchange	ENV	TBD	No schedule past ENV	NCCP/HCP Checklist complete and COI pending No 1602 Permit Anticipated
Project F	SR-55, I-405 to I-5 *Segment 1*	Ad/Award/Design	2021	August 2025	No Covered Species NCCP/HCP Checklist and COI complete 1602 Permit anticipated (all concrete impacts)
	SR-55, I-5 to SR-91 *Segment 2*	ENV	Early 2026	Late 2028	NES(MI) Complete No Covered Species NCCP/HCP Checklist and COI pending
Project G	SR-57 (NB), Orangewood Ave to Katella Ave (Segment 1a)	ENV (4/2016 – 3/2019)	Late 2024	Late 2026	NCCP/HCP Checklist and COI Complete
	SR-57 (NB), Lambert to Tonner Canyon	ENV (Expected to begin – 2023)	No schedule past ENV	No schedule past ENV	Pending

Project	Location	2019 Phase	Expected Construction Start Date	Anticipated Completed Construction	NCCP/HCP Notes
Project I	SR-91, SR-55 to Lakeview Ave *Segment 1*	ENV (1/2015–6/2020)	February 2024	September 2027	NCCP/HCP Checklist and COI Complete 1602 Permit Anticipated per segment
	SR-91, La Palma Ave to SR-55 *Segment 2*		May 2024	November 2027	
	SR-91, Acacia St to La Palma Ave *Segment 3*		October 2024	May 2028	
Project J	SR-91, SR-241 to Riverside County Line[2]	ENV (9/2007–10/2012)	TBD (contingent upon future widening in Riverside County)	No schedule past ENV	Full build out not yet scheduled
Project K	I-405, I-605 to SR-73	Construction	On-going	May 2023	All permits obtained
Project L	I-405, I-5 to SR-55	ENV (12/2014–late 2018)	No schedule past ENV	No schedule past ENV	NCCP/HCP Checklist and COI complete 1602 Permit Anticipated
Project M	I-605, I-605/Katella Interchange	ENV (8/2016 – 11/2018)	Mid 2023	Early 2025	NCCP/HCP Checklist and COI complete 1602 Permit Anticipated

[2] This project extends to the I-15. The OCTA NCCP/HCP only covers those anticipated impacts within Orange County (to the County line).

Project	Location	2019 Phase	Expected Construction Start Date	Anticipated Completed Construction	NCCP/HCP Notes
Completed:					
Project C	I-5, Vista Hermosa to PCH	Completed		July 2017	
Project D	I-5, I-5/Ortega Interchange	Completed		January 2016	
Project E	SR-22 Access Improvements	Completed		December 2014	
Project G	SR-57 (NB), Katella to Lincoln	Completed		April 2015	
	SR-57 (NB), Orangethorpe to Yorba Linda	Completed		November 2014	
	SR-57 (NB), Yorba Linda to Lambert	Completed		May 2014	
Project H	SR-91 (WB), I-5 to SR-57	Completed		June 2016	
Project I	SR-91 (WB), Tustin Interchange to SR-55	Completed		July 2016	
Project J	SR-91, SR-55 to SR-241	Completed		March 2013	
	SR-91 (EB), SR-241 to SR-71	Completed		January 2011	

[a] Project C and portions of Project D were combined. This included Project C: (I-5, south of El Toro "Y" Area to Avenida Pico) and Project D: (I-5 between SR-73 and El Toro Road through Lake Forest, Laguna Hills, Laguna Niguel, Laguna Woods, Mission Viejo, and San Juan Capistrano)

I- = Interstate; SR- = State Route; ENV = Environmental; TBD = to be determined; PCH = Pacific Coast Highway; NB = northbound; WB = westbound; EB = eastbound

2.1.2 Tracking of Habitat Impacts from Covered Freeway Improvement Projects

OCTA has implemented a process to track habitat impacts resulting from covered freeway improvement projects that includes the following steps:

1. Biological field surveys are completed as part of project-specific environmental compliance (California Environmental Quality Act/National Environmental Policy Act). This involves vegetation mapping based on field surveys typically using detailed vegetation categories. The detailed vegetation categories are cross-walked to the broad habitat types addressed in the Plan.

2. Grasslands anticipated to be impacted by the freeway improvement projects are in most cases maintained and composed of nonnative grass species. Due to the largely compromised value of this habitat type, an additional assessment is made to determine if impacts on nonnative grassland should be counted against the Plan's allotted impact caps. If it can be shown that the nonnative grassland areas meet all of the following criteria, impacts on nonnative grassland will **not** be counted:

   a) The nonnative grassland is within the median or interchanges (between on and off-ramps and the freeway or contained within clover leafs) OR within the narrow (i.e., less than 100-foot wide) strips between the freeway and adjacent development or ornamental landscaping;

   b) The nonnative grassland is regularly maintained; and

   c) The nonnative grassland does not provide live-in habitat or is not located within a significant dispersal corridor for Covered Species.

   This determination is made on a project-by-project basis using project-specific biological surveys that will be further assessed in collaboration with OCTA and the California Department of Fish and Wildlife (CDFW) and U.S. Fish and Wildlife Services (USFWS) (collectively, the Wildlife Agencies). The final impact acreages will be included in the NCCP/HCP Annual Report and tracking spreadsheet.

3. For each individual freeway improvement project, OCTA completes a quantification of impacts (both permanent and temporary) on each habitat type by overlaying the impact footprint with the vegetation mapping. Temporary impacts, which will require revegetation to previous conditions per restoration plans reviewed and approved by the Wildlife Agencies, are still included in this impact tracking because the impacts estimate in the Plan included both permanent and temporary impacts.

OCTA keeps an accounting of the Plan-to-date impacts on habitat types for all freeway improvement projects included under the Plan to ensure impacts stay within the caps listed in Table 5-7 of the Plan. Table 2-2 provides a program-to-date overview of habitat types impacted by OCTA M2 freeway improvement projects in comparison to caps established within the Plan. A detailed table of habitat impacts for each individual covered freeway project is included in Appendix A.

Table 2-2. OCTA M2 Freeway Improvement Project Program-to-Date Habitat Impact Tracking Sheet[a]

Plan Vegetation Types	Plan Caps	Impacts (Program to Date)[b]	Balance
Chaparral	5.0	-	5.0
Coniferous Forest	-	-	-
Grassland	108.1	6.460	101.7
Riparian	5.0	0.957	4.0
Scrub	10.0	1.705	8.3
Water	0.4	0.12	0.28
Wet Meadow/Marsh	2.5	-	2.5
Woodland	10.0	-	10.0
TOTALS	**141.0**	**9.2**	**131.8**

[a] Values are in acres.

[a] See Appendix A for summary of impacts from each individual covered freeway project.

2.1.3 Consistency Determinations for Covered Freeway Improvement Projects

OCTA has developed a consistency determination checklist to evaluate how and when avoidance and minimization measures and restoration of temporary impacts are implemented on covered freeway improvement projects. These consistency determinations are forwarded to the Wildlife Agencies for review and approval. The avoidance and minimization measures are then incorporated into the project-level Environmental Commitment Record (ECR) as well as the OCTA/California Department of Transportation (Caltrans) Certificate Of Inclusion (COI). The ECR is a document utilized to track a project's environmental commitments from design to post-construction. The COI enables OCTA to extend the incidental take authorization of Covered Species to Caltrans. Table 2-3 includes a summary of the consistency determinations that have been drafted, modified, or completed within the timeframe of this Annual Report.

Table 2-3. OCTA M2 Freeway Improvement Project Consistency Determinations

Project ID	Date of Biologist Review	Incorporated into ECR?	COI Signed?	Wildlife Agency Concurrence?	Restoration of Temporary Impacts Anticipated?
Project C EA 0K0200	5/30/18	Yes	Yes	Yes	Yes
Project B EA 0K6700	7/9/18	Yes	Yes	Yes	No
Project L EA 0K710K	1/29/18	Yes	Yes	Yes	Yes
Project M EA 0K8700	6/7/18	Yes	Yes	Yes	No
Project D EA 0M9800	12/10/19	Pending	Pending	Pending	No
Project F EA 0J3400	11/11/2019	N/A	N/A	Yes	No
Project G EA 0M9700	3/12/19	Yes	Yes	Yes	No
Project I EA 0K9800	3/28/19	Yes	Yes	Yes	Yes

2.2 Tracking for Covered Plant Species Policy

The OCTA M2 NCCP/HCP includes three plant species (intermediate mariposa lily, many-stemmed dudleya, southern tarplant) on the Covered Species list. These covered plant species are narrow endemics that have highly restrictive habitat requirements, localized soil requirements, or other ecological factors that limit their distribution. To ensure any actual impacts on covered plant species are properly addressed, the M2 NCCP/HCP established the Covered Plant Species Policy (see Section 5.6.2.2 of the M2 NCCP/HCP). This policy requires the evaluation of impacts on the covered plant species be based on project-specific field surveys and sets forth a process to track mitigation of impacts using credits determined through field surveys of Preserves and actions taken to enhance, restore, and create populations of covered plant species as part of restoration projects funded by OCTA. OCTA has been implementing a process to maintain a ledger-type accounting system to track credits and debits.

2.2.1 Covered Plant Species Credits/Debits Ledger

OCTA has developed a process to track credits for covered plant species protection (on Preserves) and restoration/enhancement (restoration projects). Each covered activity must include an assessment of the potential for covered plant species to occur and complete focused surveys as appropriate. Table 2-4 provides a ledger of covered plant species credits and debits as of December 31, 2019.

Intermediate Mariposa Lily

Many-stemmed Dudleya

Southern Tarplant

Table 2-4. Covered Plant Species Credits and Debits Ledger [a]

Plant	Credits	Impacts[b]	Debits[c]	Balance	Year Surveyed	Project Element	Source
Intermediate Mariposa Lily	151			+151	2015	Pacific Horizon (Aliso Canyon) Preserve	Baseline surveys (Bonterra Psomas 2015a)
	69			+220	2013	Trabuco Rose (Ferber Ranch) Preserve	Baseline surveys (Bonterra Consulting 2013)
	74			+294	2013	Bobcat Ridge (Hafen) Preserve	Baseline surveys (Bonterra Consulting 2013)
	18			+312	2015	Silverado Chaparral (MacPherson) Preserve	Baseline surveys (Bonterra Psomas 2015b)
	283			+595	2013	Wren's View (O'Neill Oaks) Preserve	Baseline surveys (Bonterra Consulting 2013)
	2			+597	2013	Live Oak Creek (Saddle Creek South)	Baseline surveys (Bonterra Consulting 2013)
	356			+953	2013 - 2019	Monitoring at Trabuco Rose Preserve	Biological monitoring of the Trabuco Rose Preserve between 2013 and 2019 resulted in an estimated population of 356 intermediate mariposa lily plants being identified.
	10			+963	2018	Monitoring at Bobcat Ridge Preserve	Biological monitoring of the Bobcat Ridge Preserve in 2018 resulted in 10 new observations of intermediate mariposa lily plants (GLA 2019b).
	100			+1,063	2019	Monitoring at Silverado Chaparral	Biological monitoring of the Silverado Chaparral Preserve in 2019 (GLA 2020).
	27			+1,090	2019	Monitoring at Bobcat Ridge	Biological monitoring of the Bobcat Ridge Preserve in 2019 (GLA 2020).
	213[3]			+1,303	2019	Monitoring at Wrens View	Biological monitoring of the Wrens View Preserve in 2019 (GLA 2020).
		0	0	+1,303			No impacts from Covered Activities to date.
Current Balance:				**+1,303**			

[3] Wrens View monitoring documented 223 new occurrences, however approximately 10 are not being counted as they are within the routinely disturbed access road footprint.

Plant	Credits	Impacts[b]	Debits[c]	Balance	Year Surveyed	Project Element	Source
Many-stemmed Dudleya	60			+60	2017	Pacific Horizon (Aliso Canyon) Preserve	Baseline surveys (Bonterra Psomas 2017)
	40			+100			Biological monitoring of the Pacific Horizon Preserve in 2018 observed a population of 100 individuals (GLA 2019b).
	80			+180		Monitoring at Pacific Horizon	Biological monitoring of the Pacific Horizon Preserve in 2019 (GLA 2020).
		0	0	+180			No impacts from Covered Activities to date.
Current Balance:				**+180**			
Southern Tarplant	1,513			+1,513	2018	Harriett Wieder Restoration Project	The Bolsa Chica Conservancy began seeding activities as part of the restoration project in early January 2018. Surveys in August 2018 totaled 1,513 plants of southern tarplant (Bolsa Chica Conservancy 20198).
	6,864			+8,377		Harriett Wieder Restoration Project	The Bolsa Chica Conservancy 2019 annual report totaled 8,377 plants of southern tarplant (Bolsa Chica Conservancy 2019). An increase of 6,864 occurrences.
	51,000			+59,377		Fairview Park Resotraiton Project	The city of Costa Mesa documented just over an acre of Southern tarplant in the 2019 annual monitoring report.
		0	0	+59,377			No impacts from Covered Activities to date.
Current Balance:				**+59,377**			

[a] Credits and debits measured in number of individual plants.

[b] Cumulative impacts cap is 500.

[c] The amount of debits required is calculated using a 3:1 mitigation ratio.

2.2.1.1 Documents Referenced for Covered Plant Species Credits and Debits

Bolsa Chica Conservancy. 2018. *Harriett Wieder Regional Park Habitat Restoration Project: Southern Tarplant Survey 2018*.

Bolsa Chica Conservancy. 2018. *Harriett Wieder Regional Park Habitat Restoration Project: Southern Tarplant Survey 2019*.

BonTerra Consulting. 2013. *Draft Biological Technical Report for the South County Properties, Measure M2 Freeway Environmental Mitigation Program Acquisition Properties Evaluation.* Irvine, CA. December.

Bonterra Psomas. 2015a. *Baseline Biological Surveys Technical Report for the Aliso Canyon (Pacific Horizon) Property, Measure M2 Freeway Environmental Mitigation Program Acquisition Properties Evaluation in Orange County, California*. October.

BonTerra Psomas. 2015b. *Baseline Biological Surveys Technical Report for the MacPherson Property, Measure M2 Freeway Environmental Mitigation Program Acquisition Properties Evaluation*. Irvine, CA. September.

Endemic Environmental Services. 2019. Fairview Park Riparian and Wetlands Mitigation Project Quarterly Report. Submitted to the City of Costa Mesa. September.

Endemic Environmental Services. 2019. Fairview Park Riparian and Wetlands Mitigation Project. Submitted to the City of Costa Mesa. December.

Glenn Lukos Associates (GLA). 2019a. *Annual Biological Monitoring Report for OCTA M2 Preserves – Trabuco Rose Preserve*. Prepared for OCTA. February.

Glenn Lukos Associates (GLA). 2019b. *Biological Monitoring Report for OCTA M2 Preserves – Pacific Horizon, Bobcat Ridge, Silverado Chaparral, Wren's View, Live Oak Creek, and Eagle Ridge*. Prepared for OCTA. March.

Glenn Lukos Associates (GLA). 2020. *Biological Monitoring Report for OCTA M2 Preserves – Trabuco Rose, Pacific Horizon, Bobcat Ridge, Silverado Chaparral, Wren's View, Live Oak Creek, and Eagle Ridge.* Prepared for OCTA. March.

2.3 Tracking Impacts on Habitat Types Resulting from Covered Activities within Preserves

The M2 NCCP/HCP establishes that no more than 13 acres (approximately 1%) of the natural habitat within the acquired Preserves will be impacted by Preserve management activities that will result in new permanent impacts on habitat. The 13 acres of anticipated impacts within the Preserves may be concentrated within a few of the Preserves or be spread evenly throughout each of the Preserves. Potential impacts include activities such as construction of new trails, access roads, recreation facilities, and maintenance structures. OCTA and Preserve Managers have been tracking any activities resulting in more than 0.1 acre of new direct effects on natural habitat within the Preserves and will record this information in a ledger to be included in this Annual Report.

OCTA will ensure that the overall cap across all Preserves is not exceeded. If degraded habitat and/or existing developed areas (e.g., roads and trails) within the Preserves are restored and converted to native habitat, OCTA will also be able use credits from these activities, subject to review and approval by the Wildlife Agencies, to offset impacts within the Preserves. OCTA will track impacts and credits within the Preserves for each of the individual habitat types, but will be held to a cap only for the overall amount of natural habitat impacted.

To date, no impacts or credits for habitat creations have been recorded on the Preserves. It is anticipated that as some of the trails are restored and invasive species are removed from disturbed areas that additional credits will be added (once approved by the Wildlife Agencies) to the 13 acres of allowable impacts.

2.4 Maintaining Rough Proportionality

Under the NCCPA, conservation measures in an approved NCCP must be roughly proportional in time and extent to the impact on habitat or Covered Species authorized under the plan. Similarly, the USFWS HCP Policy Handbook provides that mitigation for project impacts should generally occur prior to or concurrent with the impacts.

Implementation of conservation measures roughly proportional in time and extent to impacts on natural communities and Covered Species will be measured as follows: (1) for habitat acquired, the date of recordation of a conservation easement (CE) or other approved site protection mechanism; and (2) for restoration projects, the date on which the restoration projects have met their success criteria. For the purpose of maintaining rough proportionality, OCTA will ensure that a minimum 2:1 mitigation ratio for direct impacts will be maintained for each vegetation community, with the exception of grassland, which will be maintained at a minimum 1:1 ratio. Thus, for each acre of chaparral, riparian vegetation, scrub, and woodland that is directly impacted, at least 2 acres will have been conserved or restored before the impacts take place. For each acre of grassland that is directly impacted, at least 1 acre will have been conserved or restored before the impacts take place. If OCTA has not conserved or restored enough grassland habitat acreage to offset grassland impacts, it can offset grassland impacts with “out-of-kind” habitat at a 2:1 ratio. Compliance with the requirement to maintain rough proportionality will be monitored by OCTA and will be reported on an annual basis as part of the Annual Report.

Because OCTA was able to accelerate the implementation of conservation actions (Preserve acquisitions and restoration projects) through the early action plan, it is expected that most or all of the conservation actions under the Plan will be completed (i.e., CEs recorded for OCTA Preserves and restoration projects signed off as meeting their success criteria) within 10 years after permit issuance. This will be prior to when a substantial percentage of the impacts from Covered Activities occur. To ensure that rough proportionality will be maintained during the first few years of the Plan, OCTA will either record a CE for at least one Preserve or be able to demonstrate that one or more restoration projects have received sign-off from the Wildlife Agencies as meeting their success criteria within 2 years of permit issuance. To date, two restoration projects (Big Bend and City Parcel) have met their success criteria.

Upland-transitional restoration transect photo point for Big Bend Restoration Project.

Table 2-5 provides a ledger of the balance of credits achieved and habitat impacts as of December 31, 2019. Table 2-6 lists the conservation credits that have been achieved to date.

Upland portion of City Parcel Restoration Project. Signed off in 2018.

Table 2-5. Rough Proportionality of Impacts and Conservation Credits Ledger[a]

Habitat Type	Habitat Impacts Permitted to Date[b]	Rough Proportionality Requirements[c]	Habitat Credits Achieved to Date[d]	In-Kind Habitat Balance[e]	Out-of-Kind Credits Used[f]	Current Balance
Chaparral	--	--	--	--	--	--
Coniferous Forest	--	--	--	--	--	--
Grassland	6.5	6.5	--	- 6.5	+ 6.5	0.0
Riparian	1.0	2.0	13.1	+ 11.1	--	+ 11.1
Scrub	1.7	3.4	43.2	+ 39.8	- 13.0	+ 26.8
Water	0.12	0.24	0.4	+ 0.16	--	+0.16
Wet Meadow/Marsh	--	--	--	--	--	--
Woodland	--	--	--	--	--	--

[a] Values are in acres.
[b] See Table 2-2.
[c] Based on a 2:1 ratio for all habitats except grasslands, which is 1:1.
[d] See Table 2-6.
[e] Habitat credits minus rough proportionality requirements.
[f] Negative balance of grassland habitat can be offset with a 2:1 use of "out-of-kind" credits from another habitat type.

Table 2-6. Conservation Credits Achieved to Date[a]

Conservation Action	Total	Chaparral	Coniferous Forest	Grassland	Riparian	Scrub	Water	Wet Meadows/ Marsh	Woodland
Total Conservation Credits to Date:	**46.7**	**--**	**--**	**--**	**13.1**	**43.2**	**0.4**	**--**	**--**
Big Bend Restoration Project	3.7	--	--	--	0.5	3.2	--	--	--
City Parcel Restoration Project[b]	43.0	--	--	--	12.6	40.0	0.4	--	--

[a] Values are in acres.
[b] A calculation of the amount of "open water" at the City Parcel Restoration Project was determined by the project sponsor (per email from Jordan Wills dated January 14, 2019), which was subtracted from the acreage of restored riparian habitat.

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Chapter 3
OCTA Preserves

3.1 Introduction

The acquisition of Preserve lands was a primary component of the M2 NCCP/HCP conservation strategy. The selection of the Preserves was designed to meet the biological goals and objectives of the Plan while also contributing to the collective goals of the existing regional network of protected areas within the Plan Area. OCTA has acquired seven properties as part of the M2 NCCP/HCP. The locations of the M2 Preserves are shown in Figure 1 and the acreage totals are listed in Table 3-1.

Table 3-1. OCTA Preserves

OCTA Preserves	Location	Total Acres[a]	Acres of Natural Habitat
Bobcat Ridge	Trabuco Canyon	48.0	47.9
Eagle Ridge	City of Brea	301.1	296.1
Live Oak Creek [b]	Trabuco Canyon	82.8	51.3
Pacific Horizon	City of Laguna Beach	151.9	148.3
Silverado Chaparral	Silverado Canyon	203.5	200.0
Trabuco Rose	Trabuco Canyon	395.7	380.4
Wren's View	Trabuco Canyon	116.1	112.4
Totals		**1,299.1**	**1,236.4**

[a] These acreages are based on best available information used during preparation of RMPs and may be slightly different from acreages reported in the M2 NCCP/HCP.

[b] Live Oak Creek Preserve was purchased, in part, with funding provided by the National Fish and Wildlife Foundation. OCTA receives a percentage of the available credits based on the percentage of the total cost of acquiring and managing the Preserve contributed by OCTA (75.36%).

The M2 NCCP/HCP establishes guidelines for the management and monitoring of the Preserves to ensure the long-term health and viability of species and ecological values within the Preserves. Each Preserve has had Preserve-specific Resource Management Plans (RMPs) developed. Appendix C through E summarizes various Preserve maintenance and stewardship activities, including invasive species management, tree evaluations, and general maintenance activities.

3.2 Preserves Status

The following sections provide a status summary for each M2 Preserve.

3.2.1 Bobcat Ridge Preserve

Action	Bobcat Ridge Preserve Status
Acquisition	Acquired in May 2011.
Baseline Surveys	Baseline surveys were completed in 2013 by BonTerra Consulting and results documented in the Baseline Survey Technical Report. This report is included as an appendix to the RMP.
Preparation of Resource Management Plan	The draft RMP was completed in August 2017 and was available for public review for a 90-day period through December 2017. Final RMP was completed and posted on OCTA EMP website in September 2017. http://www.octa.net/Projects-and-Programs/OC-Go/OC-Go-(2011-2041)/Freeway-Mitigation/Resource-Management-Plans/
Recording of Conservation Easement	A conservation easement for the Bobcat Ridge Preserve is being prepared and is anticipated to be recorded in the near future.
Identification of Preserve Manager	Currently the Preserve is being managed by OCTA, but a long-term Preserve Manager is anticipated to be in place in the near future.
General Stewardship and Preserve Management	OCTA staff, with assistance from Preserve Management contractor RECON, and Preserve biological monitor Glen Lukos Associates (GLA) implemented routine and ongoing property management and maintenance activities. A description and inventory of general stewardship and Preserve management activities conducted is included in Appendices B and C. GLA biologists detected a pair of cactus wren during a stewardship monitoring visit and heard cactus wren on a separate visit (GLA 2020).
Public Access Policy and Enforcement	Based on an evaluation of biological resources, safety concerns, and local land use/parking constraints conducted as part of the preparation of the Bobcat Ridge RMP, it was determined that public access cannot be accommodated on this Preserve at this point in time.
Invasive Species Control Plan and Implementation	OCTA contracted with Glenn Lukos Associates (GLA) to serve as a Restoration Ecologist and prepare an Invasive Species Management Plan (ISMP). This ISMP was prepared and approved by the Wildlife Agencies. OCTA is prioritizing ISMP implementation based on threats to Covered Species. GLA biologists detected and removed a clump of stink net located adjacent to the Preserve boundary. Biological monitoring and actions will continue to quickly eradicate any new emergent invasives as outlined in the ISMP. Recent monitoring has confirmed both the Invasive Shot Hole Borer as well as the Gold Spotted Oak Borer in the Trabuco Canyon Area. OCTA will continue to monitor and treat trees that are being impacted by these invasive species. Dudek conducted emergent pest trapping in July 2019 to reevaluate for the presence of ISHB, and again found no sign and/or symptom of ISHB on this specific Preserve. The report containing detailed information of this study is included as an Appendix to the Preserve Monitoring attachment (Appendix C).
Fire Management Plan and Fire Response	OCTA has contracted with Wildland Res Mgt to complete a Fire Management Plan (FMP). A draft FMP is scheduled to be completed in 2020. The FMP will establish policies and approaches to maximize protection of biological resources during fire suppression activities, to the degree feasible. No fires within the Preserve have occurred during this period.

Action	Bobcat Ridge Preserve Status
Biological (Effectiveness) Monitoring	Biological monitoring for covered bird species was completed in 2017 (CDFW 2017). Although Cactus wren were not detected in 2017, GLA have detected them during stewardship monitoring visits at Bobcat Ridge in 2019. They were also detected during past baseline studies. Camera monitoring occurred for covered mammal species and wildlife movementin 2019. GLA established two wildlife camera stations on the Preserve in 2019. Wildlife detected by the cameras included deer and fox. See the Effectiveness Monitoring Schedule in Appendix .
Public Outreach / Education	OCTA has conducted public outreach and education as part of the preparation of the Draft and Final RMP.
Adaptive Management	The RMP has identified the following key issues for a focused adaptive management approach to address uncertainties of Preserve management: • **Vegetation Control around Cactus Patches.** Research current approaches for vegetation management around cactus patches to determine if this is needed at the Bobcat Ridge (Hafen) Preserve to protect and/or improve cactus wren populations. Approximately 1.47 acres of cactus patches were documented on the Preserve in 2019 (GLA 2020). This data will serve as the base for any future cactus patch vegetation management actions at the Preserve.
Changed Circumstances	No events occurred that meet the Changed Circumstances requirements during this period.
General Comments / Concerns	OCTA will continue to monitor the recovery of habitat at the southern boundary of the Preserve in response to a neighbor's unauthorized impact. The impact area was assessed (Appendix G) and it was determined the the 0.135 acre impacted is passively restoring and is expected to successfully recover without intervention. In addition, OCTA had new signs posted and increased the monitoring within this area. This area will continue to be a focus for monitoring.

3.2.1.1 Management and Monitoring Summary

The most recent effectiveness monitoring included focused surveys for covered bird species in 2017 (CDFW 2017). No cactus wren or coastal California gnatcatcher were detected at Bobcat Ridge Preserve during the previous effectiveness monitoring surveys, even though cactus wren had previously been documented during the biological baseline surveys (Bonterra Consulting 2013). In 2019, GLA detected a pair of cactus wren during a stewardship monitoring visit and heard cactus wren on a separate visit (GLA, 2020). Photos of a cactus wren, nest location and a nest are included in the GLA 2019 Annual Report and is attached as Appendix C (Exhibit 2C1).

Bobcat Ridge is one of three OCTA Preserves being monitored by Audubon Starr Ranch as part of a 5-year project to qualitatively and quantitatively monitor plant communities to assess stability of vegetation cover (see Section 3.3.1, *Vegetation Cover Quantitative and Qualitative Monitoring*). In the most recent monitoring report, it was noted that vegetation at Bobcat Ridge was generally stable compared to 2017-18 qualitative observations, but with relatively higher cover of non-native mustards (*H. incana, B. nigra*) and reduced woodland tree canopy cover . The report also noted that coastal sage scrub had especially high cover of the non-native annual grass *B. madritensis* and the forb *Hirschfeldia incana.* The condition of the vegetation can be partially attributed to the fact that

2018-19 was an above average rainfall season. Survey results largely reflect the higher rainfall (Audubon Starr Ranch 2019).

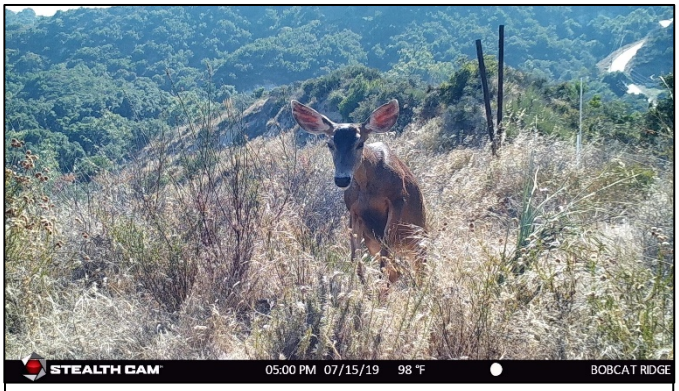
Intermediate mariposa lily during 2012 baseline surveys (photograph courtesy of M. Couffer).

In support of the protection of Covered Species, including cactus wren, GLA mapped the locations of cactus scrub to identify key habitat areas for cactus wren, and for use in the management of sensitive resources in the context of fire management. A total of 1.47 acres of cactus scrub was mapped within Bobcat Ridge. This data will be beneficial for future decision making regarding recommended vegetation management. It will also be utilized in the Bobcat Ridge Preserve Fire Management Plan (FMP) that is currently being drafted.

GLA timed monitoring visits in the spring to coincide with the blooming period of intermediate mariposa lily, which has been previously detected onsite. GLA observed locations of the mariposa lily that had been documented during previous baseline surveys and/or monitoring as well as approximately 27 new occurrences.

As part of general stewardship monitoring, GLA staff had previously documented unauthorized impacts of coastal sage scrub at the Bobcat Ridge Preserve (2017) resulting from an adjacent neighbor intentionally clearing a path along the southern border of the Preserve to access an adjacent area of their land. The neighbor did not obtain a permit from the County for this clearing and was ordered to restore the disturbance, but to date the restoration has not been completed. In 2019, GLA conducted an assessment of the damage and concluded that passive habitat reestablishment is expected to be successful for this 0.135 acre impacted area (GLA 2020). Intermediate mariposa lily was documented within this disturbed area, although in lower numbers. Three new signs ware placed near the impacted area as well as two wildlife cameras. The cameras confirmed that Mule deer and fox are utilizing the Preserve. Monitoring will continue for this area, with a specific focus on the lily.

An Invasive Species Management Plan (ISMP) was approved by the Wildlife Agencies for the Bobcat Ridge Preserve. As part of the ISMP preparation, the distribution of invasive plant species on the Preserve were mapped and priority areas for removal and methodologies were identified. This ISMP was approved by the Wildlife Agencies in 2019. OCTA is prioritizing ISMP implementation based on threats to Covered Species. As the invasive species on this Preserve are not as high of a threat to Covered Species or as prevalent as some of our other Preserves, implementation of invasive species control has not yet been scheduled. GLA biologists detected and removed a clump of stink net located adjacent to the Preserve boundary. Biological monitoring will continue and early detection and



Wildlife camera image of a Mule Deer at the Bobcat Ridge Preserve.7/2019

eradication actions will continue to ensure that any new emergent invasives will not colonize within the Preserve as outlined in the ISMP.

Maintenance tasks at the Preserve consisted of the installation of three Preserve signs, the installation of two posts for wildlife cameras, the cutting back of vegetation along the ridge trail for safe Preserve monitoring, and the removal of fallen oak limbs near the public roadway. While removing the oak tree debris, a section of posts with barbed wire fencing (installed by previous owners) was discovered and also removed, and disposed of at an off-site facility (RECON 2020). A more detailed description of the work completed at the Preserves is included in Appendix D.

3.2.1.2 Planned Actions for 2020

Planned actions and priorities for 2020 include:

- Continue monitoring the southern boundary (specifically for intermediate mariposa lily) closely. Determine if additional posts or actions are needed within this area.
- Continue monitoring covered mammal species and wildlife movement utilizing the installed wildlife camera location posts.
- Continue monitoring known populations of intermediate mariposa lily during blooming periods to detect potential trends in population growth or decline. Document additional locations in the Preserve not previously documented.
- Continue preparation of the Bobcat Ridge Preserve FMP.
- Continue preparation of a CE and coordinate with Wildlife Agencies for review and approval of the CE.

3.2.1.3 Related Documents and References

Audubon Starr Ranch. 2019. *Vegetation Monitoring on Three Orange County Transportation Authority Preserves: Bobcat Ridge, Wren's View, and Live Oak Creek*. Operating Agreement 3-5-3711. July 2019

BonTerra Consulting. 2013. *Baseline Biological Surveys Technical Report for the South County Properties, Measure M2 Freeway Environmental Mitigation Program Acquisition Properties Evaluation.* Prepared for OCTA. December.

Glenn Lukos Associates (GLA). 2019. *Biological Monitoring Report for OCTA M2 Preserves – Pacific Horizon, Bobcat Ridge, Silverado Chaparral, Wren's View, Live Oak Creek, and Eagle Ridge*. Prepared for OCTA. March.

Glenn Lukos Associates (GLA). 2020. *Biological Monitoring Report for OCTA M2 Preserves – Trabuc Rose, Pacific Horizon, Bobcat Ridge, Silverado Chaparral, Wren's View, Live Oak Creek, and Eagle Ridge*. Prepared for OCTA. March.

RECON Environmental Services (RECON). 2020. *2019 Summary Letter for Maintenance Activities Performed on OCTA Preserves.* Prepared for OCTA. March.

3.2.2 Eagle Ridge Preserve

Action	Eagle Ridge Preserve Status
Acquisition	Acquired in 2011.
Baseline Surveys	Baseline surveys were completed in 2013 by BonTerra Consulting and results documented in the Baseline Survey Technical Report. This report is included as an appendix to the RMP.
Preparation of Resource Management Plan	Draft RMP was completed in September 2017 and was available for public review for a 90-day period through December 2017. Final RMP was completed and posted on OCTA EMP website in September 2018. http://www.octa.net/Projects-and-Programs/OC-Go/OC-Go-(2011-2041)/Freeway-Mitigation/Resource-Management-Plans/
Recording of Conservation Easement	A CE for the Eagle Ridge Preserve is being prepared and is anticipated to be recorded in the near future.
Identification of Preserve Manager	OCTA currently is contracting with both GLA and RECON to manage this Preserve. A long-term Preserve Manager is anticipated to be in place in the near future.
General Stewardship and Preserve Management	OCTA staff, with assistance from Preserve Management contractor RECON, and Preserve biological monitor Glen Lukos Associates (GLA) implemented routine and ongoing property management and maintenance activities. A description and inventory of general stewardship and Preserve management activities conducted by RECON is included in Appendices B and C.
Public Access Policy and Enforcement	Due to the combination of a lack of staging areas, biological sensitivity, and other constraints, OCTA determined public access on the Preserve will be very limited. It may be possible to hold a small structured event with the help of adjacent landowners for staging and/or parking. If an event is set to occur, public access would adhere to roads and trails designated for Preserve management.
Invasive Species Control Plan and Implementation	OCTA contracted with GLA to serve as a Restoration Ecologist and completed an ISMP. The ISMP was reviewed and approved by the Wildlife Agencies in 2019. No invasives pest species have been found on this Preserve.
Fire Management Plan and Fire Response	OCTA has contracted with Wildland Res Mgt to complete an FMP. A draft FMP is scheduled to be completed in 2020. The FMP will establish policies and approaches to maximize protection of biological resources during fire suppression activities, to the degree feasible. A small (1.5 acre) fire occurred on this Preserve in July 2016. The fire was extinguished quickly, and the burn area has been recovering with no additional management actions.
Biological (Effectiveness) Monitoring	Camera monitoring for covered mammal species and wildlife movement began in 2018. In 2019, cameras have documented deer, coyote, bobcat, cattle and trespassers on horseback and bikes. GLA conducted a focused habitat suitability assessment for Southwestern pond turtle. The assessment found that habitat potential is low due to the lack of observed suitable hydrology and potentially other habitat factors, compounded by disturbance due to cattle (GLA 2020).
Public Outreach / Education	OCTA has conducted public outreach and education as part of the preparation of the Draft and Final RMP.

Action	Eagle Ridge Preserve Status
Adaptive Management	The RMP has identified the following key issues for a focused adaptive management approach to address uncertainties of Preserve management: • **Riparian Habitat Enhancement along Soquel Canyon**. Collect photo monitoring of the riparian habitat enhancement with the removal of grazing to determine if passive restoration was successful. If not, determine if active restoration is needed. OCTA and CHSP have been coordinating for the best approach in the removal of the cattle. OCTA will continue to coordinate with CHSP and potentially Orange County Sheriff Department in order to develop a strategy to remove the cattle .
Changed Circumstances	No events occurred that meet the Changed Circumstances requirements during this period.
General Comments / Concerns	*Cattle Trespass.* Cattle have been identified trespassing on the Eagle Ridge parcel before its acquisition. New fencing was installed, but cattle trespass continues to be a problem. OCTA will continue to partner with other agencies to devise a solution to this problem.

3.2.2.1 Management and Monitoring Summary

Public access is not currently authorized at the Eagle Ridge Preserve. However, three wildlife cameras have detected multiple occurrences of unauthorized access, including mountain biking, hiking, and horseback riding. In addition, cattle are heavily using the property, and have been detected on multiple site visits by OCTA, CHSP staff, and GLA biologists, as well as by the wildlife cameras. The wildlife cameras have also documented the following wildlife: coyote, skunk, bobcat, and mule deer.

An ISMP was prepared for the Eagle Ridge Preserve and approved by the Wildlife Agencies in 2019. OCTA is prioritizing ISMP implementation based on threats to Covered Species. As the invasive species on this Preserve are not as high of a threat or as prevalent as some of our other Preserves, implementation of invasive species control has not yet been scheduled. In addition, the fire management plan for the Eagle Ridge Preserve is being developed.

GLA assessed the property for western pond turtle suitability and found that the habitat potential is low due to the lack of observed suitable hydrology and potentially other habitat factors, compounded by disturbance due to cattle. However, the site should be further investigated to determine if there are opportunities to create habitat for the pond turtle, based on the hydrology and topography of the creek. The implementation of focused efforts for reptiles such as pit arrays to more accurately determine the presence/absence of coast horned lizard should be considered.

Maintenance tasks at the Preserve included vegetation removal along the primary fire/access road that traverses through the property. Due to the abundance of mustard regrowth on the main ridge road, a skid steer with a mower attachment was used to cut down vegetation on about half of the road. For fire prevention, a water truck was also stationed on-site during all days the skid steer was on-site.

Wildlife camera photos from 2019 of bobcat, coyote, and mule deer.

3.2.2.2 Planned Actions for 2020

Planned actions and priorities for 2020 include:

- Continue to develop solutions to remove the cattle from the Preserve (OCTA and CHSP) and increase the frequency of patrols.
- Continue to monitor wildlife cameras to evaluate presence of covered mammal species,wildlife movement and trespass.
- Increase monitoring efforts for covered plants when good rainfall occurs.
- Annually review the Preserve for the gnatcatcher during ongoing monitoring.
- Continue preparation of the Eagle Ridge Preserve FMP.
- Conduct focused survey efforts for reptiles, i.e. the installation and use of pit arrays should be considered.
- Continue preparation of CE and coordinate with Wildlife Agencies for review and approval of the CE.

3.2.2.3 Related Documents and References

BonTerra Consulting. 2013. *Baseline Biological Surveys Technical Report for the Hayashi (Eagle Ridge) Property, Measure M2 Freeway Environmental Mitigation Program Acquisition Properties Evaluation in Orange County, California.* March.

Glenn Lukos Associates (GLA). 2020. *Biological Monitoring Report for OCTA M2 Preserves – Trabuco Rose, Pacific Horizon, Bobcat Ridge, Silverado Chaparral, Wren's View, Live Oak Creek, and Eagle Ridge*. Prepared for OCTA. March.

RECON Environmental Services (RECON). 2020. *2019 Summary Letter for Maintenance Activities Performed on OCTA Preserves.* Prepared for OCTA. March.

3.2.3 Live Oak Creek Preserve

Action	Live Oak Creek Preserve Status
Acquisition	Acquired in April 2011.
Baseline Surveys	Baseline surveys were completed in 2013 by BonTerra Consulting and results documented in the Baseline Survey Technical Report. This report is included as an appendix to the RMP.
Preparation of Resource Management Plan	Draft RMP was completed in August 2017 and was available for public review for a 90-day period through December 2017. Final RMP was completed and posted on OCTA EMP website in September 2017. http://www.octa.net/Projects-and-Programs/OC-Go/OC-Go-(2011-2041)/Freeway-Mitigation/Resource-Management-Plans/
Recording of Conservation Easement	The CE for the Live Oak Creek Preserve is being prepared and is anticipated to be recorded in the near future.
Identification of Preserve Manager	OCTA currently is contracting with both GLA and RECON to manage this Preserve. In addition, High Level Security Services (HLSS) is assisting with the private patrol needs for the Preserves. A long-term Preserve Manager is anticipated to be in place in the near future.
General Stewardship and Preserve Management	OCTA staff, with assistance from Preserve Management contractor RECON, and Preserve biological monitor Glen Lukos Associates (GLA) implemented routine and ongoing property management and maintenance activities. A description and inventory of general stewardship and Preserve management activities conducted by RECON is included in Appendices B and C.
Public Access Policy and Enforcement	Due to the combination of the lack of staging areas, biological sensitivity, and other constraints, OCTA determined public access on the Live Oak Creek Preserve will be very limited. It may be possible to hold a small structured event with the help of adjacent landowners for staging and/or parking. If an event is set to occur, public access would adhere to roads and trails designated for Preserve management.
Invasive Species Control Plan and Implementation	OCTA contracted with GLA to serve as a Restoration Ecologist and completed an ISMP. The ISMP was approved by the Wildlife Agencies in 2019. OCTA is prioritizing ISMP implementation based on threats to Covered Species. Recent monitoring has confirmed both the Invasive Shot Hole Borer as well as the Gold Spotted Oak Borer in the Trabuco Canyon Area. Neither of these species has been detected on the Live Oak Creek Preserve. OCTA will continue to monitor and treat trees that are being impacted by these invasive species.
Fire Management Plan and Fire Response	OCTA has contracted with Wildland Res Mgt to complete an FMP. A draft FMP is scheduled to be completed in 2020. The FMP will establish policies and approaches to maximize protection of biological resources during fire suppression activities, to the degree feasible. No fires within the Preserve have occurred during this period.
Biological (Effectiveness) Monitoring	Biological monitoring for covered bird species was completed in 2017 (CDFW 2017). Camera monitoring for covered mammal species and wildlife movement began in 2018. See the Effectiveness Monitoring Schedule in Appendix B.
Public Outreach / Education	OCTA has conducted public outreach and education as part of the preparation of the Draft and Final RMP.

Action	Live Oak Creek Preserve Status
Adaptive Management	The RMP has identified the following key issues for a focused adaptive management approach to address uncertainties of Preserve management: ● **Covered Plants and Vegetation Management.** Closely monitor the response of covered plant species (e.g., intermediate mariposa lily) to vegetation management actions along the side of access roads. ● **Trails Revegetation.** Collect photo monitoring of the revegetation of closed trails to determine if passive restoration was successful. If not, determine if active restoration is needed. ● **Vegetation Control around Cactus Patches.** Research current approaches for vegetation management around cactus patches to determine if this is needed at the Live Oak Creek Preserve to protect and/or improve cactus wren populations. Monitoring efforts were focused on these needs and are summarized below.
Changed Circumstances	No events occurred that meet the Changed Circumstances requirements during this period.
General Comments / Concerns	None.

3.2.3.1 Management and Monitoring Summary

Cactus wren were documented during the biological baseline surveys of this Preserve (Bonterra Consulting 2013). The most recent effectiveness monitoring included focused surveys for covered bird species in 2017 (CDFW 2017). Two cactus wren territories/use areas were detected at the Live Oak Creek Preserve. Male and female wren (i.e., pairs) were observed as well as fledglings. No coastal California gnatcatcher were detected. Suitable, high quality cactus scrub is present on the Live Oak Creek Preserve, and conditions have not changed since baseline surveys. No covered wildlife species were detected during 2019 monitoring; however, bobcat was detected on the newly installed wildlife cameras.

In support of the protection of Covered Species, including cactus wren, GLA mapped the locations of cactus scrub to identify key habitat areas for cactus wren, and for use in the management of sensitive resources in the context of fire management. A total of 7.27 acres of cactus scrub was mapped at Live Oak Creek. A memo was prepared detailing the methodology, results, and mapping and is included as part of Appendix C. This data will be beneficial for future decision making regarding recommended vegetation management of this Preserve. This mapping will also be utilized in the Live Oak Creek Preserve FMP that is currently being drafted.

GLA timed biological monitoring visits in Spring 2019 to coincide with the blooming periods of intermediate mariposa lily. GLA did not detect new populations of intermediate mariposa lily (GLA 2019). It is recommended to continue to monitor known populations of intermediate mariposa lily during spring blooming periods to detect potential trends in population growth or decline.

GLA prepared an ISMP, which was approved by the Wildlife Agencies in 2019. OCTA is prioritizing ISMP implementation based on threats to Covered Species. As the invasive species on this Preserve are not as high of a threat to Covered Species or as prevalent as some of our other Preserves,

implementation of invasive species control has not yet been scheduled. GLA biologists detected and removed a clump of stink net located adjacent to the Preserve boundary. Biological monitoring will continue and early detection and eradication actions will continue to ensure that any new emergent invasives will not colonize within the Preserve as outlined in the ISMP.

The team arborist, Dudek, conducted invasive shot hole borer (ISHB; *Euwallacea* sp.) surveys in June and July 2017. No sign and/or symptom of ISHB was observed. Dudek conducted emergent pest trapping over a 1-month period in July 2019 to re-evaluate for the presence of ISHB, and again found no sign and/or symptom of ISHB. Invasive pests will continue to be monitored for at this Preserve.

No new unauthorized trails were documented (GLA 2019). The trails and roads documented in the RMP exist and are being utilized for management on this Preserve. Monitoring will continue to document any unauthorized trail use. The Preserve RMP refers to a section of chain link fencing that demarcates the boundary between the Preserve and an adjoining property (19071 Live Oak Canyon Road). The RMP recommends to further coordinate with the adjoining landowner to identify alternate solutions that would not affect the functions of the waterway while maintaining a barrier with the adjoining property.

Live Oak Creek is one of three OCTA Preserves being monitored by Audubon Starr Ranch as part of a 5-year project to qualitatively and quantitatively monitor plant communities to assess stability of vegetation cover (see Section 3.3.1). It was noted that there were distinct differences in non-native annual grass cover between the two subtypes of CSS on the preserve. The non-native annual grass *Bromus diandrus* was observed in higher cover classes in 2019 in the white sage subtype polygon, which is adjacent to a road, and not in the singular California sagebrush subtype polygon. As in previous years, *Opuntia littoralis*, was most commonly observed in extensive patches in the California Sagebrush polygon in the north of the preserve.

Photo monitoring of scrub habitat on Live Oak Creek Preserve

Live Oak Creek grasslands experienced eruptions of mustard species (*Brassica nigra and Hirschfeldia incana*) in the higher rainfall seasons, 2017 and 2019, and high non-native annual grass biomass similar to other preserves in Orange County and elsewhere in Southern California. With *B. nigra* averaging about six feet in height in 2019 and obscuring observations it was difficult to determine, in the one of three grassland polygons with the native bunchgrass, if *Stipa pulchra* cover was stable. Audubon further suggested removing olive trees in Live Oak Creek as well as removal of ornamental and other potentially invasive species (e.g. fennel) from the area mapped as oak woodland in the northwest corner of the Live Oak Creek preserve (Audubon Starr Ranch 2019).

Maintenance tasks performed included vegetation thinning and removal within two fuel modification zones (identified within the RMP), vegetation removal on the fire roads/access roads, and regrading

of the fire roads. A summary of the work completed at Live Oak Creek has been included in Appendix D.

3.2.3.2 Planned Actions for 2020

- Continue to evaluate the status and threat of ISHB and other fungal pathogens.
- Continue to monitor wildlife cameras to evaluate presence of covered mammal species,wildlife movement and trespass.
- Continue monitoring known populations of intermediate mariposa lily during blooming periods to detect potential trends in population growth or decline. Document additional locations in the Preserve not previously documented.
- Obtain a quote and forecast the removal of the olive trees, ornamental vegetation and invasive species within the oak woodland area. If not in 2020, then schedule for as soon as possible.
- Continue preparation of the Live Oak Creek Preserve FMP.
- Coordinate with the landowner at 19071 Live Oak Canyon Road regarding the section of fencing identified in the RMP.
- Continue preparation of CE and coordinate with Wildlife Agencies for review and approval of the CE.

3.2.3.3 Related Documents and References

Audubon Starr Ranch. 2019. *Vegetation Monitoring on Three Orange County Transportation Authority Preserves: Bobcat Ridge, Wren's View, and Live Oak Creek*. Operating Agreement 3-5-3711. July 2019.

BonTerra Consulting. 2013. *Draft Biological Technical Report for the South County Properties, Measure M2 Freeway Environmental Mitigation Program Acquisition Properties Evaluation*. Irvine, CA. December.

Glenn Lukos Associates (GLA). 2020. *Biological Monitoring Report for OCTA M2 Preserves – Trabuco Rose, Pacific Horizon, Bobcat Ridge, Silverado Chaparral, Wren's View, Live Oak Creek, and Eagle Ridge*. Prepared for OCTA. March.

RECON Environmental Services (RECON). 2020. *2019 Summary Letter for Maintenance Activities Performed on OCTA Preserves.* Prepared for OCTA. March.

3.2.4 Pacific Horizon Preserve

Action	Pacific Horizon Preserve Status
Acquisition	Acquired in April 2015.
Baseline Surveys	Baseline surveys were completed in 2015 by Bonterra Psomas and results documented in the Baseline Survey Technical Report. This report is included as an appendix to the RMP.
Preparation of Resource Management Plan	Draft RMP was completed in August 2017 and was available for public review for a 90-day period through December 2017. Final RMP was completed and posted on OCTA EMP website in September 2018. http://www.octa.net/Projects-and-Programs/OC-Go/OC-Go-(2011-2041)/Freeway-Mitigation/Resource-Management-Plans/
Recording of Conservation Easement	A Conservation Easement for the Pacific Horizon Preserve is being prepared and is anticipated to be recorded in the near future.
Identification of Preserve Manager	OCTA currently is contracting with both GLA and RECON to manage this Preserve. In addition, High Level Security Services (HLSS) is assisting with the private patrol needs for the Preserves. A long-term Preserve Manager is anticipated to be in place in the near future.
General Stewardship and Preserve Management	OCTA staff, with assistance from Preserve Management contractor RECON, and Preserve biological monitor Glen Lukos Associates (GLA) implemented routine and ongoing property management and maintenance activities. A description and inventory of general stewardship and Preserve management activities conducted by RECON is included in Appendices B and C.
Public Access Policy and Enforcement	The Pacific Horizon RMP establishes a public access policy that identifies appropriate recreational opportunities within the Preserve that are compatible with the protection of biological resources. Through an evaluation of biological resources and site conditions, as well as coordination with the Wildlife Agencies, a set of existing trails within the Preserve have been identified for managed public access and other trail segments planned for decommissioning. The current configuration of OCTA approved trails connects to other existing trails on County of Orange open space lands managed by Orange County Parks (OC Parks) as well as the City of Laguna Beach. OCTA will continue to coordinate with adjacent property owners, California Coastal Commission (CCC), and City of Laguna Beach to document a formalized regional trails strategy that involves public access connections to and across the Pacific Horizon Preserve.
Invasive Species Control Plan and Implementation	OCTA contracted with GLA to serve as a Restoration Ecologist and completed an ISMP. The ISMP was approved by the Wildlife Agencies in 2019. OCTA is prioritizing ISMP implementation based on threats to Covered Species. Invasive species removal is anticipated to begin in 2020.
Fire Management Plan and Fire Response	OCTA has contracted with Wildland Res Mgt to complete an FMP. A draft FMP is scheduled to be completed in 2020. The FMP will establish policies and approaches to maximize protection of biological resources during fire suppression activities, to the degree feasible. No fires within the Preserve have occurred during this period.
Biological (Effectiveness) Monitoring	Biological monitoring for covered bird species were completed in 2017 (CDFW 2017). Camera monitoring for covered mammal species and wildlife movement is scheduled to be completed in 2020. The installation

Action	Pacific Horizon Preserve Status
	of cameras will be completed as part of the restoration project recently approved by the CCC. See the Effectiveness Monitoring Schedule in Appendix B.
Public Outreach / Education	OCTA has conducted public outreach and education as part of the preparation of the Draft and Final RMP, as well as during public hiking events.
Adaptive Management	The RMP has identified the following key issues for a focused adaptive management approach to address uncertainties of Preserve management: • **Covered Plants and Vegetation Management**. Closely monitor the response of covered plant species (e.g., many-stemmed dudleya) to trail use and future closures. Permits were obtained in 2019 to conduct restoration including decommissioning of a duplicative trail that crosses through many-stemmed dudleya habitat. Begin the implementation of the restoration efforts in 2020. • **Trails Revegetation**. A coastal development permit was obtained for the proposed trail closures at this Preserve. Photo monitoring of the revegetation of closed trails will be conducted to determine if passive restoration was successful. If not, determine if active restoration is needed. • **Vegetation Control around Cactus Patches.** Research current approaches for vegetation management around cactus patches to determine if this is needed at the Pacific Horizon Preserve to protect and/or improve cactus wren populations. Focused efforts to address these adaptive management issues will continue in 2020.
Changed Circumstances	No events occurred that meet the Changed Circumstances requirements during this period.
General Comments / Concerns	Begin implementation of the restoration efforts to install cameras, remove invasive plant species, and close sections of trails supporting covered plant species.

3.2.4.1 Management and Monitoring Summary

The most recent effectiveness monitoring was completed during focused surveys for covered bird species in 2017. No coastal California gnatcatcher or cactus wren were detected. One male gnatcatcher was observed by CDFW and OCTA staff in 2015 (CDFW 2017). Suitable, coastal sage scrub is present on the Pacific Horizon Preserve, and conditions have not changed since the 2015 surveys. During biological monitoring visits (stewardship) GLA generally watched for OCTA M2 Covered Species, including the coastal California gnatcatcher, orangethroat whiptail, and coast horned lizard. For any species detected incidentally, its location was recorded through GPS, as well as noting whether it was a new occurrence/location, or a likely confirmation of a previously noted occurrence. GLA detected at least one gnatcatcher through vocalizations in the northern portion of the property. However, birds were not observed directly to determine the number of individuals present, or whether the detection consisted of a single male versus a pair.

In support of the protection of Covered Species, including cactus wren, GLA mapped the locations of cactus scrub to identify key habitat areas for cactus wren, and for use in the management of sensitive resources in the context of fire management. A total of 2.76 acres of cactus scrub was mapped at

Pacific Horizon. The cactus data can be used in the future to evaluate more fine scale habitat changes and to help inform management actions.

Monitoring visits have confirmed that public access is occurring at the Pacific Horizon Preserve. To better understand the level of access, GLA has recommended the placement of cameras, which will also help document wildlife species and movement on the site. Coastal Development Permits will be needed to place cameras and potentially mend fencing to better control some of the public access activities.

GLA timed biological monitoring visits in the spring to coincide with the blooming periods of the OCTA M2 covered plant species, specifically many-stemmed dudleya and intermediate mariposa lily. GLA observed both many-stemmed dudleya and intermediate mariposa lily at the locations that had been documented during previous baseline surveys and/or monitoring. GLA was directed by OCTA to determine the approximate population size of dudleya. GLA detected approximately 180 dudleya individuals.

Unauthorized bike jumps within Pacific Horizon Preserve in 2018.

Mountain biking and hiking continue to occur at the Pacific Horizon Preserve, which are authorized activities. GLA continued to document unauthorized trail modification from mountain bike use. OCTA obtained a CCC waiver and was able to restore these areas in 2019. Trail modifications for mountain bike use are ongoing and as a result, OCTA requested to extend the authorization to repair trail modifications for an additional five years. In addition this authorization request included the removal of invasive species, decommissioning of a duplicative trail segment which is a threat to many-stemmed dudleya and restore other disturbed areas in the vicinity of the trail which support intermediate mariposa lily and coastal sage scrub habitats. Signs and wildlife cameras were also proposed to be placed around the restoration areas and on the Preserve in specific locations. OCTA has obtained a coastal development permit (CDP) from the California Coastal Commission (CCC) to implement these tasks. OCTA has also coordinated with Orange County Parks (OC Parks) and the city of Laguna Beach to obtain approvals from those agencies. Monitoring and reporting of these restoration tasks will be performed and provided to the Wildlife Agencies as well as the CCC. OCTA will continue to monitor for these unauthorized activities. GLA also observed evidence of dog use at the Preserve, including dog scat and tracks.

GLA completed the Pacific Horizon Preserve ISMP and OCTA obtained approval from CDFW and USFWS. Invasive species were mapped, and priorities for removal have been set. Invasive species occur on County of Orange land and will also be removed from those areas as part of the OCTA restoration effort described above. OCTA hopes to begin implementation of this project in 2020.

The maintenance tasks performed at the Pacific Horizon Preserve during 2019 included the removal of illegal bike jumps, treatment of artichoke thistle plants, and the installation of wooden stakes. Work

associated with the removal of the bike jumps consisted of using non-mechanized hand tools to remove all soil piles. The disturbed areas were recontoured to match the surrounding areas; all soil was balanced on-site. In previously disturbed areas, prickly pear cactus pads (*Opuntia spp*.) were collected from surrounding areas and installed within the unauthorized bike trails to prevent future off-road use. Only a small percentage of cuttings were salvaged from numerous plants in the vicinity, so as to not negatively impact any prickly pear cactus patches. Additonal information pertaining to maintenance activities are included in Appendix D.

Planned Actions for 2020:

- Implement the proposed restoration activities including invasive species removal and select duplicative trail restoration.
- Continue monitoring of unauthorized trail use, particularly in the northern portion of the Preserve and near known populations of many-stemmed dudleya.
- Continue monitoring known populations of many-stemmed dudleya during blooming periods to detect potential trends in population growth or decline.
- Continue preparation of the Pacific Horizon Preserve FMP.
- Continue preparation of CE and coordinate with Wildlife Agencies for review and approval of the CE.

3.2.4.2 Related Documents and References

Bonterra Psomas. 2015. *Baseline Biological Surveys Technical Report for the Aliso Canyon (Pacific Horizon) Property, Measure M2 Freeway Environmental Mitigation Program Acquisition Properties Evaluation in Orange County, California*. October.

Glenn Lukos Associates (GLA). 2020. *Biological Monitoring Report for OCTA M2 Preserves – Trabuco Rose, Pacific Horizon, Bobcat Ridge, Silverado Chaparral, Wren's View, Live Oak Creek, and Eagle Ridge*. Prepared for OCTA. March.

RECON Environmental Services (RECON). 2020. *2019 Summary Letter for Maintenance Activities Performed on OCTA Preserves.* Prepared for OCTA. March.

3.2.5 Silverado Chaparral Preserve

Action	Silverado Chaparral Preserve Status
Acquisition	Acquired in December 2014.
Baseline Surveys	Baseline surveys were completed in 2015 by BonTerra Consulting and results documented in the Baseline Survey Technical Report. This report is included as an appendix to the RMP.
Preparation of Resource Management Plan	Draft RMP was completed in August 2017 and was available for public review for a 90-day period through December 2017. Final RMP was completed and posted on OCTA EMP website in September 2017. http://www.octa.net/Projects-and-Programs/OC-Go/OC-Go-(2011-2041)/Freeway-Mitigation/Resource-Management-Plans/
Recording of Conservation Easement	Draft CE for the Silverado Chaparral Preserve is being prepared and is anticipated to be recorded in the near future.
Identification of Preserve Manager	OCTA currently is contracting with both GLA and RECON to manage this Preserve. In addition, High Level Security Services (HLSS) is assisting with the private patrol needs for the Preserves. A long-term Preserve Manager is anticipated to be in place in the near future.
General Stewardship and Preserve Management	OCTA staff, with assistance from Preserve Management contractor RECON, and Preserve biological monitor Glen Lukos Associates (GLA) implemented routine and ongoing property management and maintenance activities. A description and inventory of general stewardship and Preserve management activities conducted by RECON is included in Appendices B and C.
Public Access Policy and Enforcement	OCTA will be implementing a managed public access approach for the Silverado Chaparral Preserve in coordination with the adjoining OC Parks lands.
Invasive Species Control Plan and Implementation	OCTA contracted with GLA to serve as a Restoration Ecologist and completed an ISMP. The ISMP was approved by the Wildlife Agencies in 2019. OCTA is prioritizing ISMP implementation based on threats to Covered Species.
Fire Management Plan and Fire Response	OCTA has contracted with Wildland Res Mgt to complete an FMP. A draft FMP is scheduled to be completed in 2020. The FMP will establish policies and approaches to maximize protection of biological resources during fire suppression activities, to the degree feasible. No fires within the Preserve have occurred during this period.
Biological (Effectiveness) Monitoring	Biological monitoring for Covered Birds were completed in 2017. Camera monitoring for Covered Mammals and wildlife movement occurred in 2019. More protected cameras will need to be set (one was stolen in 2019). Camera monitoring and unauthorized trail use should be monitored in 2020. See the Effectiveness Monitoring Schedule in Appendix B.
Public Outreach / Education	OCTA has conducted public outreach and education as part of the preparation of the Draft and Final RMP.
Adaptive Management	The RMP has identified the following key issues for a focused adaptive management approach to address uncertainties of Preserve management: • **Public Access and Wildlife Activity.** Use wildlife movement cameras to monitor and gauge wildlife activity to evaluate changes in the Silverado Chaparral Preserve public access policies. This

Action	Silverado Chaparral Preserve Status
	monitoring would be collected while the levels of public access are being reviewed and potentially changed. • **Covered Plants and Vegetation Management.** Closely monitor the response of covered plant species (e.g., intermediate mariposa lily) to vegetation management actions along the side of access roads. • **Trails Revegetation**. Collect photo monitoring of the revegetation of closed trails to determine if passive restoration was successful. If not, determine if active restoration is needed. • **Vegetation Control around Cactus Patches.** Research current approaches for vegetation management around cactus patches to determine if this is needed at the Pacific Horizon Preserve to protect and/or improve cactus wren populations. Focused monitoring efforts to address these adaptive management issues are scheduled to begin in 2020.
Changed Circumstances	No events occurred that meet the Changed Circumstances requirements during this period.
General Comments / Concerns	None.

3.2.5.1 Management and Monitoring Summary

While performing general stewardship biological monitoring, GLA generally watched for OCTA M2 Covered Species, including the coastal California gnatcatcher, coastal cactus wren, orangethroat whiptail, and coast horned lizard. GLA detected two coast horned lizards (including 1 gravid female and 1 male) and a third area with coast horned lizard scat by an ant colony. GLA mapped potential invasive ant species also that may warrant further intervention due to potential threat to coast horned lizards, as well as other native harvester ant colonies. GLA detected bobcat onsite. GLA did not detect gnatcatcher, cactus wren, or orangethroat whiptail.

In support of the protection of Covered Species, including cactus wren, GLA mapped the locations of cactus scrub to identify key habitat areas for cactus wren, and for use in the management of sensitive resources in the context of fire management. A total of 0.61 acre of cactus scrub was mapped at Silverado Chaparral.

Photo of coast horned lizard documented at Silverado Chaparral in 2019.

GLA timed a Spring 2019 biological monitoring visit to coincide with the blooming periods of the OCTA M2 covered plant species, specifically many-stemmed dudleya and intermediate mariposa lily. GLA did not detect many-stemmed dudleya; however, multiple new occurrences of intermediate mariposa lily were detected at the property, totaling approximately 100 individuals.

Public access is not currently authorized at the Silverado Chaparral Preserve. During monitoring visits, GLA observed active and ongoing disturbance of existing unmapped and mapped trails for

mountain bike use. GLA mapped the location of disturbance and notified OCTA. The site will continue to be monitored to document unauthorized access and activities, including by OCTA's private security company and GLA's monitoring team. GLA noted progressively escalating trail improvements, as well as apparent ingress/egress points. Subsequently, coordination (including site meetings) occurred between OCTA, OC Parks, RECON, Irvine Ranch Conservancy, HLSS, and GLA to review the severity of encroachment, and to identify locations for the installation of additional fencing, signage, and trail cameras; as well as to review access and routes for regular security patrols by HLSS and OC Parks law enforcement staff. As a result of the meeting, additional fencing with signage was installed to block access to newly cut trails and demarcate property boundaries. Increased monitoring continues for this Preserve.

Two cameras were installed in May 2019. One camera was stolen. Wildlife cameras detected deer and bobcat. Wildlife cameras also detected unauthorized people on the Preserve including a man, a woman hiking with several dogs, and another hiker with two dogs. Through coordination with OCTA, GLA removed the remaining wildlife camera on an interim basis in September 2019 due to the theft risk as well as reducing the effort through the winter months to save funding for spring monitoring.

GLA prepared an ISMP, which was approved by the Wildlife Agencies in 2019. OCTA is prioritizing ISMP implementation based on threats to Covered Species. As the invasive species on this Preserve are not as high of a threat to Covered Species or as prevalent as some of our other Preserves, implementation of invasive species control has not yet been scheduled.

Maintenance tasks performed at the Silverado Chaparral Preserve included the installation of Preserve signs and wildlife-friendly fencing in select locations. The installation of fencing included barbless wire 3-strand fencing, with the lowest strand of fencing at least 18 inches from the ground to allow for the safe passage of wildlife (i.e., deer). A summary of the work completed at the Silverado Chaparral Preserve has been included in Appendix D.

3.2.5.2 Planned Actions for 2020

- Continue monitoring unauthorized trail use activity (particularly mountain biking). Coordinate and collaborate with County of Orange and staff at Irvine Ranch Conservancy to address this issue.
- Re-install cameras for tracking wildlife use and to capture images of unauthorized access throughout the Preserve. Increased security for the cameras is necessary, such as cemented poles and boxes.
- Continue monitoring for covered plant species (many-stemmed dudleya and intermediate mariposa lily) during blooming periods to detect potential trends in population growth or decline.
- Consider the implementation of focused efforts for reptiles such as pit arrays in order to more accurately determine the population of coast horned lizard, as necessary.
- Continue preparation of the Silverado Chaparral Preserve FMP.
- Continue preparation of the CE and coordinate with Wildlife Agencies for review and approval of the CE.

3.2.5.3 Related Documents and References

BonTerra Psomas. 2015. *Baseline Biological Surveys Technical Report for the MacPherson Property, Measure M2 Freeway Environmental Mitigation Program Acquisition Properties Evaluation*. Irvine, CA. September.

Glenn Lukos Associates (GLA). 2020. *Biological Monitoring Report for OCTA M2 Preserves – Trabuco Rose, Pacific Horizon, Bobcat Ridge, Silverado Chaparral, Wren's View, Live Oak Creek, and Eagle Ridge*. Prepared for OCTA. March.

RECON Environmental Services (RECON). 2020. *2019 Summary Letter for Maintenance Activities Performed on OCTA Preserves.* Prepared for OCTA. March.

3.2.6 Trabuco Rose Preserve

Action	Trabuco Rose Preserve Status
Acquisition	Acquired in May 2011.
Baseline Surveys	Baseline surveys were completed in 2013 by BonTerra Consulting and results documented in the Baseline Survey Technical Report. This report is included as an appendix to the RMP.
Preparation of Resource Management Plan	Draft RMP was released in November 2015 and was available for public review for a 90-day period through February 2017. Final RMP was completed and posted on OCTA EMP website in September 2017. http://www.octa.net/Projects-and-Programs/OC-Go/OC-Go-(2011-2041)/Freeway-Mitigation/Resource-Management-Plans/
Recording of Conservation Easement	Draft CEs for the Trabuco Rose Preserve are being prepared and are anticipated to be recorded in the near future. There will be two CEs for this Preserve. One will cover the portion (1.6 acres) of the Preserve that provides mitigation under the U.S. Army Corps of Engineers (ACOE) permit and has been structured to follow the CE template from the ACOE. A second CE utilizing the CDFW template will cover the rest of the Preserve.
Identification of Preserve Manager	OCTA currently is contracting with both GLA and RECON to manage this Preserve. In addition, High Level Security Services (HLSS) is assisting with the private patrol needs for the Preserves. A long-term Preserve Manager is anticipated to be in place in the near future.
General Stewardship and Preserve Management	OCTA staff, with assistance from Preserve Management contractor RECON, and Preserve biological monitor Glen Lukos Associates (GLA) implemented routine and ongoing property management and maintenance activities. A description and inventory of general stewardship and Preserve management activities conducted by RECON is included in Appendices B and C.
Public Access Policy and Enforcement	The Trabuco Rose (Ferber Ranch) RMP establishes a public access policy that identifies appropriate recreational opportunities within the Preserve that are compatible with the protection of biological resources. Through an evaluation of biological resources and site conditions, as well as coordination with the Wildlife Agencies, a set of existing trails within the Preserve have been identified for managed public access and other trail segments planned for decommissioning. OCTA has held multiple public access events on the Trabuco Rose (Ferber Ranch) Preserve (see Table 6-2).
Invasive Species Control Plan and Implementation	OCTA contracted with GLA to serve as a Restoration Ecologist and completed an ISMP. The ISMP was approved by the Wildlife Agencies in 2019. Based on threats to Covered Species, OCTA began ISMP implementation in 2018 and continued in 2019. • **Invasive Pests.** Recent monitoring has confirmed both the Invasive Shot Hole Borer as well as the Gold Spotted Oak Borer in the Trabuco Canyon Area. Continue to monitor and treat trees that being impacted by these invasive species. Invasive Shothole Borer (*Euwallacea fornicatus*; ISHB) monitoring and evaluation surveys were conducted in 2019 to evaluate levels of infestation within the Preserve. Dudek arborists evaluated a total 134 riparian trees within the Trabuco Rose Preserve. Of the 134 trees evaluated, a total of eight trees exhibited signs and symptoms of ISHB, of

Action	Trabuco Rose Preserve Status
	which seven were determined to have low infestation rates and one had moderate infestation rate (same results as 2018; no newly infested trees were observed). In addition, to evaluate for the presence of ISHB in areas previously found to not be infested with ISHB, Dudek conducted emergent pest trapping over a 1-month period in July 2019 to evaluate for the presence of ISHB. No new pests and/or disease were observed on the Trabuco Rose Preserve.
Fire Management Plan and Fire Response	OCTA has contracted with Wildland Res Mgt to complete an FMP. A draft FMP is scheduled to be completed in 2020. The FMP will establish policies and approaches to maximize protection of biological resources during fire suppression activities, to the degree feasible. No fires within the Preserve have occurred during this period.
Biological (Effectiveness) Monitoring	Biological monitoring for Covered Birds were completed in 2017. Camera monitoring for Covered Mammals and wildlife movement has been occurring since 2016. In addition, approximately 35.03 acres of cactus patches were documented on the Preserve in 2019 (GLA 2020). This data will serve as the base for any future cactus patch vegetation management actions at the Preserve. See the Effectiveness Monitoring Schedule in Appendix B.
Public Outreach / Education	OCTA has conducted public outreach and education as part of the preparation of the Draft and Final RMP. In addition, public access occurs on a regular basis during the scheduled hikes and rides on this Preserve.
Adaptive Management	The RMP has identified the following key issues for a focused adaptive management approach to address uncertainties of Preserve management: • **Covered Plants and Vegetation Management**. Monitor effectiveness of methods to protect Covered Plants from vegetation management activities along access roads. GLA evaluated the potential effect of road maintenance on intermediate mariposa lily and did not document impacts to intermediate mariposa lily (or suspect any) as a result of road maintenance. Additionally, intermediate mariposa lily at the Preserve are far enough from the roads that impacts are not expected from typical road maintenance. Monitoring for these species will continue. • **Trails Revegetation**. Monitor passive restoration of trails identified for decommissioning in the RMP. In 2018, GLA staff inspected and evaluated all the trails identified in the Preserve RMP for "passive restoration." GLA reviewed 13 trails or trail segments. Of the 13 trails, 3 of the trails, were noted as possibly needing some active restoration at some point. In 2019, GLA continued to monitor the recovery of the unauthorized trails. In summary it was found that the trails are self restoring quite well. There were some locations (less than 2018) that may warrant active restoration actions. OCTA will continue to monitor these trails as they passively restore and implement active restoration as warranted.
Changed Circumstances	No events occurred that meet the Changed Circumstances requirements during this period.
General Comments / Concerns	Ongoing trespassing is a major concern for this Preserve due to its proximity to local rural development and history as a property with adjacent neighbor access. In general, trespassing declined in comparison to previous years, but remains a concern. OCTA is continuing to monitor unauthorized access and working to address the problem through

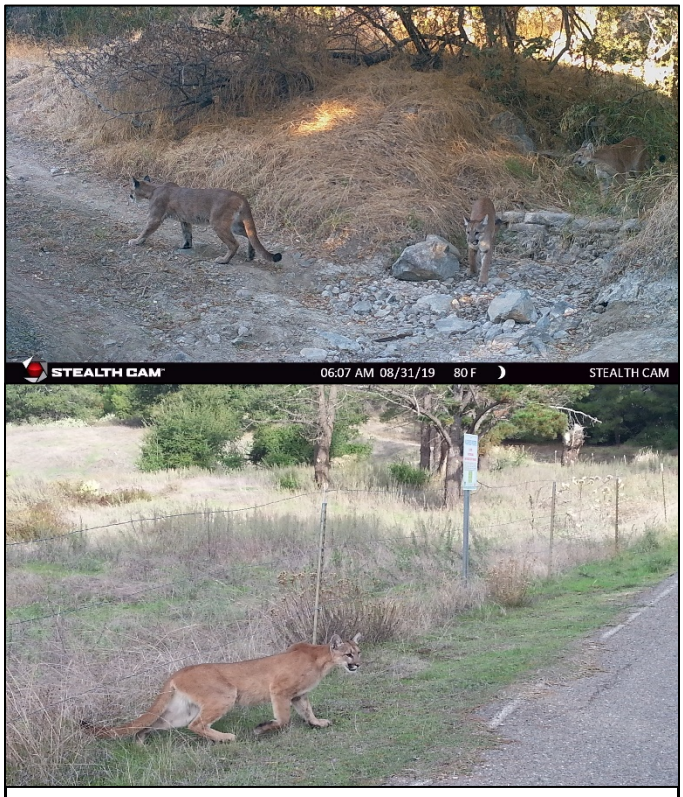
Action	Trabuco Rose Preserve Status
	enforcement actions, public engagement and education, and hosting managed access events.

3.2.6.1 Management and Monitoring Summary

Effectiveness monitoring completed included focused surveys for covered bird species in 2017 (CDFW 2017). Seven cactus wren territories/use areas were detected at the Trabuco Rose Preserve. Male and female wren (i.e., pairs) were observed. Suitable, high quality cactus scrub is present on the Trabuco Rose Preserve, and conditions have not changed since baseline surveys. A pair of coastal California gnatcatcher were observed in 2017, which was similar to the level of occupancy recorded during baseline surveys. During 2019, GLA biologists did not detect the gnatcatcher within the property but did confirm the cactus wren in some of the areas of previous detections

Table 4-1 of the RMP noted that prior to effectiveness monitoring, wildlife cameras would be set up and monitored for at least six months to assess movement and connectivity for bobcat and mountain lion. GLA continued to operate and monitor wildlife cameras at various stations in 2019. As with past monitoring, GLA observed a range of wildlife with the cameras, including mountain lion, bobcat, mule deer, coyote, and gray fox. Mountain lions were detected at 4 different camera stations including three mountain lions detected at the same time on August 21, 2019. Two cameras detected numerous trespassers, including hikers and people on mountain bikes. Through coordination with OCTA, GLA removed the wildlife cameras on an interim basis in October 2019 due to the level of effort and costs associated with maintenance, checking the cameras, and managing the data combined with the lack of new data being collected.

While performing biological monitoring, GLA generally watched for OCTA M2 Covered Species, including the coastal California gnatcatcher, coastal cactus wren, orangethroat whiptail, and coast horned lizard. For any species detected incidentally, its location was recorded through Global Positioning System (GPS), as well as noting whether it was a new occurrence/location, or a likely confirmation of a previously noted occurrence. GLA did not detect the orangethroat whiptail or coast horned lizard during the various monitoring visits, although the whiptail is expected to occur throughout the Preserve since it has been detected multiple times during past monitoring visits. Although not previously detected at the Preserve, the horned lizard also has the potential to occur.



Mountain lion(s) photos from wildlife cameras and from OCTA security in 2019. Note the three lions in the top picture.

In support of the protection of Covered Species, including cactus wren, GLA mapped the locations of cactus scrub to identify key habitat areas for cactus wren, and for use in the management of sensitive resources in the context of fire management. A total of 35.03 acres of cactus scrub was mapped at Trabuco Rose. A memo was prepared detailing the methodology, results, and mapping (Appendix C).

GLA timed biological monitoring visits in the spring to coincide with the blooming periods of the OCTA M2 covered plant species, specifically many-stemmed dudleya and intermediate mariposa lily. GLA did not detect any many-stemmed dudleya at the property but did observe the intermediate mariposa lily in multiple locations where it had been previously documented. GLA evaluated the potential effect of road maintenance on intermediate mariposa lily and did not document impacts to intermediate mariposa lily (or suspect any) as a result of road maintenance. Additionally, with the exception of one intermediate mariposa lily that was observed about a foot from the road edge, the rest of the past observations, and those that were observed in 2019, intermediate mariposa lily at the Preserve are far enough from the roads that impacts are not expected from typical road maintenance. (see Section 2.2, *Tracking for Covered Plant Species Policy*).

OCTA sponsored a number of docent hikes and equestrian rides on the Trabuco Rose Preserve (see Section 6.1.2, *Preserve-Specific Public Outreach Events*). OCTA will continue to implement a managed public access approach along authorized trail segments. GLA noted multiple occurrences of unauthorized public use at the Preserve documented by the wildlife cameras, including hiking and mountain bikes. In some instances, the hikers brought dogs in and were seen taking plants from the Preserve, which is prohibited. Trespassing has been documented by the OCTA private security company and warnings were issued. The site will continue to be monitored by OCTA private security as well as OC Sheriff officers to document unauthorized access and activities, including by OCTA's private security company and GLA's monitoring team. The trails marked for decommissioning are doing quite well passively restoring. There are some sections that may need additional attention, and those trails and areas will continue to be monitored. More information is included in the GLA biological monitoring report attached.

Implementation of the Invasive Species Management Plan is ongoing. RECON conducted initial treatment of the Priority 1 invasive species and some of the Priority 2 invasive species in 2018. RECON conducted follow-up treatment in spring 2019. The primary invasive species that was retreated was artichoke thistle/cardoon (*Cynara cardunculus*). For pampas grass (*Cortaderia selloana*), initial treatments were very effective as there were only a few plants with limited green growth observed this spring. No retreatment of salt cedar (*Tamarix spp*.) was necessary. RECON's report is attached as an appendix to the GLA Biological Monitoring Report (Appendix C).

Invasive Shothole Borer (*Euwallacea fornicatus*; ISHB) monitoring and evaluation surveys were conducted in 2019 to evaluate levels of infestation within the Preserve. Dudek arborists evaluated a total 134 riparian trees within the Trabuco Rose Preserve. Of the 134 trees evaluated, a total of eight trees exhibited signs and symptoms of ISHB, of which seven were determined to have low infestation rates and one had moderate infestation rate (same results as 2018; no newly infested trees were observed). In addition, to evaluate for the presence of ISHB in areas previously found to not be infested with ISHB, Dudek conducted emergent pest trapping over a 1-month period in July 2019 to evaluate for the presence of ISHB. Two panel traps were submitted to the State of California Department of Food and Agriculture (CDFA) Plant Health and Pest Prevention Services for identification/ confirmation of ISHB. Both traps submitted for evaluation were found to not have ISHB. Two traps positively identified scolytid beetle (*Euwallacea spp*), a common ambrosia beetle

that attacks distressed trees. No new pests and/or disease were observed on the Trabuco Rose Preserve.

Trail revegetation continues. Cactus pads were installed on this unauthorized trail in 2013 and have very successfully matured.

Based on the results of the 2019 surveys and supplemental emergent pest trapping, ISHB is considered active within the Trabuco Rose Preserve. However, based on the findings of the 2019 ISHB survey, ISHB continues to be in the early stages of infestation. Furthermore, with the exception of three interior trees found on the Trabuco Rose Preserve, the majority of ISHB signs and symptoms continue to be found on the periphery of the western boundary. Alternatively, the observation of ISHB sign within the interior of the Preserve continues to be considered an outlier from the observed population along the edge of the property. However, based on the ISHB's potential for spread, it is within the ISHB's zone of influence/impact for the area.

In 2019, GLA continued to monitor the recovery of the unauthorized trails at Trabuco Rose. The trails are restoring well through natural recruitement. There were some spots on different trails that may warrant active restoration actions. OCTA will continue to monitor these trails as they near full restoration. See photos and a depiction of trails in Appendix C, specifically in Appendix D of that report for more detailed information.

Erosion continues to be an issue in between the main gate and the Preserve access road entering east into the Preserve. There is a large eroded gully that continues to increase with larger rain systems. This area showed additional signs of erosion after large storm events in 2019. The main access road into the Preserve is at risk due to the growing size of this gully. This work is anticipated to include engineering and will require the assistance of contractors. OCTA met with engineers and the Wildlife Agencies to discuss potential solutions to this feature in 2019. OCTA will continue to develop long-term solutions to secure the slopes of this gully and provide safe access through the Preserve.

Eroded gully near the main gate of the Trabuco Rose Preserve in June 2019.

During 2019, the majority of the maintenance work was conducted at the Trabuco Rose Preserve. Tasks included the following: access/fire road maintenance, tasks for public safety, fence repairs, the installation of a hitching post for equestrian use, cactus salvage and planting, invasive plant

treatments, and trail maintenance in preparation for equestrian rides. Debris was removed from streambeds, including Rose Canyon Creek, and vegetation on all fire roads/access roads on Trabuco Rose, for fire prevention/removal of fire hazards. Additionally, vegetation was also removed and/or thinned within two fuel modification zones on Trabuco Rose (consistent with the RMP and OCFA requirements). Vegetation was also removed along all fire roads/access roads, and fallen limbs from oak and sycamore trees that blocked access were also cut up and removed regularly throughout the year. This material was placed away from roads and drainages and spread out as to not create a fire hazard. Invasive species control work on Trabuco Rose began in early 2019 and followed the methodology in the approved ISMP for OCTA M2 Preserves – Trabuco Rose Preserve, prepared by Glen Lukos Associates (GLA; 2017). The initial treatment of the Priority 1 invasive species and some of the Priority 2 invasive species, as classified by GLA (2017), was completed in fall 2018, and retreatments occurred in spring 2019. A summary of the work completed at Trabuco Rose has been included in Appendix D.

3.2.6.2 Planned Actions for 2020

- Coordinate with contractors to develop a long-term solution for the gully near the main gate.
- Continue monitoring for unauthorized trail use.
- Conduct docent lead field trips as part of managed public access program.
- Continue to evaluate the status and threat of ISHB. Continue to monitor and collaborate with other scientists regarding the ISHB presence and impacts to this Preserve.
- Monitor wildlife cameras for covered mammal species and wildlife movement.
- Continue to implement the ISMP recommendations.
- Continue preparation of the Trabuco Rose Preserve FMP.
- Continue preparation of the CEs and coordinate with Wildlife and Regulatory Agencies for review and approval of the CEs.
- Implement focused survey efforts for reptiles, i.e. the installation and use of pit arrays should be considered. Related Documents and References:

3.2.6.3 Related Documents and References

BonTerra Consulting. 2013. *Draft Biological Technical Report for the South County Properties, Measure M2 Freeway Environmental Mitigation Program Acquisition Properties Evaluation*. Irvine, CA. December.

Glenn Lukos Associates (GLA). 2020. *Biological Monitoring Report for OCTA M2 Preserves – Trabuco Rose, Pacific Horizon, Bobcat Ridge, Silverado Chaparral, Wren's View, Live Oak Creek, and Eagle Ridge*. Prepared for OCTA. March.

RECON Environmental Services (RECON). 2020. *2019 Summary Letter for Maintenance Activities Performed on OCTA Preserves.* Prepared for OCTA. March.

3.2.7 Wren's View Preserve

Action	Wren's View Preserve Status
Acquisition	Acquired in May 2011.
Baseline Surveys	Baseline surveys were completed in 2013 by BonTerra Consulting and results documented in the Baseline Survey Technical Report. This report is included as an appendix to the RMP.
Preparation of Resource Management Plan	Draft RMP was released in November 2016 and was available for public review for a 90-day period through February 2017. Final RMP was completed and posted on OCTA EMP website in September 2017. http://www.octa.net/Projects-and-Programs/OC-Go/OC-Go-(2011-2041)/Freeway-Mitigation/Resource-Management-Plans/
Recording of Conservation Easement	Draft CE for the Wren's View Preserve is being prepared and is anticipated to be recorded in the near future.
Identification of Preserve Manager	OCTA currently is contracting with both GLA and RECON to manage this Preserve. In addition, High Level Security Services (HLSS) is assisting with the private patrol needs for the Preserves. A long-term Preserve Manager is anticipated to be in place in the near future.
General Stewardship and Preserve Management	OCTA staff, with assistance from Preserve Management contractor RECON, and Preserve biological monitor Glen Lukos Associates (GLA) implemented routine and ongoing property management and maintenance activities. A description and inventory of general stewardship and Preserve management activities conducted by RECON is included in Appendices B and C.
Public Access Policy and Enforcement	The Wren's View (O'Neill Oaks) RMP establishes a public access policy that identifies appropriate recreational opportunities within the Preserve that are compatible with the protection of biological resources. Through an evaluation of biological resources and site conditions, as well as coordination with the Wildlife Agencies, a set of existing trails within the Preserve have been identified for managed public access and other trail segments planned for decommissioning. OCTA has held multiple public access events on the Wren's View Preserve (see Section 6.1.2).
Invasive Species Control Plan and Implementation	OCTA has contracted with GLA to serve as a Restoration Ecologist and prepare an ISMP. The Wren's View ISMP wasapproved by the Wildlife Agencies in 2019. OCTA is prioritizing ISMP implementation based on threats to Covered Species. Invasive species removal has not occurred yet on this Preserve. ISHB surveys were conducted in 2019. Based on surveys, initial recommendations were to remove eight infected trees and continue to monitor the sycamores on site at the Wren's View Preserve. After further coordination between OCTA and the Wildlife Agencies, it was decided to remove one highly infected sycamore, prune some of the infected trees, and continue to monitor. GSOB was detected in 2019 by an Audubon biologist conducting vegetation surveys for OCTA. Following this confirmation, Dudek conducted presence/absence surveys throughout Wren's View Preserve. The observation of GSOB within the Wren's View Preserve is the first such recorded observation in Trabuco Canyon, California, and as such is considered a threat to the canyon's oak tree resources. To manage the observed GSOB outbreak within Wren's View, Dudek (along with the

Action	Wren's View Preserve Status
	Wildlife Agencies) recommended that trees found to have high levels of GSOB be removed and debarked, and all other trees greater than 10 inches in diameter within 200–300 feet of an infested, including the infested tree, be chemically treated. Additional information on these surveys and recommendations are included in Appendix C, Appendix E. OCTA will work on getting the recommended trees treated and will continue monitoring.
Fire Management Plan and Fire Response	OCTA has contracted with Wildland Res Mgt to complete an FMP. A draft FMP is scheduled to be completed in 2020. The FMP will establish policies and approaches to maximize protection of biological resources during fire suppression activities, to the degree feasible. No fires within the Preserve have occurred during this period.
Biological (Effectiveness) Monitoring	Biological monitoring for covered bird species were completed in 2017 (CDFW 2017). Camera monitoring for covered mammal species and wildlife movement was initiated in 2018 and continued through 2019. In 2019, deer, coyote, bobcat, gray fox and mountain lion were detected. See the Effectiveness Monitoring Schedule in Appendix B.
Public Outreach / Education	OCTA has conducted public outreach and education as part of the preparation of the Draft and Final RMP.
Adaptive Management	The RMP has identified the following key issues for a focused adaptive management approach to address uncertainties of Preserve management: • **Public Access and Wildlife Activity**. Wildlife movement cameras were utilized to monitor and gauge wildlife activity in 2018 and 2019. Wildlife detected at the camera stations in 2019 include mountain lion, bobcat, deer, coyote, and gray fox. At this point in time in does not seem that the public access levels are high enough to warrant further assessments or a reduction in the public access events at this Preserve. • **Covered Plants and Vegetation Management**. Closely monitor the response of covered plant species (e.g., intermediate mariposa lily) to vegetation management actions along the side of access roads. • **Trails/Grazed Areas Revegetation**. Collect photo monitoring of the revegetation of closed trails and degraded habitat areas due to past grazing to determine if passive restoration was successful. If not, determine if active restoration is needed. • **Vegetation Control around Cactus Patches.** Research current approaches for vegetation management around cactus patches to determine if this is needed at the Pacific Horizon Preserve to protect and/or improve cactus wren populations. Focused monitoring efforts to address these adaptive management issues are scheduled to begin in 2020.
Changed Circumstances	No events occurred that meet the Changed Circumstances requirements during this period.
General Comments / Concerns	Continue to monitor and collaborate with other scientists regarding the ISHB presence and impacts on this Preserve.

3.2.7.1 Management and Monitoring Summary

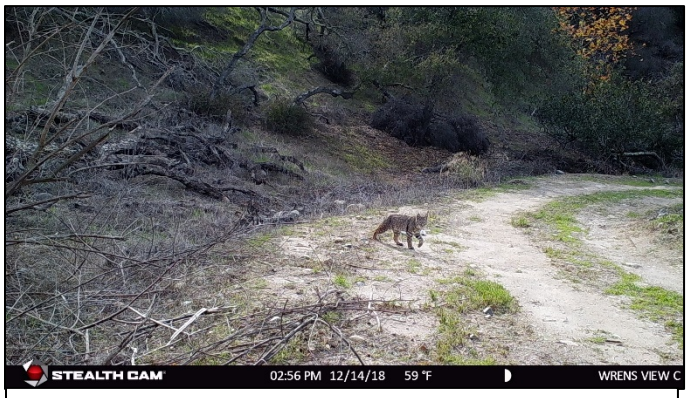
Effectiveness monitoring completed included focused surveys for covered bird species in 2017 (CDFW 2017). Two cactus wren territories/use areas were detected at the Wren's View Preserve.

Male and female wren (i.e., pairs) were observed as well as fledglings. Cactus wren were documented during the biological baseline surveys of this Preserve (Bonterra Consulting 2013). Suitable, high quality cactus scrub is present on the Wren's View Preserve, and conditions have not changed since baseline surveys. A pair of coastal California gnatcatcher had previously been documented during the biological baseline surveys, but none were detected in 2019. Suitable habitat is still present on the Preserve and it is unclear why this species was not detected.

Cactus wren habitat depicted in 2016. 2019 stewardship monitoring confirmed the utilization of this area by cactus wrens.

While performing general stewardship biological monitoring, GLA generally watched for Covered Species, including the coastal California gnatcatcher, coastal cactus wren, orangethroat whiptail, and coast horned lizard. For any species detected incidentally, its location was recorded. No gnatcatchers were detected during GLA's monitoring visits. GLA biologists detected cactus wrens in three separate locations at the property in 2019. Two of the territories corresponded with locations noted by CDFW biologist Christine Beck (accompanied by Lesley Hill) during focused surveys performed in 2017. The third group was detected near the northern property boundary. GLA also detected an orangethroat whiptail during monitoring visits. The coast horned lizard has not yet been detected at this Preserve.

GLA has initiated camera monitoring for covered mammal species and wildlife movement in 2018 and continued camera monitoring into 2019. Wildlife detected at the camera stations include deer, coyote, bobcat, gray fox and mountain lion.



Camera monitoring photo (bobcat) from 2019.

The Wren's View Preserve has the potential to support many-stemmed dudleya, and GLA will continue to monitor the site during the blooming period for this species to determine presence. GLA timed biological monitoring visits in Spring 2019 to coincide with the blooming periods of intermediate mariposa lily. GLA biologists mapped multiple locations of intermediate mariposa lily that were not previously documented, totaling approximately 250 individuals. Note that GLA observed some disturbance to no more than ten intermediate mariposa lily as a result of maintenance of the main road going up to the gate. In one instance, the intermediate mariposa lily was growing out of the road itself off to the side. In other instances, the intermediate mariposa lily was mixed in with vegetation growing on the immediately adjacent berm that was encroaching into the road. In all instances it appeared that the intermediate mariposa lily was cut from mechanical trimming of the vegetation. Note that for those that are

growing in the road or at the very edge, it would be difficult to avoid completely to keep the road clear for access. GLA noted that the disturbance was not the result of overzealous trimming.

OCTA sponsored a number of docent hikes on the Wren's View Preserve (see Section 6.1.2). OCTA will continue to implement a managed public access approach along authorized trail segments. GLA did not observe any new trail cuts or evidence of unauthorized access; however, trespassing through the property has been a common daytime and nighttime occurrence, in part due to the location of the former home site to the northeast of the Preserve. Trespassing has been documented by the OCTA private security company and warnings were issued. The site will continue to be monitored to document unauthorized access and activities, including by OCTA's private security company, OC Sheriff officers, and GLA's monitoring team. As part of GLA's efforts, the biological monitors will periodically check any evidence of habitat disturbance within the Preserve due to human activity. The three wildlife cameras may also provide the secondary benefit of documenting unauthorized activities.

As part of the effectiveness monitoring, GLA biologists conducted a review of the Preserve's perimeter fencing to note any recommendations to OCTA. GLA inspected the fencing for any areas where fencing had been removed, damaged, or was otherwise in a condition requiring maintenance. This included fencing with slackened wire that may pose an entanglement threat to wildlife.

GLA established three camera stations on the Preserve in 2018, which were maintained at the Preserve until October 2019. Wildlife detected at the camera stations include mountain lion, bobcat, deer, coyote, and gray fox. People were detected multiple times hiking and using mountain bikes.

Internal barbed wire (and a small section of chain link) fencing has been mapped and is recommended for removal. Livestock no longer reside on the property to the west, and coordination with the new property owner should continue in order to determine if the barbed wire fencing can be modified to better promote wildlife movement. OCTA is working with the Orange County Conservation Corps to potentially help remove some of this fencing.

GLA conducted comprehensive invasive species mapping and has prepared an ISMP that has been reviewed and approved by CDFW and the USFWS. OCTA will begin implementing the finalized ISMP based on priorities outlined in the plan.

In 2019, ISHB surveys continued on the Preserve. Emergent pest trapping was conducted over a 1-month period in July 2019. The surveys showed that 13 trees in Wren's View exhibited signs and symptoms of ISHB. One sycamore tree was found to have a high infestation rate. This tree was dead and was removed in 2019. No newly infected trees were found. ISHB monitoring will continue for the Preserve.

GSOB was detected by an Audubon biologist conducting vegetation surveys for OCTA. The biologist noted suspicious looking exist holes on an oak tree. Dudek performed a check of the tree and confirmed through sampling that the dead oak tree contained evidence GSOB. Following this confirmation, Dudek conducted presence/absence surveys throughout Wren's View Preserve. A total of 690 trees were evaluated and nine oak trees were found to exhibit signs of GSOB. The observation of GSOB within the Wren's View Preserve is the first such recorded observation in Trabuco Canyon, California, and as such is considered a threat to the canyon's oak tree resources. To manage the observed GSOB outbreak within Wren's View, Dudek (along with the Wildlife Agencies) recommended that OCTA follow the protocol utilized to manage the GSOB outbreak in Weir Canyon, California. Specifically, it is recommended that any trees found to have high levels of GSOB be removed

and debarked, and all other trees greater than 10 inches in diameter within 200–300 feet of an infested, including the infested tree, be chemically treated. As such, based on the 2019 Wren's View Extent Survey, it is recommended that the initial tree found to have GSOB be removed (it was retroactively removed in July 2019), eight trees found to have low to moderate levels be chemically treated, and all trees greater than 10 inches in diameter located within 200–300 feet of the infested trees be chemically treated. Additional information on these surveys and recommendations are included in Appendix C, Appendix E.

Orange County Fire Authority (OCFA) obtained a grant focused on invasive pest treatment and tree treatments in 2019 as they are related to fire prevention. OCTA has been working with OCFA to help with the GSOB issue on Wren's View. OCFA (in coordination with the University of California Cooperative Extension- Los Angeles and Orange County) plans on treating the identified GSOB trees as well as a buffer around the trees in 2020 to hopefully help treat and manage this outbreak. OCTA and OCFA have also contacted adjacent landowners to communicate the concern and request that they also survey for and manage their lands for GSOB.

Wren's View is one of three OCTA Preserves being monitored by Audubon Starr Ranch as part of a 5-year project to qualitatively and quantitatively monitor plant communities to assess stability of vegetation cover (see Section 3.3.1, Vegetation Cover Quantitative and Qualitative Monitoring). In the most recent monitoring report, it was noted that vegetation at Wren's View was generally stable compared to 2017-18 qualitative observations, but with relatively higher cover of non-native mustards (H. incana, B. nigra) and reduced woodland tree canopy cover . The report also noted that coastal sage scrub in 2019, saw an increase in non-native cover, *H. incana* and *B. madritensis*. The sage scrub shrubs appear otherwise in excellent condition. The succulent *Opuntia littoralis* was also present and in good condition. Audubon also noted that they observed a decline in woodlands in Wren's View (i.e. thinning canopies). For the first time since 2016 the crew observed signs of tree disease (i.e. *Fusarium* dieback staining) and crown, limb and tree dieback. Woodland understories were stable with non-native annual grasses and forbs dominating under the relatively open tree canopy of the (formerly) cattle-disturbed woodland (Audubon Starr Ranch 2019).

In support of the protection of Covered Species, including cactus wren, GLA mapped the locations of cactus scrub to identify key habitat areas for cactus wren, and for use in the management of sensitive resources in the context of fire management. A total of 14.73 acres of cactus scrub was mapped at Wren's View. A memo was prepared detailing the methodology, results, and mapping (Attachment C, Appendix B).

2019 maintenance tasks performed at the Wren's View Preserve included removal of two sycamore trees infested with the ISHB, and vegetation removal on the fire roads/access roads of the Preserve. For vegetation removal along the fire roads/access roads, there were several mapped locations of intermediate mariposa lily located within or adjacent to the roads. Therefore, special care was taken in these areas to detect the plant and avoid any disturbances while vegetation removal occurred. As referenced above, even with this care some intermediate mariposa lily will still trimmed during this effort. Vegetation was removed along Trabuco Canyon Road and the entrance to Wren's View, as well as on all fire roads. A summary of the work completed at Wren's View has been included in Appendix D.

3.2.7.2 Planned Actions for 2020

- Continue monitoring for unauthorized trail use.

- Conduct docent lead field trips as part of managed public access program.
- Implement recommendations for GSOB and ISHB infestation and continue to evaluate the status and threat of these pests.
- Monitor wildlife cameras for covered mammal species and wildlife movement.
- Continue monitoring known populations of covered plant species (e.g., intermediate mariposa lily) during blooming periods to detect potential trends in population growth or decline. Document additional locations in the Preserve not previously documented.
- Continue preparation of the Wren's View Preserve FMP.
- Continue preparation of the CE and coordinate with Wildlife Agencies for review and approval of the CE.

3.2.7.3 Related Documents and References

Audubon Starr Ranch. 2019. *Vegetation Monitoring on Three Orange County Transportation Authority Preserves: Bobcat Ridge, Wren's View, and Live Oak Creek*. Operating Agreement 3-5-3711. July 2019.

BonTerra Consulting. 2013. *Baseline Biological Surveys Technical Report for the South County Properties, Measure M2 Freeway Environmental Mitigation Program Acquisition Properties Evaluation.* Prepared for OCTA. December.

Glenn Lukos Associates (GLA). 2020. *Biological Monitoring Report for OCTA M2 Preserves – Trabuco Rose, Pacific Horizon, Bobcat Ridge, Silverado Chaparral, Wren's View, Live Oak Creek, and Eagle Ridge*. Prepared for OCTA. March.

RECON Environmental Services (RECON). 2020. *2019 Summary Letter for Maintenance Activities Performed on OCTA Preserves.* Prepared for OCTA. March.

3.3 OCTA Preserve-Wide Actions

The following sections provide a status of actions undertaken and coordinated across multiple OCTA Preserves.

3.3.1 Vegetation Cover Quantitative and Qualitative Monitoring

Audubon Starr Ranch, with direction and support from OCTA, has undertaken a 5-year project to qualitatively and quantitatively monitor plant communities to assess stability of vegetation cover on three OCTA Preserves: Bobcat Ridge (Hafen), Wren's View (O'Neill Oaks), and Live Oak Creek (Saddlecreek South). Baseline sampling occurred in April 2016, followed by annual monitoring in April 2017 and April 2018.

This section captures the discussion and recommendations from Starr Ranch for the 2019 annual report. Additional information is included as Appendix E. The report noted that vegetation at the Bobcat Ridge, Wren's View, and Live Oak Creek preserves was generally stable in 2019 compared to 2017-18 qualitative observations, but with relatively higher cover of non-native mustards (*H. incana, B. nigra*) and reduced tree canopy cover in two preserves (Bobcat Ridge and Wren's view). Following are major changes or otherwise noteworthy observations made by Starr Ranch in 2019:

- Chaparral at all three preserves remained stable relative to previous seasons.
- Bobcat Ridge preserve coastl sage scrub (CSS) had especially high cover of the non-native annual grass B. madritensis and the forb Hirschfeldia incana in 2019. The Live Oak Creek white sage subtype of CSS had high cover of B. diandrus in 2019. This polygon is adjacent to a road and might experience higher levels of disturbance than other CSS polygons.
- In CSS on the Wren's View preserve, 2019 saw an increase in non-native cover, *H. incana* and *B. madritensis*. The sage scrub shrubs appear otherwise in excellent condition. The succulent *Opuntia littoralis* was also present and in good condition.
- The non-native shrub *Nicotiana glauca* was again observed in the CSS or chaparral at all three sites as scattered individuals. At Wren's View, there is at least one small patch of this species in the road, which we suggest be removed.
- In 2019 as in 2017, both relatively high rainfall seasons, Live Oak Creek grasslands experienced eruptions of mustard species (*Brassica nigra* and *Hirschfeldia incana*) and high non-native annual grass biomass similar to other preserves in Orange County and elsewhere in Southern California. *Stipa pulchra* cover in the native needlegrass grassland was difficult to determine due to low visibility from extremely tall and dense *B. nigra*.
- In 2019 we observed a decline in woodlands in Bobcat Ridge and Wren's View (i.e. thinning canopies) but not on Live Oak Creek preserve. For the first time since 2016 the crew observed signs of tree disease (i.e. *Fusarium* dieback staining) and crown, limb and tree dieback on Wren's View property. Woodland understories were stable with non-native annual grasses and forbs dominating under the relatively open tree canopy of the (formerly) cattle-disturbed Wren's View woodland. We again reported many olive trees in one larger Live Oak Creek woodland.

- The polygon designated "coast live oak woodland" at the northwest edge of the Live Oak Creek preserve continues to include an old home site with many ornamentals, including oleander, succulents, fruit trees, and pines as well as non- natives such as *Foeniculum vulgare* (fennel).

Following five seasons of drought, 2018-19 was an above average rainfall season. Survey results largely reflect the higher rainfall. The changing climate will likely bring increased shifts in vegetation over the coming years. Southern California is expected to become increasingly warmer and drier with the possibility of periods of intense rainfall during the rainiest months of December through February (Allen and Luptowitz 2017). That pattern, as we have emphasized, was most evident in summer 2018 and early winter 2019. We continue to suggest regular visits to CSS and grassland during spring months to check for and, where possible, control invading grasses in CSS but especially dicot non-natives in both habitats, as well as concentrated non-native removal in the chaparral adjacent to the cattle disturbed woodland at Wren's View.

We further reiterate the importance of continued monitoring of woodland health and the removal of olive trees in Live Oak Creek as well as ornamental and other potentially invasive species (e.g. fennel) from the area mapped as oak woodland in the northwest corner of the Live Oak Creek preserve. The abandoned buildings in this area have the potential to become a hazard. Planting of oaks may help to close the canopy and perhaps reduce the non-native cover in the understory of the formerly cattle-disturbed Wren's View woodland.Related Documents and References

3.3.1.1 Related Documents and References

Audubon Starr Ranch. 2019. *Vegetation Monitoring on Three Orange County Transportation Authority Preserves: Bobcat Ridge, Wren's View, and Live Oak Creek*. Operating Agreement 3-5-3711. July 2019.

Chapter 4
OCTA-Funded Restoration Projects

4.1 Introduction

As part of their commitments to deliver more effective mitigation for the M2 freeway projects, OCTA allocated funds towards habitat restoration projects. Potential habitat restoration properties were evaluated based on biological and non-biological criteria, a process that included a prioritization process to select restoration programs that would be funded by OCTA. There were two separate rounds of funding for restoration, totaling over $10 million. The restoration projects are being implemented by various cities and non-profit entities within Orange County. Project sponsors are required to prepare annual monitoring reports to track progress towards meeting success criteria and updates on implementation status. Table 4-1 lists the OCTA-funded restoration projects, with summaries of each following.

Table 4-1. OCTA-Funded Restoration Projects – Rounds 1 and 2

Round	Project	Sponsor	Description	Signed Off
1	Agua Chinon/ Bee Flat Canyon	Irvine Ranch Conservancy	90.1 acres of restoration consisting of chaparral, grassland, coastal sage scrub, elderberry scrub, oak woodland, and riparian	
	Big Bend	Laguna Canyon Foundation	3.7 acres of restoration consisting of coastal sage scrub and riparian woodland to enhance wildlife connectivity	√
	City Parcel	City of San Juan Capistrano	53 acres of restoration consisting of riparian and coastal sage scrub within Trabuco Creek Wildlife Linkage	√
	Fairview Park	City of Costa Mesa	23 acres of restoration consisting of wetlands, grasslands, coastal sage scrub, and riparian	
	UCI Ecological Preserve	Nature Reserve of Orange County	8.5 acres of restoration consisting of cactus scrub	
2	Aliso Creek	Laguna Canyon Foundation	55 acres of restoration consisting of riparian and transitional habitat	
	Chino Hills State Park	Habitat Restoration Science/Chino Hills State Park	13.5 acres of riparian restoration and 6 acres of cactus scrub restoration	
	Harriett Weider Regional Park	Bolsa Chica Conservancy	8.2 acres of restoration consisting of grassland, coastal sage scrub, and riparian habitat	
	Lower Silverado Canyon	Irvine Ranch Conservancy	28.4 acres of restoration consisting of riparian and coastal sage scrub habitat	

Round	Project	Sponsor	Description	Signed Off
	North Coal Canyon	RECON Environmental Inc./Chino Hills State Park	5.5 acres of restoration consisting of coastal sage scrub habitat within a key wildlife connectivity linkage area	
	West Loma	Irvine Ranch Conservancy	62.47 acres of restoration consisting of grassland, coastal sage scrub, and riparian habitat	
2016	USFS Dam Removal	U.S. Forest Service	Removal of 14 dams along San Juan Creek to improve hydrologic functions	

4.2 Restoration Project Status

4.2.1 Agua Chinon/Bee Flat Canyon

Action	Agua Chinon/Bee Flat Canyon Status
Sponsor	Irvine Ranch Conservancy
OCTA Funding	$1,497,160
Location	Irvine
Acreage	90.1 acres
General Habitat Types	Chaparral, coastal sage scrub, coast live oak/sycamore, oak woodland, native grassland, riparian
Restoration Design Plans	Approved in 2010.[4]
Restoration Installation	Implementation began in 2011 and is ongoing.
Restoration Monitoring of Success Criteria	Monitoring is ongoing. Monitoring shows the project is on track to meet the success criteria by the year projected.
Land Protection Mechanism	Lands are deed restricted for open space and conservation purposes as the result of the transfer of land from the Irvine Company to the County of Orange. Lands still under the Irvine Company are subject to an Irrevocable Offer of Dedication to the City of Irvine (Preservation Area R).
Long-Term Management of Restoration Site	The project area is owned in fee by the County of Orange, with portions of Agua Chinon owned by the Irvine Company. The Orange County Parks Department and the Irvine Company are responsible for their long-term stewardship subject to the terms and conditions of the Central-Coastal NCCP/HCP.
General Comments / Concerns	None.

[4] The USFWS and CDFW approved the restoration plan framework for this project in 2010. A more detailed plan was drafted and approved by USFWS and CDFW in 2011. To also obtain mitigation credit from the ACOE, the restoration plan for the Agua Chinon subwatershed was developed further into a Habitat Mitigation Monitoring Plan to comply with the Environmental Protection Agency 2008 Final Mitigation Rule.

4.2.1.1 Project Summary

The Agua Chinon/Bee Flat Canyon restoration project is being completed by The Irvine Ranch Conservancy (IRC) and includes restoration of 90.1 acres of natural habitat in the San Diego Creek watershed, within the sub-watersheds of Agua Chinon and Bee Flat Canyon. The sites include disturbed coastal sage scrub, grassland, and chaparral, as well as woodland and riparian habitat. The OCTA-funded restoration project will add to the other ongoing restoration projects in the same watershed that are being funded by other entities. The project site is within the Central-Coastal NCCP/HCP Central Reserve system, but the restoration proposed for this project is above and beyond the requirements of the Central-Coastal NCCP/HCP.

The long-term goal of the restoration is to facilitate habitat restoration and enhancement for the purpose of increasing landscape-scale ecosystem resilience and resistance to disturbance, primarily from catastrophic wildfire and invasive species. Sub-watershed–wide weed targets also will be controlled. The restoration success criteria include the reduction of nonnative cover of grasslands to native cover.

Bee Flat Update

The annual report was provided to the Wildlife agencies for review and discussion. The Wildlife Agencies agreed that the site has met the necessary non-native cover criteria (as well as the other success criteria). One more round of treatment is needed in the spring for select polygons. It is then anticipated that the site will obtain sign off for the implementation phase. IRC will provide an email summary and photographs of the follow-up treatment areas once completed. At that time it it anticipated that formal concurrence and sign off on the site will be received.

Agua Chinon Update

Performance monitoring at Agua Chinon, most recently performed in 2019 indicates that restoration efforts have been highly successful in establishing native vegetation and controlling nonnative weeds.. In 2019, the maintenance activities in Agua Chinon consisted of weed control, which included targeted invasive plant removal. The average native plant cover exceeded criteria thresholds for all habitat types and only two of the 40 polygons did not meet success standards. Vegetation of restoration sites compared favorably with that of the reference sites, therefore, the IRC proposes a reevaluation of success criteria and requests that Agua Chinon / Bee Flat become eligible for sign-off. OCTA will coordinate with IRC, the Wildlife Agencies and Army Corps of Engineers to coordinate potential sign off.

4.2.1.2 Related Documents and References

Irvine Ranch Conservancy. 2011a. *Restoration Plan Framework for Bee Flat Canyon Under the Renewed Measure M Freeway Mitigation and Resource Protection Program*. Irvine, CA. Report dated July 8, 2011.

Irvine Ranch Conservancy. 2017. *Habitat Mitigation and Monitoring Plan: Agua Chinon Subwatershed.* Agreement No. C-1-2384 between OCTA and IRC. Irvine, CA.

Irvine Ranch Conservancy. 2019. *Annual Status Report, January-December 2019: Renewed Measure M Freeway Mitigation and Resource Protection Program, Agua Chinon Riparian Corridor.* Agreement No. C-1-2384 between OCTA and IRC. Irvine, CA.

Irvine Ranch Conservancy. 2019. *Annual Status Report, January-December 2019: Renewed Measure M Freeway Mitigation and Resource Protection Program, Bee Flat Canyon.* Agreement No. C-1-2384 between OCTA and IRC. Irvine, CA.

4.2.2 Big Bend

Action	Big Bend Status
Sponsor	Laguna Canyon Foundation
OCTA Funding	$87,500
Location	Laguna Beach
Acreage	3.7 acres
General Habitat Types	Coastal sage scrub, riparian woodland
Restoration Design Plans	Approved in 2011.
Restoration Installation	Implemented in 2011.
Restoration Monitoring of Success Criteria	Monitoring was initiated in 2011 and 5 years of monitoring complete. The project was signed off in 2017.
Land Protection Mechanism	A deed restriction is expected to be recorded for the property to ensure long-term land use consistent with the project's restoration and mitigation intent.
Long-Term Management of Restoration Site	The City of Laguna Beach owns the property and is obligated to manage it to perpetuate the benefits of the restoration project. It is anticipated that the project site will be incorporated into an Orange County Parks management agreement.
General Comments / Concerns	Work with the City of Laguna Beach to record the restoration areas land protection document.

4.2.2.1 Project Summary

The Big Bend restoration project is located in the City of Laguna Beach. Since its purchase by the City a decade ago, the site has been used as an informal trailhead to access the 20,000-acre South Coast Wilderness System. The project site was degraded by invasive species and human activity. Over the past 10 years, the City of Laguna Beach has worked with the Laguna Canyon Foundation to preserve more than 250 acres adjacent to the proposed restoration area, which is now under City ownership and managed by OC Parks. This restoration site, however, is not part of the Central-Coastal NCCP/HCP Coastal Reserve.

The project restored 3.2 acres of disturbed coastal sage scrub and approximately 0.5 acre of riparian habitat to benefit local species and increase the wildlife corridor's local and regional effectiveness. Restoration included the removal of invasive nonnative species and debris, planting of native species, and maintenance/improvement of flood conveyance patterns across the site to enhance water quality for this important coastal watershed (the San Juan watershed). The project achieved the success criteria in January 2017. The project sponsor has continued to work with the City to draft a deed restriction. This deed restriction is anticipated to be completed soon.

4.2.2.2 Related Documents and References

Laguna Canyon Foundation. 2011. *Restoration and Enhancement Plan: Big Bend Property*. Laguna Beach, CA. Report dated May 10, 2011.

Laguna Canyon Foundation. 2015. *2014 Annual Status Report: Big Bend Habitat Restoration, 3.7 Acres*. Laguna Beach, CA. Report dated January 31, 2015.

4.2.3 City Parcel

Action	City Parcel Status
Sponsor	City of San Juan Capistrano
OCTA Funding	$1,500,000
Location	City of San Juan Capistrano (within Trabuco Creek Wildlife Linkage)
Acreage	53 acres
General Habitat Types	Riparian corridor, coastal sage scrub, oak woodland, native grassland
Restoration Design Plans	Approved in 2011.
Restoration Installation	Implemented in 2011.
Restoration Monitoring of Success Criteria	Monitoring initiated in 2011 and 5 years of monitoring complete. The project was signed off as of October 2018.
Land Protection Mechanism	The City of San Juan Capistrano recorded a Declaration of Covenants and Restrictions in the fall of 2013 to ensure long-term land use consistent with the project's restoration and habitat management intent.
Long-Term Management of Restoration Site	The City of San Juan Capistrano owns and manages the entire property of this restoration site as part of the Northwest Open Space.
General Comments / Concerns	None.

4.2.3.1 Project Summary

The City Parcel (2C Ranch Trabuco Canyon) is located within the San Juan Creek (Trabuco Creek) watershed in the City of San Juan Capistrano. This project has been completed and restored 13 acres of riparian and 40 acres of coastal sage scrub habitats.

Restoration included the removal and control of invasive, nonnative plants across the entire restoration area, followed by the planting of native riparian and upland species. This has established a more diverse habitat structure that is conducive to supporting an array of native plants and wildlife. California Natural Diversity Database (CNDDB) occurrence records for coastal California gnatcatcher, least Bell's vireo, and southwestern willow flycatcher intersect with the restoration site. The project site is not within the Plan Area of the Central-Coastal NCCP/HCP or the Orange County Southern Subregion HCP but within the City's designated Northwest Open Space. This open space area provides an important connection between these two landscape-level planning areas. This project restored a gap linking gnatcatcher habitat and improved a corridor between the Coastal and Central NCCP/HCP areas.

The project achieved the set success criteria in October 2018. This project employed over 30 disadvantaged San Juan Capistrano youth, removed over 25,000 pounds of illegally dumped concrete and trash, and removed an additional 15,000 pounds of debris. It is estimated that over 200,000 invasive weeds were removed and over 60,000 native plants and trees were planted. The project sponsor successfully recorded a restricted covenant of the restored area in 2013. All required commitments for the project have been satisfied.

4.2.3.2 Related Documents and References

City of San Juan Capistrano. 2011. *Restoration and Enhancement Plan: 2C Ranch/Trabuco Creek Restoration*. San Juan Capistrano, CA. Report dated April 15, 2011.

Sevrens, Gail K. 2018. Response to Request for Sign-off on the 2C Ranch/Trabuco Creek Restoration Project included in the Orange County Transportation Authority NCCP/HCP. Received by Lesley Hill, October 9, 2018. (Sign Off Letter)

4.2.4 Fairview Park

Action	Fairview Park Status
Sponsor	City of Costa Mesa
OCTA Funding	$2,000,000
Location	Costa Mesa
Acreage	23 acres
General Habitat Types	Wetlands, native grassland, coastal sage scrub, willow scrub, oak woodland
Restoration Design Plans	Approved in 2010.
Restoration Installation	Implemented in 2011.
Restoration Monitoring of Success Criteria	Monitoring initiated in 2012 and 6 years of monitoring complete.
Land Protection Mechanism	A CE was recorded in 2008 for the Orange County Public Works in favor of the Orange County Flood Control District that currently protects the site. In 2019, it was realized that the city of Costa Mesa will need to record a CE over additional of the project.
Long-Term Management of Restoration Site	The City of Costa Mesa will maintain the restored wetlands and riparian habitat project site in-perpetuity. Improvements and restoration are guided by the Fairview Park Master Plan approved by the Costa Mesa City Council in 1998.
General Comments / Concerns	City of Costa Mesa needs to provide information requested by OCTA and the Wildlife Agencies in relation to restoration acreage and history. See below.

4.2.4.1 Project Summary

The City of Costa Mesa restored 23 acres of native grassland, coastal sage scrub, wet meadow/marsh, and riparian habitats within the northwest portion of this public park. The purpose was to create native habitat for riparian birds and animals by increasing native plant diversity within 10 feet of the constructed wetlands and stream channels. The project includes the creation of wetland ponds and a water delivery irrigation system to establish and support the native habitat. This restoration site is within the Santa Ana River watershed. The project site is within the Plan Area of the Central-Coastal NCCP/HCP but is not part of the Reserve. There was a previous mitigation project at this location (for the Santa Ana River Mainstem Project Lower Santa Ana River Reach 2 Channel Excavation), but the restoration project approved for funding by OCTA is above and beyond the requirements of the previous project.

Occurrences of coastal California gnatcatcher, least Bell's vireo, and California least tern have been observed at the restoration site. In addition, successful revegetation efforts for southern tarplant have been implemented at the restoration site.

The project is well beyond established in many of the planted areas for riparian and coastal sage scrub. Compared to the quarterly inspection in September, invasive plants covereage are still less than 1%. Currently, there is 7.21 acres of coastal sage scrub, 3.11 acres of riparian, 0.76 acres of wetland, 1.09 acres of southern tarplant, and 1.46 acres of alluvial coastal sage scrub. The coastal sage scrub has been growing well without water for 4 years. The original grassland area converted to coastal sage scrub, where California gnatcatchers have been observed nesting for the past two years. Cattails and bulrush are well maintained and in lower densities compared to the high density observed in 2018, so there is no need for large machines to enter the ponds at this time. Homeless activity is still an issue at the wetlands degrading native habitat and leaving excessive amounts of trash at ponds and channels.

Coordination has been on-going with the city of Costa Mesa to resolved a few concerns realized in 2019. This includes areas of the restoration project site that were not planted. The city is working on the following tasks and will provide updates in 2020 to OCTA and the Wildlife Agencies:

- Cross checking current vegetation & trails map against original OCTA project restoration map.
    - Include updated figure with acreages of habitat types currently present on site for comparison to original restoration plan.
- On-site quantification of vegetation disturbed by current maintenance work to the ponds
- Determine off site mitigation ratio and areas the City might use for continued discussion

4.2.4.2 Related Documents and References

City of Costa Mesa. 2010. *City of Costa Mesa Fairview Park Wetlands and Riparian Habitat Project Restoration Plan*. Costa Mesa, CA. Report dated November 3, 2010.

Endemic Environmental Services. 2019. *Fairview Park Riparian Mitigation Wetlands Project: Annual Report 2019*. Costa Mesa, CA.

4.2.5 UCI Ecological Reserve

Action	UCI Ecological Reserve Status
Sponsor	Nature Reserve of Orange County (Natural Communites Coalition)
OCTA Funding	$325,000
Location	Irvine
Acreage	8.5 acres
General Habitat Types	Cactus scrub
Restoration Design Plans	Approved in 2010.
Restoration Installation	Implemented in 2011.
Restoration Monitoring of Success Criteria	Monitoring initiated in 2012 and 7 years of monitoring complete. The site is very close to meeting the set success criteria but experienced a high amount of nonnative grasses in 2017. Monitoring will continue until 2020,

Action	UCI Ecological Reserve Status
	at which time it is expected that the nonnative cover will meet the projects' set criteria.
Land Protection Mechanism	The Preserve is designated for conservation and habitat management by University of California (UC) Irvine's long-range development plan and pursuant to the Central-Coastal NCCP/HCP.
Long-Term Management of Restoration Site	The Preserve is managed by the UC Irvine Office of Natural Resources, for the School of Biological Science.
General Comments / Concerns	Natural Communities Coalition (NCC) has been coordinating with the Wildlife Agencies in regard to the percent of non-native cover. NCC will continue to coordinate with both the Wildlife Agencies and OCTA until sign off is obtained.

4.2.5.1 Project Summary

The Natural Communities Coalition has been responsible for the planning and implementation (completed in November 2011) of the restoration and enhancement of 8.5 acres of cactus scrub in a mosaic of native grassland at the University of California (UC) Irvine Ecological Preserve, located in the San Joaquin Hills. The goal of the project was to increase breeding habitat for coastal California gnatcatcher and cactus wren. Even at the early stages of establishment, both cactus wrens and coastal California gnatcatchers were observed using the restoration area. Coastal California gnatcatchers were observed moving through the restoration site in pairs and family groups, foraging in native shrubs that were at the site prior to restoration and in native forbs that have developed since the restoration began. With respect to cactus wrens, the southern half of the restoration site was used by a family group. Cactus wrens were observed foraging in the restoration site, and a juvenile cactus wren was observed calling from planted prickly pear cactus clumps (Natural Communities Coalition 2017). The project site is within the Central-Coastal NCCP/HCP Coastal Reserve, but the proposed restoration is above and beyond the requirements of the Central-Coastal NCCP/HCP.

The project site is doing well, having met most of the set success criteria. The fifth-year of performance monitoring for the UCI Measure M cactus scrub restoration project was conducted in April 2017. Absolute native cover, including perennial and annual species, was 99%. Cactus accounted for 6.7% of the total native cover. Nonnative cover was 71%, mainly from annual grass cover at 57%. The performance monitoring report concluded that the habitat restoration goals of the project had been achieved by improving the quality of cactus scrub habitat for cactus wrens and California gnatcatchers over 8.5 acres within the UCI Preserve (Land IQ 2017). In August 2017, OCTA requested sign-off for the project from the Wildlife Agencies. In their 8-27-2017 response, the Wildlife Agencies agreed in general that the habitat restoration goals had been met, except they were concerned about the high cover of nonnative species, consisting of mostly of annual grass (56.7% absolute cover). Following several consecutive years of very low rainfall during implementation of the project, 2017 was an above-average rainfall year, which resulted in significant increases of both native and nonnative cover. Nonetheless, native perennial and annual species successfully reproduced (e.g., flowering, seed production and new recruitment) throughout the site. While the Wildlife Agencies recognized the project successfully established desirable native habitat, there was concern that the high cover of nonnative annual grasses could undermine the long-term success of the restoration effort.

The Wildlife Agencies recommended that the nonnative species be treated for one additional growing season and transect data be collected after one more growing season and reported for review. More specific information and survivorship data for the 1-acre remedial site was also requested. In a

November 6, 2017 meeting, NCC, OCTA, Land IQ, CDFW and USFWS reached consensus on the following next steps to achieve signoff by the Wildlife Agencies for the 8.5-acre cactus scrub restoration project:

- The restoration team will avoid further disturbance of the site by not conducting additional maintenance, but instead rely on the demonstrated resilience of established native shrubs and expected fluctuation in annual precipitation to achieve the desired condition of continued increases in native plant cover with a reduction in the cover of annual grasses.
- Wildlife Agencies will consider amending the success criteria, in 2018, as it relates to the cover of annual grasses as 10% absolute cover is exceptionally low for the Subregion (except in chaparral-dominated areas) and may not be reflected in neighboring reference sites at the Ecological Preserve.
- The restoration ecologist will revisit the site in 2019 to document changes in cover values, sharing updates on site condition with the greater project team for purposes of receiving signoff.

While no additional maintenance was performed by NCC, in April 2018 UCI conducted spot weeding in the restoration area as part of their annual weed management across the UCI Preserve. No additional maintenance has occurred since then.

The restored cactus scrub habitat continues to develop within reasonable expectations for plant growth, cover and species distribution, especially considering the historic drought conditions during the majority of the establishment period coupled with the higher than average rainfall that occurred in 2016/17 and again in 2018/19. The site demonstrates sustainability and resilience as shown by the increase in native cover and decrease in nonnative grass cover from 2017 to 2019 during which only limited spot-weeding occurred primarily in the remedial planting area. It is recommended that UCI Preserve managers continue to monitor and control purple false brome and fennel throughout the Preserve with a consistent eradication program. Throughout the Preserve, opportunities for management of black mustard blooms in heavy clay soils may also be warranted to help weed management in higher rainfall years as part of overall management of black mustard within the Preserve. Coordination is on-going with NCC and the Wildlife Agencies on how best to address concerns related to the high non-native cover throughout the site and the continued dominance of mustard in the remedial planting area.

4.2.5.2 Related Documents and References

Griswald, M., Preston, K., and Bowler, P. 2010. *Measure M Cactus Scrub Restoration Plan for the University of California Irvine Ecological Preserve*. Irvine, CA. Report dated December 2, 2010.

Land IQ. 2017. 2017 Performance Monitoring Report Year 5 Measure M Cactus Scrub Restoration for the University of California Irvine Ecological Preserve. Prepared for the Natural Communities Coalition. June 2017.

Natural Communities Coalition. 2019. *Measure M Cactus Scrub Restoration for the University of California Irvine 2019 Performance Monitoring Results Memorandum*. Irvine, CA. Memo dated October 31, 2019.

4.2.6 Aliso Creek

Action	Aliso Creek Status
Sponsor	Laguna Canyon Foundation
OCTA Funding	$1,105,000
Location	Laguna Niguel
Acreage	55 acres
General Habitat Types	Riparian and transitional habitats
Restoration Design Plans	Approved in 2014[5].
Restoration Installation	Implemented in 2015.
Restoration Monitoring of Success Criteria	Monitoring initiated in 2015 and 5 years of monitoring complete.
Land Protection Mechanism	The County of Orange is currently drafting a restrictive covenant that will cover the entire 55-acre restoration project area.
Long-Term Management of Restoration Site	Orange County Parks owns and manages this land as part of Aliso and Wood Canyons Wilderness Park, in conjunction with the Aliso and Wood Canyon RMP.
General Comments / Concerns	None.

4.2.6.1 Project Summary

Laguna Canyon Foundation restored 55 acres of riparian habitat along Aliso Creek, in the City of Laguna Niguel. The project included removing nonnative invasive plants and planting willow and mulefat scrub and transitional riparian-upland habitats. It has added to other restoration projects in the same watershed funded by other entities. The site is in the San Juan watershed and within the boundaries of the Aliso and Wood Canyons Wilderness Park, but outside of the Central-Coastal NCCP/HCP Reserve boundaries.

The restoration of riparian habitat along Aliso Creek benefits Covered Species such as the least Bell's vireo, southwestern willow flycatcher, western pond turtle, and bobcat. Known occurrences of least Bell's vireo, southwestern willow flycatcher, and western pond turtle have been recorded at this restoration site. The restoration plan includes specific actions to benefit and improve western pond turtle habitat. Both western pond turtle and least Bell's vireo were documented within the restoration area in 2018. Effective weed control in 2018 has assisted in transforming the site during 2019 from an arundo-dominated habitat to a functioning native riparian habitat that will promote better hydrology and high-quality habitat for wildlife. This will remain the goal in the following year. In 2019, cooler temperatures and more consistent precipitation allowed for substantial progress towards reaching performance goals. A maintenance program has been implemented in order to control erosion, target invasive weeds, protect plants, and remove debris. LCF staff and volunteers planted

[5] The USFWS and CDFW approved the restoration plan for this project in 2014. To also obtain mitigation credit from the ACOE, the restoration plan was developed further into a Habitat Mitigation Monitoring Plan (HMMP) to comply with the Environmental Protection Agency 2008 Final Mitigation Rule. Implementation began while the HMMP was being developed with the ACOE.

transitional species in areas where plant cover and diversity were necessary. Invasive plant removal has remained on target and supports forecasted results.

4.2.6.2 Related Documents and References

Laguna Canyon Foundation. 2020. *Aliso Creek Habitat Mitigation and Monitoring Plan Annual Report for Year 5 (2019) of Project Implementation Aliso and Wood Canyons Wilderness Park.* Aliso Viejo, CA. Report dated February 1, 2020.

4.2.7 Chino Hills State Park

Action	Chino Hills State Park Status
Sponsor	Habitat Restoration Sciences/Dudek (Chino Hills State Park approval)
OCTA Funding	$193,000
Location	Yorba Linda
Acreage	11 acres
General Habitat Types	Cactus scrub
Restoration Design Plans	Approved in 2017 and revised in 2019.
Restoration Installation	Pending.
Restoration Monitoring of Success Criteria	Pending.
Land Protection Mechanism	The property is owned in fee title and is permanently conserved by the California Department of Parks and Recreation.
Long-Term Management of Restoration Site	The park is managed according to the Chino Hills State Park General Plan (California Department of Parks and Recreation 1999).
General Comments / Concerns	None.

4.2.7.1 Project Summary

CHSP is composed of 14,102 acres in the hills of Santa Ana Canyon, with portions of the park found in Orange, Riverside, and San Bernardino Counties. Ranging from 430 to 1,781 feet above mean sea level, the park straddles the north end of the Santa Ana Mountains and the southeast portion of the Puente-Chino Hills, which together form the northern end of the Peninsular Ranges in southern California. The restoration site is outside the Central-Coastal NCCP/HCP Plan Area.

The original CHSP restoration project proposed to enhance 21 acres of riparian, woodland, and cactus scrub habitats. It was later determined that a more intensive cactus scrub restoration project within CHSP would provide better ecological benefits. This project change was coordinated with and approved by the Wildlife Agencies and is discussed in greater detail in Section 8.2.4, *Chino Hills State Park and North Coal Canyon Restoration Project Modification*. The resulting project is an intensive restoration of 11 acres of cactus scrub within CHSP on the slope overlooking Yorba Linda south of the junction of Southridge Trail and Diemer Trail. The 11-acre cactus scrub restoration project will help return this area to its previous condition and benefit the OCTA M2 Covered Species coastal California gnatcatcher and cactus wren.

In 2019, OCTA was able to successfully procure a new agreement for project implementation with Habitat Restoration Sciences, Inc. (HRS) and Dudek. Updates were provided to the restoration plan

(approved by the Wildlife Agencies as well as Chino Hills State Park staff). Revisions were made to the project footprint based on the existing conditions during the baseline field review. While the project footprint changed, the restoration site acreage was retained as 11 acres.

HRS completed initial site preparation on June 3, 2019, which included initial clearing of existing non-native vegetation, Best Management Practive (BMP) installation, and trash and debris removal. Work conducted for the remainder of the designated installation period included conducting grow-kill treatment of emerging weeds, trash removal and BMP maintenance.

Due to contracting delays, site preparation was conducted later than originally scheduled. Therefore, the appropriate window for an adequate spring season grow-kill was missed. HRS attempted to conduct the grow-kill in summer 2019, however, due to lack of precipitation and the natural phenology of the annual weeds, there was not significant germination of non-native weeds. In response to site conditions and the persistent weed seed bank, a comprehensive grow-kill approach was recommended by Dudek as an adaptive management strategy. All agencies agreed to extend the grow-kill treatments through Year One of the restoration project and delay the seeding and planting until Winter 2020/2021 (end of Year One). Additionally, locating available seed that complies with the CHSP regional seed restrictions has required timing with seasonal availability, adding to project delays. The additional year of grow-kill will allow for the securing of required species, holding the plants through the season and bolstering numbers and species with an additional season of collection. The project schedule was also revised, to accommodate delays in contracting, availability of seed and to allow for additional control of non-native invasive species prior to seeding. Due to delays in seed availability, seed and container plant installation will occur in 2020/2021.

4.2.7.2 Related Documents and References

California State Parks. 2017. *Cactus Scrub Restoration, Northeast Preserve, Chino Hills State Park*. Perris, CA. Report dated January 10, 2017.

Dudek. 2020. *Notice of Installation Completion for Cactus Scrub Restoration, Northeast Preserve, Chino Hills State Park Memorandum*. Encinitas, CA. Report dated February 28, 2020.

4.2.8 Harriet Weider Regional Park

Action	Harriet Weider Regional Park Status
Sponsor	Bolsa Chica Conservancy
OCTA Funding	$475,000
Location	Huntington Beach
Acreage	9.65 acres
General Habitat Types	Native grassland, coastal sage scrub, riparian
Restoration Design Plans	Approved in 2017 (some trail mapping approved in 2018)
Restoration Installation	Implemented in 2016.
Restoration Monitoring of Success Criteria	Monitoring initiated in 2016 and 3 years of monitoring complete.
Land Protection Mechanism	The County of Orange has drafted a restrictive covenant. It is anticipated that this document will be executed in 2020.

Action	Harriet Weider Regional Park Status
Long-Term Management of Restoration Site	The Bolsa Chica Conservancy, in partnership with Orange County Parks, will be the long-term management entity.
General Comments / Concerns	None.

4.2.8.1 Project Summary

The Bolsa Chica Conservancy restoration project comprises 9.65 acres of grassland, coastal sage scrub, and riparian habitat in the Santa Ana watershed. The project area may attract least Bell's vireo, coastal cactus wren, coastal California gnatcatcher and burrowing owl. Harriett Weider Regional Park is to be established as a mixed-use passive park, with sections restored to native habitat.

The Harriett Wieder Regional Park Restoration Project (sponsored by the Bolsa Chica Conservancy) was approved in the second round of restoration project funding in 2012. The original footprint occurred on County lands as well as private lands. To simplify the project, the Bolsa Chica Conservancy shifted the project area to County lands only. This shift also enabled the project to increase from 8.2 to 9.65 acres. The habitat types to be restored remain the same for the project (native grassland, coastal sage scrub, and riparian). This project modification was approved by the Wildlife Agencies and EOC. The restoration plan for this project was refined. The conservancy has successfully re-introduced southern tarplant to a site near the new interpretive center north of the park and included tarplant seed in the restoration plant palette.

The Bolsa Chica Conservancy was able to begin implementation (i.e., seed collection, plant propagation, installation of temporary irrigation, and seeding and plantings in some areas) of this project in 2016 while working out the details of the final success criteria and trail alignments with the Wildlife Agencies and OC Parks. To date, 8,377 individuals of southern tarplant have been documented within the restoration area. Thus far, growth has met two thirds of the performance criteria. A cactus seeding effort took place in 2019 with results to be documented in 2020 and additional cactus planting will be completed during the 2020 warm season. The project expects aggressive weed control over the next few seasons in order to maintain success criteria.

4.2.8.2 Related Documents and References

Bolsa Chica Conservancy. 2018. *Habitat Restoration Plan for Harriett Wieder Regional Park*. Bolsa Chica Conservancy with assistance from LSA Associates Inc., Huntington Beach, CA. December 2018.

Bolsa Chica Conservancy. 2019. *Harriett Wieder Regional Park Habitat Restoration Project Year 2 Annual Report 2019.* Huntington Beach, CA. 2019

Bolsa Chica Conservancy. 2019. *Harriett Wieder Regional Park Habitat Restoration Project Southern Tarplant Survey 2019.* Huntington Beach, CA. 2019

4.2.9 Lower Silverado Canyon

Action	Lower Silverado Canyon Status
Sponsor	Irvine Ranch Conservancy
OCTA Funding	$1,414,435
Location	County of Orange
Acreage	28.4 acres
General Habitat Types	Riparian
Restoration Design Plans	Approved in 2014.
Restoration Installation	Implemented in 2014.
Restoration Monitoring of Success Criteria	Monitoring initiated in 2014 and 6 years of monitoring complete.
Land Protection Mechanism	The project site is subject to, and protected by, the permanent SilMod Conservation Easement Deed recorded in 2002 in favor of The Nature Conservancy. In addition, the lands are deed restricted for open space and conservation purposes under the wilderness park designation as the result of the transfer of land from the Irvine Company to the County of Orange.
Long-Term Management of Restoration Site	The project site is owned in fee by the County of Orange, and OC Parks is responsible for its long-term stewardship. IRC works under contract to the County of Orange under the supervision of OC Parks to manage this area and has existing formal permission to conduct restoration projects here. Broad management of the site, consistent with the terms of the Conservation Easement Deed, is guided by the Resource Plan for the 2009 SilMod Conservation Easement Property. The Integrated Adaptive Management Framework for the North Irvine Ranch Wildlands (Noss 2011) is the umbrella management framework that applies to all management units in the North Irvine Ranch regardless of ownership or mechanism of land protection.
General Comments / Concerns	None.

4.2.9.1 Project Summary

The IRC has implemented both active and passive restoration of 20.6 acres of riparian habitat and 7.8 acres of coastal sage scrub along Silverado Creek, a tributary to Santiago Creek (total of 28.4 acres). The project location is within the Santa Ana watershed. The degraded habitat that has been restored lies within a landscape mosaic containing patches of intact habitat. Restoring degraded patches within the mosaic has improved continuity to further benefit habitat quality of both restored and intact components. The project site is within the plan area for the Central-Coastal NCCP/HCP, but it is not currently part of the Reserve. However, the land will remain as conserved open space due to the recordation of conservation easements dedicated to The Nature Conservancy.

The Lower Silverado Canyon restoration project is now in its sixth year of active management but in its third year of planting. As of 2019, the Year 3 minimum target has been surpassed, on average, by all habitat types and the interim minimum increase of two species has been met. Additionally, three polygon areas meet the final success criteria. There were 44 bird, six mammal, and three reptile species observed on the site in 2019. Arthropod performance monitoring results are more varied but are expected to improve as the project progresses. Between 2018 and 2019 there was abundant

rainfall which caused significant flooding. Most restoration polygons were resilient but there were management challenges as invasives from upstream re-sprouted in the restoration area and water flows created unvegetated areas. Monitoring of the affected areas will continue in 2020 and remedial action will take place if necessary. Goals for 2020 also include the continued removal of high priority weeds, such as *smilo sp.*.

4.2.9.2 Related Documents and References

Irvine Ranch Conservancy. 2018b. *Habitat Mitigation and Monitoring Plan: Lower Silverado Canyon Under the Renewed Measure M Freeway Mitigation and Resource Protection Program*. Irvine, CA. February 2018.

Irvine Ranch Conservancy. 2019. *Annual Status Report, January-December 2019: Renewed Measure M Freeway Mitigation and Resource Protection Program, Lower Silverado Canyon.* Agreement No. C-3-1774 between OCTA and IRC. Irvine, CA.

4.2.10 North Coal Canyon

Action	North Coal Canyon Status
Sponsor	RECON Environmental Inc. (Chino Hills State Park approval)
OCTA Funding	$247,500
Location	Yorba Linda
Acreage	5.5 acres
General Habitat Types	Riversidean alluvial fan, coastal sage scrub
Restoration Design Plans	Approved in 2015 and revised in 2019.
Restoration Installation	Implemented in 2019.
Restoration Monitoring of Success Criteria	Pending
Land Protection Mechanism	The property is owned in fee title and is permanently conserved by the California Department of Parks and Recreation.
Long-Term Management of Restoration Site	The park is managed according to the Chino Hills State Park General Plan (California Department of Parks and Recreation 1999).
General Comments / Concerns	None.

4.2.10.1 Project Summary

The North Coal Canyon property is owned by California State Parks and is within CHSP. This property is a vital link between the surrounding Puente-Chino Hills to the north and the Cleveland National Forest and the Santa Ana Mountains on the south. The proposed restoration project will enhance and restore 5.5 acres of coastal sage scrub/Riversidian alluvial fan sage scrub on the north side of SR-91. The project is expected to improve wildlife movement by making habitat north of SR-91 more attractive to wildlife and will complete the restoration of the entire Coal Canyon parcel by connecting three other restoration projects being funded by other entities. This bio-corridor is the only remaining link that allows dispersal of wildlife between CHSP and the more diverse Santa Ana Mountains. Coal Canyon provides habitat for the movement of OCTA M2 Covered Species such as mountain lion and

bobcat and provides high quality habitat for coastal California gnatcatcher as well as foraging habitat for the least Bell's vireo.

In 2019, OCTA was able to successfully procure a new agreement for project implementation with RECON Environmental Inc. Minor updates were provided to the restoration plan and approved by the Wildlife Agencies as well as Chino Hills State Park staff. Minor revisions were made the project schedule and planting palette.

Following an initial meeting in March of 2019, seed collection and site preparation took place. The preparation included cutting down eucalyptus trees, mowing large patches of invasive vegetation, and mowing and trimming of nonnative vegetation that was intermixed with native vegetation. Additionally, a mainline irrigation system and native seed was collected from Chino Hills Discovery Center. Container plant installation was scheduled for early 2020.

4.2.10.2 Related Documents and References

California State Parks. 2015. *Coastal Sage Scrub Restoration, North Coal Canyon, Chino Hills State Park*. Perris, CA. Revised March 2019.

Irvine Ranch Conservancy. 2016. *Project Summary of IRC/OCTA Measure M2 Coal Canyon Undercrossing Wildlife Connectivity Improvements*. Irvine, CA. Report dated October 27, 2016.

RECON Environmental, Inc. 2020. *OCTA North Coal Canyon Restoration Project, Summary of Work Completed (March 2019 – February 2020).* San Diego, CA.

4.2.11 West Loma

Action	West Loma Status
Sponsor	Irvine Ranch Conservancy
OCTA Funding	$1,322,800
Location	County of Orange
Acreage	62.47 acres
General Habitat Types	Scrub, riparian
Restoration Design Plans	Approved in 2013.
Restoration Installation	Implemented in 2013.
Restoration Monitoring of Success Criteria	Monitoring initiated in 2013 and 7 years of monitoring complete.
Land Protection Mechanism	A portion of the land is under conservation easement held by The Nature Conservancy, and the other portion is deed restricted exclusively for open space by the County of Orange and is dedicated as part of the reserve lands in the Central-Coastal NCCP/HCP.
Long-Term Management of Restoration Site	OC Parks is responsible for long-term stewardship subject to the terms and conditions of the Orange County Central-Coastal NCCP/HCP and the East Orange Conservation Easement, as well as the management plans developed under these agreements.
General Comments / Concerns	None.

4.2.11.1 Project Summary

IRC has restored 62.47 acres of grassland, coastal sage scrub, and riparian habitat and realigned existing wildlife fencing at the West Loma site. The restoration site is in the Santa Ana watershed. The degraded habitat that has been restored lies within a landscape mosaic containing patches of intact habitat. Restoring degraded patches within the mosaic has improved contiguity to further benefit habitat quality of both restored and intact components. The original restoration project design included realignment of fencing along the 241 Toll Road to improve wildlife movement, but it was determined this was not feasible (see Section 8.2.1). In place of realigning fencing, this project also includes the placement of plantings and wildlife cameras at the SR-91 Coal Canyon undercrossing and culvert. The plantings were installed to help entice more wildlife to utilize the existing potential crossing structures (freeway underpass and culvert). Cameras were installed to document wildlife movement through these structures. This project also capitalizes on a large-scale restoration project that is currently taking place within the same watershed. The project site intersects with CNDDB occurrence records for many-stemmed dudleya, orangethroat whiptail, and coastal California gnatcatcher. A portion of the project site is within the Central-Coastal NCCP/HCP Reserve, but the restoration is above and beyond the requirements of the Central-Coastal NCCP/HCP.

As of 2019, vegetation performance monitoring indicates that restoration efforts at West Loma have been largely successful and show clear increases in native cover, native functional groups, native species richness, and native vertical density. Due to above average rainfall during 2019, nonnative cover has been the most difficult criteria to meet and will be prioritized in the following years. Arthropod performance monitoring results are varied but are expected to improve as habitat is restored and disturbances are decreased. Pre-disturbance nesting surveys were conducted in and around restoration polygons in March and April 2019, and a total of 11 nesting locations were observed within the West Loma subwatershed. One pair of Coastal California gnatcatcher, one pair of Cactus wren, and four Least Bells' Vireo individuals were observed. A follow-up survey of the CAGN pair found one nest with three young adjacent to restoration polygons. Appropriate buffers were established for each nesting location with guidance from the HMMP and the qualified avian biologist.

Additionally, the wildlife monitoring camera program at the SR-91 Coal Canyon undercrossing for the OCTA mitigation project was initiated in January 2017. Eight trail cameras and one vehicle counter were in operation from January 2019 to December 2019. Four cameras were replaced at various times due to vandalism and theft. The cameras caught a total of 618 bobcats, 420 coyotes, one mule deer, one gray fox, and eight raccoons. There was a total of 250 wildlife crossing confirmed which is a significant increase from previous years. Daily human activity in the undercrossing continues to be prevalent. Human, dog, and vehicle activity have increased since 2018.

4.2.11.2 Related Documents and References

Irvine Ranch Conservancy. 2018b. *Habitat Mitigation and Monitoring Plan: West Loma Subwatershed Under the Renewed Measure M Freeway Mitigation and Resource Protection Program*. Irvine, CA. March 2018.

Irvine Ranch Conservancy. 2019. *Annual Status Report, January-December 2019: Renewed Measure M Freeway Mitigation and Resource Protection Program, West Loma Subwatershed.* Agreement No. C-3-1775 between OCTA and IRC. Irvine, CA.

4.2.12 USFS Dam Removal

Action	USFS Dam Removal Status
Sponsor	United States Forest Service (Trabuco District)
OCTA Funding	$185,000
Location	San Juan Creek
Acreage	Removal of 14 dams (acreage not measured)
General Habitat Types	Creek bed and riparian to benefit arroyo chub
Restoration Design Plans	Approved in 2016.
Restoration Installation	The first phase of dam removals (10) funded by OCTA was implemented in November 2018. Additional dam removals will be completed by 2020.
Restoration Monitoring of Success Criteria	Monitoring initiated in 2018. USFS biologist will monitor stream recovery for 3 years after dam removal.
Land Protection Mechanism	Project within the USFS protected lands. No other mechanisms are needed.
Long-Term Management of Restoration Site	To be completed by the USFS.
General Comments / Concerns	None.

4.2.12.1 Project Summary

The purpose of the Trabuco District Dam Removal Project is to enhance aquatic organism passage and stream habitat in Silverado, Holy Jim, Trabuco, and Upper San Juan Creeks. Removing human-made dams in these creeks is essential to supporting native aquatic species and providing suitable habitat for potential re-establishment of extirpated species including southern California steelhead trout. This will implement, in part, recovery plan goals for southern steelhead. Removal of fish passage barriers is one of the highest priority action items for the San Juan and Trabuco Creek watershed. A total of 81 dams are targeted for removal.

These dams presented partial or complete barriers to native fish and other aquatic organisms, especially during periods of low flow. Dams alter physical stream processes such as bed load and sediment transport, natural surface flows, and channel adjustment. This has negative effects on aquatic species, aquatic habitat, and downstream habitat. The ability to move up and down stream is essential for aquatic species in order to complete their life cycles and maintain viable populations. Facilitating aquatic organism passage and improving stream habitat will increase accessible stream habitat for existing and potential populations of native aquatic species.

The American Conservation Experience crew and USFS staff completed removal of San Juan dams 1, 2, 3, 4, 5, 6, 7, 9, 10, and 11 in November 2018. With jackhammers and sledgehammers, dams were fully demolished or in some cases partially demolished to remove sections that were barriers to fish passage. Russell Barabe and Ken Sankary of CDFW assisted USFS with protection of arroyo chub below dam 1; this was done by using nets to partition the pool such that the fish were away from the immediate work area. The dam removal at these locations will be monitored to determine if any additional work is needed. In May of 2019, a walking (spider) excavator removed dams 13,15,23, and 25 from San Juan Creek.

With the dams removed, fish and other aquatic organisms will be able to move more freely through the areas that were previously blocked by the dams. USFS has now removed 70 dams in total, including work funded by other partners. OCTA has funded the removal of 14 dams within San Juan Creek in order to fulfill the additional conditions for coverage required for arroyo chub under the NCCP/HCP (see Section 5.1.1, *Arroyo Chub*). Due to work done in 2018 and 2019, considerable re-shaping and re-establishment of natural stream channels have been achieved. As of Spring 2019, Arroyo Chub have moved upstream from dam 1 to dam 12 areas. All dam removal work is expected to be complete by approximately June 2020.

4.2.12.2 Related Documents and References

Orange County Transportation Authority (OCTA). *Collection Agreement Between U.S. Forest Service and OCTA: OCTA Agreement No. C-7-1629, Attachment A*.

Orange County Transportation Authority (OCTA). *Trabuco Dam Removal Project – 2019 Progress Report Introduction and Project Description.* Agreement number 18-CO-11050200-009.

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Chapter 5
Additional Conditions for Coverage

5.1 Introduction

As part of the Conservation Analysis (Chapter 6) in the M2 NCCP/HCP, there were two Covered Species, arroyo chub and many-stemmed dudleya, noted for additional conditions for coverage above and beyond the acquisition of the seven OCTA Preserves and funding of restoration projects.

5.1.1 Arroyo Chub

The conservation actions included in the M2 NCCP/HCP provided a positive but marginal benefit for conservation of arroyo chub. To provide for a level of conservation required for coverage of arroyo chub under the NCCPA, OCTA will implement a future restoration project focused on improving habitat conditions for arroyo chub.

OCTA has initiated the USFS Dam Removal restoration project to provide conservation for arroyo chub required under the M2 NCCP/HCP (see Section 4.2.12, *USFS Dam Removal*). The following actions have been taken to achieve these conditions for arroyo chub:

- In 2017, the Environmental Oversight Committee (EOC) and Wildlife Agencies approved moving forward with the USFS Dam Removal project, and OCTA has contracted with USFS to remove 14 dams.
- The restoration project design has been approved.
- Restoration activities were initiated in November 2018 with the removal of 10 dams that were funded by OCTA. Additional dam removals will be completed by 2020.
- Monitoring began in 2018.
- When this project has been signed off, this condition will be met.

5.1.2 Many-stemmed Dudleya

To ensure that the M2 NCCP/HCP provides conservation and management for many-stemmed dudleya, OCTA will protect, enhance, and/or establish a major population (i.e., 500 individuals) of many-stemmed dudleya. This threshold can be accomplished through the protection, enhancement, and/or establishment of many-stemmed dudleya populations at multiple locations or at a single location. During baseline surveys of the Preserves, four occurrences with 60 individuals were identified on the Pacific Horizon (Aliso Canyon) Preserve. Ongoing Preserve management may improve habitat suitability (e.g., reduction of invasive species) that results in the expansion of the existing population on Pacific Horizon Preserve. If a minimum of 500 individuals are eventually identified on the Pacific Horizon Preserve within the 10 years from M2 NCCP/HCP adoption (by 2027), then this objective will be considered complete. If this objective cannot be met within the first 10 years as described, OCTA will select and oversee implementation of a restoration project designed to establish or expand a population of many-stemmed dudleya.

The following actions have been taken to achieve these conditions for many-stemmed dudleya:

- At the Pacific Horizon Preserve, OCTA directed GLA to conduct biological monitoring in 2019 to coincide with the blooming periods of the covered plant species, specifically many-stemmed dudleya. GLA detected approximately 80 additional dudleya individuals (GLA 2019). Bringing the total amount of individuals on this Preserve to 180 (GLA 2020).
- A Pacific Horizon Preserve ISMP was completed by GLA and has been approved by the Wildlife Agencies. The ISMP specifically identifies actions to protect and enhance disturbed habitat in the proximity of the many-stemmed dudleya population at the Pacific Horizon Preserve. This project was approved by the California Coastal Commission and city of Laguna Beach and County of Orange in 2019. Invasive species removal is anticipated to begin in 2020.
- Bike jumps and berms continue to be created regularly near the many-stemmed dudleya habitat at the Pacific Horizon Preserve. OCTA has and will continue to remove these berms on an as needed basis in order to protect the existing population of many-stemmed dudleya. This area will continue to be monitored.

Chapter 6
Public Outreach

6.1 Public Outreach Overview

In 2006, Orange County voters approved the renewal of Measure M, effectively extending the half cent sales tax to provide funding for transportation projects and programs in the county. As part of the renewed Measure M (or Measure M2), a portion of the M2 freeway program revenues were set aside for the M2 EMP to provide funding for programmatic mitigation to offset impacts from the freeway projects in the 13 freeway segments covered by Measure M2. OCTA has been committed to transparency in how the M2 funds have been and are being used to implement the EMP. OCTA has conducted a variety of public outreach activities aimed at informing and engaging the public on the overall EMP as well as Preserve-specific issues and events.

- Hold Public Meetings – OCTA held public meetings during the preparation of the RMPs and will hold an annual public meeting to present this Annual Report. In addition, the regularly scheduled Environmental Oversight Committee meetings are open to the public and Preserve-specific issues are addressed at these meetings.
- Maintain Website – OCTA currently maintains the OC-Go (M2) Environment Mitigation Program (EMP) website that includes Preserve-specific information, copies of the RMPs for download, and information on Preserve hiking and riding tours: http://www.octa.net/Projects-and-Programs/OC-Go/OC-Go-(2011-2041)/Freeway-Mitigation/Environmental-Mitigation-Program-Overview/.
- Develop Outreach and Volunteer Programs – OCTA has been working to develop a volunteer program that addresses education and management needs. OCTA is encouraging trail user groups to participate in "self-monitoring and policing" programs.

6.1.1 EMP Public Outreach Events and Meetings

Table 6-1 includes a list of events, workshops, and public meetings that OCTA has had to address the actions of the EMP and solicit public input.

Table 6-1. EMP Public Outreach Events 2019

Date	Location	Stated Purpose
2/19/19	University California Irvine (UCI)	UCI Environmental Law and Policy Presentation
4/2/2019	City of San Juan Capistrano City Hall	OCTA EMP City Parcel Restoration Project presentation (EOC Chair Bartlett)
4/24/2019	UCI	UCI Environmental Policy Panel
6/22/2019	O'Neill Regional Park	Saddleback Canyon Riders Emergency Evacuation Drill Event

Date	Location	Stated Purpose
8/13/2019	OCTA	EMP Update to the Citizens Advisory Committee

6.1.2 Preserve-Specific Public Outreach Events

Each Preserve RMP identifies and outlines the need for public outreach and education as critical components to ensuring successful management and public support of the Preserve. A public that is informed of the Preserve's biological values, goals, and activity restrictions is more likely to respect and follow Preserve guidelines. Table 6-2 includes a list of events, riding, and hiking tours held to address Preserve-specific issues.

Table 6-2. Preserve-Specific Public Outreach Events 2019

Date	Location	Stated Purpose
4/6/2019	Trabuco Rose Preserve	Wilderness Preserve Hiking Tour to educate the public about property value and access
4/28/2019	Trabuco Rose Preserve	Wilderness Preserve Equestrian Tour to educate the public about property value and access
6/8/2019	Wren's View Preserve	Wilderness Preserve Hiking Tour to educate the public about property value and access
6/30/2019	Trabuco Rose Preserve	Wilderness Preserve Equestrian Tour to educate the public about property value and access
7/14/2019	Trabuco Rose Preserve	Wilderness Preserve Equestrian Tour to educate public about property value and access
8/17/2019	Pacific Horizon Preserve	Wilderness Preserve Hiking Tour to educate public about property value and access
8/24/2019	Trabuco Rose Preserve	Wilderness Preserve Equestrian Tour to educate public about property value and access
10/5/2019	Wren's View Preserve	Wilderness Preserve Hiking Tour to educate public about property value and access
11/2/2019	Trabuco Rose Preserve	Wilderness Preserve HikingTour to educate public about property value and access

6.1.3 Regional Coordination and Collaboration

The NCCP/HCP Administrator is responsible for coordinating with other regional management and monitoring programs to stay abreast of regional monitoring issues. Table 6-3 summarizes

collaboration efforts, meetings, and activities undertaken by the OCTA staff (Lesley Hill and Dan Phu) during the timeframe of this Annual Report.

Table 6-3. Collaboration with Regional Management and Monitoring Programs 2019

Date	Group	Stated Purpose
5/23, 7/25, 11/21	County of Orange Area Safety Task Force (COAST)	A working group of (more than 35 organizations) decision makers and executives for fire departments, public utilities, transportation agencies, natural resource management agencies, landowners, non-profit groups, and other community members to jointly identify problems and propose solutions for wildfire prevention, and to work together to implement them.
3/28, 7/25, 11/21	Orange County Invasive Tree Pests Group	A group of scientists/ professionals that share information pertaining to invasive tree pests including the Gold Spotted Oak Borer (GSOB) and the Polyphagous Shot Hole Borer (PSHB).
4/19, 10/17, 12/17	Interagency Regional Working Group	This group includes landowners and private and public agencies throughout Southern California. The group began with a focus on wildlife connection concerns (mainly for mountain lion) and has evolved into a focus on natural resource issues that cross County boundaries through Southern California. Recent topics have included vegetation mapping methodologies, statewide connectivity mapping efforts, camera trapping, and suggestions for maintaining existing wildlife movement structures.
2/21, 11/21, 12/11	Southern California Association of Governments (SCAG) – Sustainability Working Group	OCTA participated in the following working group meetings established and steered by SCAG.
3/5	Cactus Wren Symposium	Discussion of status and research of cactus wren populations in Southern California
1/16, 3/13, 6/20, 9/9	Caltrans Advanced Mitigation Working Group	To share status and lessons learned from other regional transportation agencies in topics

Date	Group	Stated Purpose
		related to advanced mitigation and permitting
7/18, 8/29, 10/16	Aliso Creek Watershed Project Collaboration Group	To identify and start to build agreement on goals for the Aliso Creek Watershed.
September 23 – 26	International Confererence of Ecology and Transportation	Collaborated with other organizations on the latest research and information in regards to transportation projects and ecology/biology.
6/12 and 10/3	Interagency Updates	Coordination meetings pertaining to mitigation strategies and updates with Orange County Public Works and Orange County Waste and Recycling

Chapter 7
Plan Funding

7.1 Summary of Endowment Process

OCTA has the responsibility to ensure the Preserves are protected and meet the NCCP/HCP commitments. Because management of the Preserves is not a primary function within OCTA's business operations, this obligation will be, and is in the process of being, formally transferred to appropriate and qualified third-party organizations. Until OCTA selects long-term managers for each of the Preserves, it is performing this role in an interim period, which is defined as 5 to 7 years after the Preserves have been acquired. The interim period consists of the finalization of the NCCP/HCP, placement of protective measures on the Preserves, and establishment of the endowment. During this time, OCTA is responsible for performing routine land management and maintaining the biological value of the Preserves.

OCTA is currently transitioning from the interim period to the next phase, the intermediate period, which was initiated after the NCCP/HCP was finalized in June 2017. During the intermediate period, OCTA begins to shift the Preserve management duties to the entities chosen to manage the Preserves subject to the NCCP/HCP standards. The intermediate period also entails the recording of conservation easements and the establishment of the endowment. This phase is expected to last approximately 10 to 15 years according to recent financial recommendations made by the EOC Ad Hoc committee. M2 funds will be used to sustain the management activities during the intermediate period.

Pursuant to the objectives of the NCCP/HCP, OCTA's goal is to ultimately transfer the long-term property title and management of the Preserves to other qualified entities (public or private non-profit). Based on preliminary estimates of management and monitoring costs, OCTA established a target of a $46.2 million endowment to fund the long-term management of the Preserves, which was authorized by the OCTA Board of Directors in October 2014. Staff collaborated with the EOC, the Finance and Administration Committee, the Board, and other mitigation land owners to develop a set of comprehensive land management strategies. This approach enabled OCTA to determine financial recommendations for the establishment of the endowment that are efficient and have the potential to maximize economies of scale, and the selection process for the endowment fund manager (EFM). The guiding principles, long-term funding strategy, and potential expenditure options list were approved by the Board in May 2015.

Throughout the endowment funding period, the EMP funds will have specified allocations. Approximately $3 million will be deposited in the endowment on an annual basis for up to 10 to 12 years, during which OCTA must also pay for the interim land management from the existing Measure M revenue source. The existing Measure M revenues will also be used for other expenditures, such as habitat restoration projects. The annual deposits are estimated to earn approximately $11.7 million in investment returns, net of fund management fees over the duration of the establishment period.

The long-term management cost is a significant factor that will impact the target endowment amount. Additionally, it is possible the long-term land manager may also manage the endowment that is tied to the Preserve, or the Preserve manager and the endowment manager may be separate entities. Therefore, the funding of the endowment consists of two phases:

1. The endowment funding phase, expected to be a 10- to 12-year period
2. After the endowment has been established, determination of whether the endowment is managed by a single or multiple entities

The EFM has several responsibilities:

- Manage the funds OCTA deposits in trust for the benefit of the Preserves.
- Accrue investment earnings over the establishment period.
- Work with OCTA to establish permanent endowment(s) to fund the management of the Preserves in perpetuity.
- Annually prepare and update a funding plan that describes annual deposits made by OCTA, historical and forecasted investment earnings, fees charged, target endowment value, and completion schedule.
- Provide quarterly and annual reports on the status of the endowment.
- Deliver updates periodically to OCTA and its designated committees.

In 2016, OCTA completed a selection process and contracted with the California Community Foundation (CCF), based in Los Angeles, California, to manage the endowment to fund the EMP.

7.2 Current Status of Endowment Funding

Pursuant to the responsibilities of the EFM, CCF releases a quarterly comprehensive report that includes the composition of the Endowment Pool and the performance and is reviewed for consistency with endowment objectives. It is then presented to the Board. Staff will continue to oversee and provide endowment updates to the Finance and Administration Committee and EOC on a regular basis. As of December 31, 2019, the endowment balance is $13,034,838, and on par with baseline assumptions with respect to interest earnings. The number exceeded the projected balance of $12,440,408 due to higher than expected investment earnings, and overall gains in the market (OCTA, 2020). The projected annualized cost for endowment services was 0.75% based on indications received during the due diligence process. The program is currently paying 0.35% fee on a sliding scale.

The final endowment funding requirements will be based on a Property Analysis Report (PAR) or PAR-like analysis that will be completed by OCTA within 5 to 7 years. This analysis will itemize and define the long-term obligations at each Preserve using Preserve specific information developed for the Preserve RMPs. It is expected that additional years of interim habitat management will provide a database and sounder basis for estimating the cost of long-term management. The final endowment funding level will be based upon actual negotiated long-term management contracts for each individual Preserve. OCTA will coordinate with the Wildlife Agencies and obtain the Wildlife Agencies' review and approval of the PAR analysis and determination of the permanent endowment funding requirements.

Chapter 8
Plan Administration

8.1 NCCP/HCP Administrator

OCTA is responsible for implementing the M2 NCCP/HCP and staffing an NCCP/HCP Administrator position. The NCCP/HCP Administrator's role is to oversee and coordinate Plan implementation. The NCCP/HCP Administrator communicates regularly with Preserve Managers regarding the status of Preserve stewardship; the progress on conservation action implementation, monitoring, and management; and new or ongoing issues to be addressed. The NCCP/HCP Administrator is the primary point of contact for the Wildlife Agencies and for preparing the Annual Report demonstrating NCCP/HCP compliance.

OCTA has designated the following individual as the NCCP/HCP Administrator:

Lesley Hill
(714) 560-5759
lhill@octa.net

8.2 Minor Modifications to Plan, Permits, and Implementing Agreement

The Plan allows for minor modifications to the Plan, permits, and Implementing Agreement if the modifications are non-substantive and do not meet the threshold of a Minor and Major Amendment. The following actions are noted as minor modifications to the Plan that have occurred and were included in the First OCTA Annual Report (2018). Details for each of these modifications were provided and approved by the Wildlife Agencies. Minor modifications to the Plan to date have included the following:

- West Loma Wildlife Crossing Component
- United States Forest Service Dam Removal Project
- Eagle Ridge (Hayashi) Preserve Boundary Modification
- Chino Hills State Park and North Coal Canyon Restoration Project Modification

No new minor modifications were needed in 2019.

8.3 Minor or Major Amendments to the Plan

No Minor or Major Amendments to the Plan have been proposed during the timeframe of this Annual Report.

8.4 Changed Circumstances

No events meeting the criteria of a Changed Circumstance occurred during the timeframe of this Annual Report.

Chapter 9
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Appendix A
Covered Freeway Improvement Projects
Habitat Tracking Ledger

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Table A-1. Covered Freeway Projects Habitat Impact Tracking Ledger[a]

Project ID	Segment	Checklist Date	Total	Chaparral	Coniferous Forest	Grassland	Riparian	Scrub	Water	Wet Meadows/ Marsh	Woodland
Totals to Date:			**9.242**	**--**	**--**	**6.460**	**0.957**	**1.705**	**0.12**	**--**	**--**
Project C EA 0K0200	C1	5/30/18	0.722	--	--	--	0.707	0.015	--	--	--
Project B EA 0K6700	B	7/26/18	0.00	--	--	--	--	--	--	--	--
Project L EA 0K710K	L1	1/29/18	6.810	--	--	6.46	0.25	--	0.10	--	--
Project M EA 0K8700	M	6/7/18	0.00	--	--	--	--	--	--	--	--
Project D 0M9800	D	12/10/19	0.00	--	--	--	--	--	--	--	--
Project F 0J3400	F1	11/11/19	0.00	--	--	--	--	--	--	--	--
Project G 0M9700	G1a	3/12/19	0.02	--	--	--	--	--	0.02	--	--
Project I 0K9800	I	3/28/19	1.69	--	--	--	--	1.69	--	--	--

[a] Values are in acres. Includes both permanent and temporary impacts.

Table A-2. Summary of Applicable Avoidance and Minimization Measures and Status of Restoration Activities for Temporary Impacts from Covered Freeway Projects

Project ID	Applicable Avoidance and Minimization Measures	Restoration for Temporary Impact Areas Status
Project C EA 0K0200	Sections 5.6.1, 5.6.2.1, 5.6.2.2, 5.6.2.3, 5.6.3, 5.6.4 and 5.6.5	As described in the NES, temporary impacts (staging, access, storage) will be contained outside of riparian/suitable habitat to the maximum extent practicable. All temporary impact areas adjacent to native habitats [i.e. coastal sage scrub, riparian (Oso Creek and Aliso Creek)] will be replanted with native plant species and approved by the Wildlife agencies. A plant establishment period of at least 3 years will be established. This will include the removal of litter and trash, weeding, water application, irrigation repair, replacement of plant material that dies, and other activities required to ensure the long-term survival of plant material to satisfy M2 HCP/NCCP obligations and permit conditions. Permittee shall restore all temporary impacts on site at a 1:1 ratio immediately following construction completion or, with written approval from CDFW, at the beginning of the next growing season.
Project B EA 0K6700	Sections 5.6.1, 5.6.2.1, 5.6.3, 5.6.4 and 5.6.5	As described in the NES, areas of natural habitat that are temporarily affected by construction activities will be restored to a natural condition. The restoration effort will emulate surrounding vegetation characteristics and/or return to previous conditions. Restoration plans will be prepared during final design and included in the Plans, Specifications, and Estimates (PS&E) package. The revegetation plan will be prepared consistent with the California Department of Transportation (Caltrans) landscape architecture guidelines and requirements. Restoration plans will be reviewed and approved by the Wildlife Agencies (the California Department of Fish and Wildlife [CDFW] and the United States Fish and Wildlife Service [USFWS]). A temporary restoration plan will be developed as part of the design and construction phase of the project.
Project L EA 0K710K	Sections 5.6.1, 5.6.2.1, 5.6.2.3 and 5.6.3.	As described in the NES, construction will be implemented to minimize temporary impacts (intended to benefit Roosting Bats NES Section 5.6.3). In addition, as stated in the NES areas of natural habitat that are temporarily affected by construction activities will be restored to a natural condition. The restoration effort will emulate surrounding vegetation characteristics and/or return to previous conditions. For freeway construction projects, revegetation plans will be part of the project design following Caltrans' landscape architecture guidelines and requirements. Restoration plans will be reviewed and approved by the Wildlife Agencies. A temporary restoration plan will be developed as part of the design and construction phase of the project.
Project M EA 0K8700	Sections 5.6.1, 5.6.2.1, 5.6.3 and 5.6.4.	No natural habitat is found within the project area. Thus, no restoration of temporary impacts is needed.

Project ID	Applicable Avoidance and Minimization Measures	Restoration for Temporary Impact Areas Status
Project I EA 0K9800	Sections 5.6.1, 5.6.2.1, 5.6.3 and 5.6.4.	As included in the NES areas of natural habitat that are temporarily affected by construction activities will be restored to a natural condition. The restoration effort will emulate surrounding vegetation characteristics and/or return to previous conditions. For freeway construction projects, revegetation plans will be part of the project design following Caltrans' landscape architecture guidelines and requirements. Restoration plans will be reviewed and approved by the Wildlife Agencies. A temporary restoration plan will be developed as part of the design and construction phase of the project.
Project G EA 0M9700	Sections 5.6.1, 5.6.2.1, 5.6.3 and 5.6.4.	No natural habitat is found within the project area. Thus, no restoration of temporary impacts is needed.
Project F 0J3400	Not Applicable	No natural habitat is found within the project area. Thus, no restoration of temporary impacts is needed.

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Appendix B
Annual Schedule for Effectiveness Monitoring

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Table B-1. Annual Schedule for Effectiveness Monitoring on OCTA Preserves

Action	Frequency/ Schedule	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Adopt RMP							B L S T W	P E																						
Effectiveness Monitoring:																														
Rare Plants	3 to 5 years	*B E L T W*			*P S*					B E L P S T W				B E L P S T W				B E L P S T W				B E L P S T W				B E L P S T W				B E L P S T W
Reptiles	4 years	*B E L T W*			*P S*						B E L P S T W			B E L P S T W				B E L P S T W				B E L P S T W				B E L P S T W				B E L P S T W
Birds	4 years	*B E L T W*			*P S*		B L P T W				B L P S T W				B E L P S T W				B E L P S T W				B E L P S T W				B E L P S T W			
Mammals [a]	4 years	*B E L T W*			*P*		*S*	P	E	B L S T W		P	E	B L S T W		P	E	B L S T W		P	E	B L S T W		P	E	B L S T W		P	E	B L S T W
Natural Communities Quantitative [b]	4 years					*B L W*	*B L W*	B L W	*B L W*	B L W				B E L P S T W				B E L P S T W				B E L P S T W				B E L P S T W				B E L P S T W

Action	Frequency/ Schedule	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Natural Communities Comprehensive	10 years	*B E L T W*			*P S*								B E L P S T W										B E L P S T W						

Red Italics = Baseline Survey

[a] Mammal monitoring is completed with wildlife cameras and is an on-going monitoring activity. Every 4 years an analysis of the data is completed to interpret mammal monitoring data.

[b] Methodologies to complete quantitative monitoring of natural communities are currently being reviewed with the other regional conservation entities and the Wildlife Agencies. A pilot program has been initiated at other OCTA Preserves. An agreed upon monitoring will be applied to the Preserves going forward once methodologies are finalized.

Key:

Letter ID	OCTA Preserve	Location
B	Bobcat Ridge (formerly Hafen)	Trabuco Canyon
E	Eagle Ridge (formerly Hayashi)	City of Brea
L	Live Oak Creek (formerly Saddle Creek South)	Trabuco Canyon
P	Pacific Horizon (formerly Aliso Canyon)	City of Laguna Beach
S	Silverado Chaparral (formerly MacPherson)	Silverado Canyon
T	Trabuco Rose (formerly Ferber Ranch)	Trabuco Canyon
W	Wren's View (formerly O'Neill Oaks)	Trabuco Canyon

Appendix C
Biological Monitoring Report for OCTA M2 Preserves: Trabuco Rose, Pacific Horizon, Bobcat Ridge, Silverado Chaparral, Wren's View, Live Oak Creek, and Eagle Ridge
March 2020

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FINAL

BIOLOGICAL MONITORING REPORT

FOR

OCTA M2 PRESERVES:
TRABUCO ROSE, PACIFIC HORIZON, BOBCAT RIDGE, SILVERADO CHAPARRAL, WREN'S VIEW, LIVE OAK CREEK, AND EAGLE RIDGE

March 2020

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OCTA M2 PRESERVES: TRABUCO ROSE, PACIFIC HORIZON, BOBCAT RIDGE, SILVERADO CHAPARRAL, WREN'S VIEW, LIVE OAK CREEK, AND EAGLE RIDGE BIOLOGICAL MONITORING REPORT

I. BACKGROUND

In 2006, Orange County voters approved the renewal of Measure M, effectively extending the half cent sales tax to provide funding for transportation projects and programs in the county. As part of the renewed Measure M (or Measure M2), a portion of the M2 freeway program revenues were set aside for the M2 Environmental Mitigation Program (EMP) to provide funding for programmatic mitigation to offset impacts from the 13 freeway projects covered by Measure M2. The Orange County Transportation Authority (OCTA) prepared the M2 Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP or Plan) as a mechanism to offset potential project-related effects on threatened and endangered species (Covered Species) and their habitats in a comprehensive manner. A key component of the Plan conservation strategy has included the identification and acquisition of habitat Preserves to offset habitat impacts.

OCTA has acquired seven properties as part of the M2 EMP; this report includes the following seven Preserves[1]: Trabuco Rose (previously known as Ferber Ranch; purchased in 2011), Pacific Horizon (previously known as Aliso Canyon; purchased in 2015), Silverado Chaparral (previously knowns as MacPherson; purchased in 2013), Bobcat Ridge (previously known as Hafen; purchased in 2011), Wren's View (previously known as O'Neill Oaks; purchased in 2011), Live Oak Creek (previously known as Saddle Creek South; purchased in 2011), and Eagle Ridge (previously known as Hayashi; purchased in 2011). Currently the Preserves are being managed by OCTA, but a long-term Preserve Manager is anticipated to be in place within the next three to five years. The Preserve Manager is responsible for the implementation of management and monitoring tasks as outlined in each Preserve's Resource Management Plan (RMP) (OCTA 2017 – Trabuco Rose, Silverado Chaparral, Bobcat Ridge, Wren's View, and Live Oak Creek; OCTA 2018 – Pacific Horizon and Eagle Ridge). The purpose of this report is to document interim biological monitoring activities conducted by Glenn Lukos Associates (GLA) from January 1, 2019 through December 31, 2019 and provide management recommendations at the Preserves.

In addition, a total of 1.75 acres of waters of the U.S., of which 0.14 acre consists of wetlands, within Trabuco Rose Preserve is compensatory mitigation for the U.S. Army Corps of Engineers (USACE) and California State Water Resources Control Board (SWRCB) in the form of preservation. While monitoring and reporting for the entire Preserve is related to the USACE/SWRCB mitigation sites since these are surrounding buffer areas, a USACE/SWRCB Annual Monitoring Form is attached as Appendix A to provide the USACE/SWRCB with the information they require regarding tasks within the Trabuco Rose RMP that are specific to their mitigation areas.

[1] The OCTA Preserves were officially renamed through a public voting process in February 2018.

II. SITE INFORMATION

A. Responsible Parties for Biological Monitoring

Preserve Manager: Orange County Transportation Authority
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Report Preparer: Glenn Lukos Associates
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B. Landscape Setting

Trabuco Rose Preserve

The 399-acre Trabuco Rose Preserve is located northwest of the City of Rancho Santa Margarita in Trabuco Canyon [Exhibit 1 – Location Map] and is accessed from Trabuco Oaks Road and Rose Canyon Road. Trabuco Oaks Road becomes Hickey Canyon Road near the OCTA property line. The Preserve is located immediately adjacent to the CDFW-managed Hafen Reserve to the west and near other open space lands, including the Cleveland National Forest to the north, Trabuco Creek and O'Neill Regional Park to the south, and the Joplin Youth Center to the east, which is maintained predominately as open space.

The Preserve is located on the southwestern flank of the Santa Ana Mountains in the headwaters of Trabuco Creek and features rolling terrain with elevations ranging from 1,120–1,650 feet above mean sea level. The site consists of several north to northeast trending ridges that are bisected by similarly trending valleys. Slopes are moderate to steep, with local small cliffs. Hickey Creek drains the western side of the Preserve.

Pacific Horizon Preserve

The 150-acre Pacific Horizon Preserve is located east of Pacific Coast Highway in the City of Laguna Beach in Orange County. The northwestern edge of the property is adjacent to residential development along Barracuda Way and Loretta Drive, while the southeastern edge of the property is adjacent to The Ranch at Laguna Beach (The Ranch). The northern and eastern boundaries abut open space in Aliso and Wood Canyons Wilderness Park.

Topography on the property is hilly, with the main ridgeline running through the middle of the property and canyons draining steep slopes to either side. Elevations range from approximately 40 feet above mean sea level (msl) at the southeastern edge of the property to 840 feet above msl at the northwestern edge. Two unnamed blueline streams occur in the northwestern portion of the property, with smaller drainage features present in the canyon bottoms.

Bobcat Ridge Preserve

The 48-acre Bobcat Ridge Preserve is located northwest of the City of Rancho Santa Margarita in Trabuco Canyon, immediately adjacent to the east side of Live Oak Canyon Road, north of its intersection with Shelter Canyon Road and is accessed from Live Oak Canyon Road, Shelter Canyon Road, and Hunky Dory Lane. Surrounding land uses include California Department of Fish and Wildlife's (CDFW's) Hafen property, Cleveland National Forest, O'Neill Regional Park, and areas of low density, rural residential development.

The Preserve is located on the southwestern flank of the Santa Ana Mountains and consists of predominantly rolling terrain with elevations ranging from 1,190 to 1,450 feet above mean sea level (msl). Two ephemeral drainages that flow in a westerly direction are located in the western half of this property. A larger ephemeral drainage is located along the eastern boundary of the property and appears on the USGS quadrangle as a blueline stream; several small ephemeral drainages flow into this drainage from within the property limits.

Silverado Chaparral Preserve

The 204-acre Silverado Chaparral Preserve is located in unincorporated Orange County, east of the cities of Orange and Irvine. Baker Canyon Road is to the north, Ladd Canyon Road is to the east, Silverado Canyon Road is to the south, and Black Star Canyon Road is to the west. The Preserve is accessed from Black Star Helo Pad Road and Hall Canyon Road in the northwest portion of the site. Both of these roads are dirt roads off of Baker Canyon Road. The property is within the Cleveland National Forest administrative boundary and Cleveland National Forest land holdings are to the north and east of the Preserve. The western edge of the Preserve is immediately adjacent to County of Orange open space managed by the Irvine Ranch Conservancy. Low density rural residential development occurs along Silverado Canyon Road south of the property, and a recreational vehicle (RV) park occurs to the north along Baker Canyon Road.

Topography on the Preserve is hilly, with the main ridgelines oriented in a northeast to southwest direction. Elevations range from approximately 1,135 to 1,678 feet above mean sea level (msl). No blueline streams occur on the Preserve, but multiple drainage features are present in the canyon bottoms, which flow into Santiago Creek.

Wren's View Preserve

The 119-acre Wren's View Preserve is located northwest of the City of Rancho Santa Margarita in Trabuco Canyon, and is accessed from Trabuco Oaks Drive, Live Oak Canyon Road, and Trabuco Canyon Road. Live Oak Canyon Road becomes Trabuco Canyon Road south of the Preserve's southern boundary. Surrounding land uses include the O'Neill Regional Park, miscellaneous agriculture, and areas of low density, rural and medium density residential development.

The Preserve is located on the southwestern flank of the Santa Ana Mountains and consists of predominantly rolling terrain with elevations ranging from 950 to 1,250 feet above mean sea level (msl). Three ephemeral drainages that flow in a westerly direction are located in the western half of the Preserve and several small, southeast---flowing ephemeral drainages occur along the southeastern boundary of the Preserve.

Live Oak Creek Preserve

The 84-acre Live Oak Creek Preserve is located northwest of the City of Rancho Santa Margarita in Trabuco Canyon, and is accessed from Live Oak Canyon Road approximately 0.3 mile from its intersection with El Toro Road/Santiago Canyon Road. Surrounding and nearby land uses include the Saddle Creek North Preserve, Cleveland National Forest, Live Oak Plaza Conservation Area, miscellaneous agricultural and commercial, St. Michael's Preparatory School, and areas of low density, rural residential development.

The Preserve is located on the southwestern flank of the Santa Ana Mountains and consists of predominantly rolling terrain with elevations ranging from 1,160 to 1,600 feet above mean sea level (msl). Two principal ephemeral drainages that flow in a westerly direction occur on the property: one adjacent to Live Oak Canyon Road and the other in the center of the property.

Eagle Ridge Preserve

The 301-acre Eagle Ridge Preserve is located within a large block of undeveloped land in northeastern Orange County. Specifically, the Preserve is located in the Chino Hills southeast of Carbon Canyon Road (State Route [SR] 142) and is accessed from Carbon Canyon Road off a private dirt road, Carbon Ridge Road. Chino Hills State Park borders the southeastern boundary of the property. Surrounding land uses are mostly open space with residential development along SR-142 to the southwest of the Preserve.

The Preserve lies along Carbon Canyon between the remainder of the Chino Hills to the southeast and the Puente Hills to the northwest. A ridgeline runs across the center of the property in a northeast-southwesterly direction with steep slopes down to Soquel Canyon and Carbon Canyon. Elevations on site range from approximately 650 to 1,260 feet above mean sea level (msl). A blueline stream in Soquel Canyon crosses the eastern corner of the property.

C. Covered Species and Sensitive Habitats

Trabuco Rose Preserve

Bonterra Consulting conducted biological baseline surveys for the Preserve in 2012 (Bonterra 2013). Covered Species observed on Trabuco Rose Preserve included coastal California gnatcatcher (*Polioptila californica californica*), coastal cactus wren (*Campylorhynchus brunneicapillus*), orange-throated whiptail (*Aspidoscelis hyperythra beldingi*), bobcat (*Lynx rufus*), and intermediate mariposa lily (*Calochortus weedii var. intermedius*, IML). Ongoing biological monitoring has also documented nesting populations of coastal cactus wren and extensive use by mountain lion (*Puma concolor*). Additional Covered Species with the potential to occur but that have not been documented on the Preserve include many-stemmed dudleya (*Dudleya multicaulis*) and coast horned lizard (*Phrynosoma blainvillii*). The Preserve is almost entirely within U.S. Fish and Wildlife Service (USFWS) designated critical habitat for the coastal California gnatcatcher.

The Preserve was identified as a priority conservation area because of the diversity of habitat types found on the property and its value for wildlife movement due to its adjacency to other large blocks of protected lands, contributing to regional conservation, with the goal to enhance habitats that support Covered Species, including coastal sage scrub, cactus scrub, chaparral, grassland, riparian, wetlands, and woodland habitats.

Notably, Trabuco Rose Preserve supports large areas of high-quality native grasslands, a unique habitat that has been diminished in this region due to farming/grazing practices and development.

Pacific Horizon Preserve

Bonterra Consulting conducted biological baseline surveys for the Preserve in 2015 (Bonterra Psomas 2015). Covered Species observed on Pacific Horizon Preserve included California gnatcatcher, many-stemmed dudleya, and intermediate mariposa lily. Additional Covered Species with the potential to occur but that have not been documented on the Preserve include coast horned lizard, orange-throated whiptail, and bobcat. The Preserve is not located in an area proposed or designated as critical habitat. There is critical habitat for coastal California gnatcatcher to the south and southeast of the Preserve.

The Pacific Horizon Preserve satisfies many of the property acquisition criteria that was utilized to evaluate potential alignment with the OCTA EMP program including being identified as a Priority Conservation Area (PCA); supporting Covered Species and associated natural communities; contributing to regional biological connectivity; and containing a diversity of high quality habitat types, including chaparral, grassland, and coastal sage scrub.

Bobcat Ridge Preserve

Bonterra Consulting conducted biological baseline surveys for the Preserve in 2012 (Bonterra 2013). Covered Species observed on Bobcat Ridge Preserve included coastal cactus wren and intermediate mariposa lily. In 2019, GLA documented orange-throated whiptail during biological monitoring. Additional Covered Species with the potential to occur but that have not been documented on the Preserve include coastal California gnatcatcher, bobcat, mountain lion, and coast horned lizard. The Preserve is almost entirely within USFWS designated critical habitat for the coastal California gnatcatcher.

The Bobcat Ridge Preserve satisfies many of the property acquisition criteria that were utilized to evaluate potential alignment with the OCTA EMP program including being identified as a PCA; supporting Covered Species and associated natural communities; contributing to regional biological connectivity; and containing a diversity of high quality habitat types, including coastal sage scrub, ephemeral and intermittent streams supporting riparian woodland, wetlands, oak woodland, grassland, and cliff and rock.

Silverado Chaparral Preserve

Bonterra Consulting conducted biological baseline surveys for the Preserve in 2014 (Bonterra Psomas 2015). Covered Species observed on Silverado Chaparral Preserve included orange-throated whiptail, coast horned lizard, and intermediate mariposa lily. OCTA and Orange County Parks staff confirmed mountain lion tracks on the Preserve in 2016. GLA documented presence of bobcat during biological monitoring in 2019. Additional Covered Species with the potential to occur but that have not been documented on the Preserve include coastal California gnatcatcher and many-stemmed dudleya. While not a Covered Species, the Preserve is within USFWS designated critical habitat for the arroyo toad (*Anaxyrus californicus* [*Bufo microscaphus californicus*]).

The Silverado Chaparral Preserve satisfies many of the property acquisition criteria that was utilized to evaluate potential alignment with the OCTA EMP program including being identified as a PCA; supporting

Covered Species and associated natural communities; contributing to regional biological connectivity; and containing a diversity of high quality habitat types, including coastal sage scrub, chaparral, coast live oak woodland, riparian forest, and grassland.

Wren's View Preserve

Bonterra Consulting conducted biological baseline surveys for the Preserve in 2012 (Bonterra 2013). Covered Species observed on Wren's View Preserve included California gnatcatcher, orange-throated whiptail, mountain lion, and intermediate mariposa lily. Ongoing biological monitoring has also documented presence of bobcat, while also confirming use by mountain lion. Additional Covered Species with the potential to occur but that have not been documented on the Preserve include coast horned lizard. While not a Covered Species, the Preserve is within USFWS designated critical habitat for the arroyo toad.

The Wren's View Preserve satisfies many of the property acquisition criteria that were utilized to evaluate potential alignment with the OCTA EMP program including being identified as a PCA; supporting Covered Species and associated natural communities; contributing to regional biological connectivity; and containing a diversity of high quality habitat types, including coastal sage scrub, oak woodland, chaparral, cliff, and rock.

Live Oak Creek Preserve

Bonterra Consulting conducted biological baseline surveys for the Preserve in 2012 (Bonterra 2013). Covered Species observed on Live Oak Creek Preserve included coastal cactus wren and intermediate mariposa lily. In addition, adjacent neighbors documented presence of bobcat and mountain lion in 2018, which GLA confirmed in 2019. Additional Covered Species with the potential to occur but that have not been documented on the Preserve include coastal California gnatcatcher, orange-throated whiptail, and coast horned lizard. The Preserve is within USFWS designated critical habitat for the coastal California gnatcatcher.

The Live Oak Creek Preserve satisfies many of the property acquisition criteria that were utilized to evaluate potential alignment with the OCTA EMP program including being identified as a PCA; supporting Covered Species and associated natural communities; contributing to regional biological connectivity; and containing a diversity of high quality habitat types, including chaparral, coastal sage scrub, riparian woodland, oak woodland, and grassland.

Eagle Ridge Preserve

Bonterra Consulting conducted biological baseline surveys for the Preserve in 2012 (Bonterra 2013). Bonterra did not detect any Covered Species during baseline surveys; however, several species were noted by Bonterra as having a potential to occur, including western pond turtle (*Emys marmorata*). The RMP noted the potential for pond turtles to migrate up Soquel Canyon from Carbon Canyon; however, the potential for occurrence within the actual Preserve boundary may be low due to limited hydrology and potentially other habitat factors, compounded by disturbance due to cattle. However, the site should be further investigated to determine if there are opportunities to create habitat for the pond turtle, based on the hydrology and topography of the creek. GLA noted bobcat at the Preserve in 2019 through wildlife camera detections. Additional Covered Species with the potential to occur include intermediate mariposa lily, southern tarplant (*Centromadia parryi* ssp. *australis*), many-stemmed dudleya, coast horned lizard, orange-throated whiptail,

and coastal California gnatcatcher, though many of these species have a limited potential for occurrence. The local community has also documented recent use by mountain lion. The Preserve is not located in an area proposed or designated as critical habitat. There is critical habitat for coastal California gnatcatcher to the southwest of the Preserve.

The Preserve was identified as a priority conservation area because of the diversity of habitat types found on the property and its value for contributing to regional biological connectivity, with the goal to enhance habitats that support Covered Species, including oak woodland, chaparral, grassland, and riparian.

D. Measure M2 Preserve Management Overview

The M2 NCCP/HCP Preserves are subject to four levels of management in terms of stewardship, management, and monitoring.

- Level 1 management comprises basic stewardship monitoring and management and includes establishing and maintaining property boundaries with fencing and gates; posting signs that indicate Preserve rules, restrictions, and regulations; and controlling public access and trash collection, with enforcement as needed.

- Level 2 management focuses on management activities that protect Covered Species and natural communities and provide compatible recreational opportunities for the public. Level 2 management includes all Level 1 management actions as well as monitoring and management of the overall condition of the Preserve, invasive species, erosion, sedimentation, trails and public use facilities, and, occasionally, restoration.

- Level 3 management and monitoring consists of all Level 1 and 2 management activities as well as species-specific and habitat-specific monitoring and management, including focused species surveys, species-/habitat- specific protection measures (e.g., fencing and manual weed removal in a rare plant area), and habitat enhancement projects (e.g., restoration of coastal California gnatcatcher habitat).

- Level 4 management consists of regional monitoring of vegetation communities, wildlife movement, and species population trends across the Plan Area. OCTA is not be responsible for conducting regional monitoring outside of their specific Preserves but will contribute monitoring data collected at OCTA Preserves in a format that can be integrated with regional monitoring databases as appropriate. Data will be submitted to an appropriate data repository, such as the Biogeographic Information and Observation System (BIOS), California Natural Diversity Database (CNDDB), or other regional monitoring databases.

III. MONITORING ACTIVITIES

Monitoring activities focus on the overall condition of the Preserves and threats and stressors to the Preserves' wildlife and habitat. This includes mapping and recording invasive plant and wildlife species, unauthorized trail cutting, encroachments by adjacent property owners, areas of erosion and/or sedimentation, and monitoring trail conditions. Monitors also review the Preserve for maintenance needs

including examining fence lines and gates, checking for missing or damaged signage, reporting fallen trees, and documenting trash and illegal dumping, as necessary. Incidental detections of OCTA M2 Covered Species and/or sensitive species are documented and reported to the CNDDB. Exhibit 2 provides monitoring photographs, Exhibit 3 provides special status species mapping including OCTA Covered Species, Exhibit 4 provides locations of monitoring photographs and wildlife camera stations, as applicable, and Exhibit 5 provides trail mapping.

A. Summary of Biological Monitoring Surveys

This report documents survey visits conducted by GLA biologists from January 1 through December 31, 2019, which were overseen by David Moskovitz, Lead GLA Biological Monitor. Table 1 also provides a summary list of survey dates, personnel, tasks completed, covered/sensitive species observed, action items, and recommendations to OCTA.

The staff key for Table 1 is provided below:

GLA Staff Key	OCTA Staff Key
AN = April Nakagawa	LH = Lesley Hill
DM = David Moskovitz	
DS = David Smith	
JA = Jeff Ahrens	
JS = Jillian Stephens	
KL = Kevin Livergood	
LK = Lexi Kessans	
SA = Sheri Asgari	
SC = Stephanie Cashin	
TM = Trina Ming	
ZW = Zack West	

Table 1. Summary of Survey Visits to the M2 Preserves

Date of Visit	Purpose of Visit	GLA/OCTA Staff	Tasks Completed	Covered/Sensitive Species Observed	GLA Notes/Actions	Notes/Recommendations to OCTA
Trabuco Rose Preserve						
1/23/19	Biological Monitoring/Cactus Mapping	ZW, TM	Mapped cactus scrub and conducted reconnaissance for USACE/SWRCB annual monitoring.	n/a	None	None
1/30/19	Fence Line Monitoring	ZW, TM	Conducted focused fence monitoring.	n/a	An area of fence line was falling over. Another area was slack. Location information was provided to OCTA.	Repair fence line as necessary.
3/27/19	Passive Trail Restoration and USACE/SWRCB Preservation Invasive Species Monitoring	SA, TM	Monitored passive trail restoration for 2019 and monitored USACE/SWRCB preservation areas.	n/a	Noted non-natives included a patch of brittlebush (*Encelia farinosa*). Noted invasive species including Gazania (*Gazania linearis*) and African cornflag (*Chasmanthe floribunda*). Noted species were not present in USACE/SWRCB preservation areas. Non-native observations were GPS-mapped.	Included in USACE/SWRCB monitoring memo (Appendix A) and trail restoration monitoring memo (Appendix D).
4/11/19	Follow-up Passive Trail Restoration Monitoring	TM, AN	Conducted follow-up passive trail restoration monitoring of Decommissioned Trails 1 - 4.	n/a	An unauthorized woman with two medium sized brindle pit bull mixes was observed at the top of Decommissioned Trail 4. She was holding popcorn flower, some grass (potentially giant wild rye), and other plant species. GLA biologists indicated to her they were conducting monitoring for OCTA and she left immediately following Decommissioned Trail 4 to off-site of the property. Patches of Veldt grass (*Ehrharta calycina*) were GPS-mapped throughout Decommissioned Trails 1 - 4.	Included in trail restoration monitoring memo (Appendix D).
5/3/19	Biological Monitoring	DM, JA	Checked cameras and performed maintenance, as necessary.	n/a	None	None

Date of Visit	Purpose of Visit	GLA/OCTA Staff	Tasks Completed	Covered/Sensitive Species Observed	GLA Notes/Actions	Notes/Recommendations to OCTA
5/7/19	USACE/SWRCB Preservation Monitoring	LK, ZW	Monitored USACE/SWRCB preservation areas.	n/a	Documented in USACE/SWRCB monitoring memo (Appendix A).	Documented in USACE/SWRCB monitoring memo (Appendix A).
5/24/19	Biological Monitoring	DM, TM	Checked cameras/intermediate mariposa lily.	n/a	None	None
6/13/19	Biological Monitoring	JA, JS	Checked and mapped intermediate mariposa lily along road system. Replaced camera cards to camera stations A, B and J.	Intermediate mariposa lily, cactus wren	Mountain lions detected at camera location A.	None
6/25/19	Biological Monitoring	DM, ZW	Checked and photographed intermediate mariposa lily along road system. Additional USACE/SWRCB monitoring photos were also taken.	Intermediate mariposa lily, cactus wren	Updated GIS database.	Portions of the roads still need to be weeded/manicured.
10/10/19	Biological Monitoring	DM, JA	Retrieved wildlife cameras from the property.	n/a	Mountain lions detected at camera locations A and J.	None
12/13/19	Biological Monitoring	JF, DS	Took annual permanent photo station photos; checked for erosion and encroachments.	n/a	Noted some erosion along the roads.	Review erosional areas.
Pacific Horizon Preserve						
1/2/19	Cactus Mapping	ZW, JS	Completed cactus mapping.	n/a	Completed cactus mapping.	Continue to monitor for mountain biking encroachments.
3/14/19	Biological Monitoring and Review for Coastal Development Permit	LH, LK, DM, SA	Reviewed invasive species areas of high priority removal, fence line to be repaired, locations of posts for wildlife cameras, and trail repair needs.	Coastal California gnatcatcher, many-stemmed dudleya	Begin preparation of coastal development permit application, including preparation of a management/restoration plan.	Continue to monitor for mountain biking encroachments.

Date of Visit	Purpose of Visit	GLA/OCTA Staff	Tasks Completed	Covered/Sensitive Species Observed	GLA Notes/Actions	Notes/Recommendations to OCTA
5/20/19	Biological Monitoring/Dudleya Census	DM/JS	Checked for flowering dudleya.	n/a	Dudleya were not yet flowering. Scheduled follow-up visit.	Continue to monitor for mountain biking encroachments.
6/1/19	Biological Monitoring/Dudleya Census	JS	Dudleya census.	Many-stemmed dudleya	First dudleya are flowering; check back in a few days.	Continue to monitor for mountain biking encroachments.
6/4/19	Biological Monitoring/Dudleya Census	SC	Dudleya census, flagged dudleya, mapped crownbeard.	Many-stemmed dudleya	Dudleya are not at peak yet. Fog and low temperatures may be delaying flowering. Go back in 2 weeks to finish census.	Continue to monitor for mountain biking encroachments.
6/17/19	Biological Monitoring/Dudleya Census	SC/JS	Dudleya census.	Many-stemmed dudleya	Completed dudleya census.	Continue to monitor for mountain biking encroachments.
Bobcat Ridge Preserve						
5/2/19	Biological Monitoring	SC, TM	Monitored encroachment.	Intermediate mariposa lily leaves, cactus wren	Refer to road encroachment monitoring memo for results, attached as Appendix G. Detected and removed clump of an invasive plant located adjacent to the property (stink net, *Oncosiphon piluliferum*).	Check for stink net and remove as detected.
6/10/19	Biological Monitoring	SC, TM	Monitored encroachment, intermediate mariposa lily, cactus wren.	Intermediate mariposa lily, cactus wren, orange throated whiptail	The road was driven on again; tire pattern in plants was visible; many deerweed crowns were broken; a few California sagebrush were broken. Appears to be an off-road vehicle, (i.e., quad/polaris).	Install wildlife camera to monitor encroachment.
7/1/19	Biological Monitoring	ZW	Oversaw sign and camera post installation.	n/a	None	Continue to monitor encroachment.
7/3/19	Biological Monitoring	ZW	Completed camera installation.	n/a	None	Continue to monitor encroachment.
11/4/19	Biological Monitoring	ZW, LK	Monitored encroachment; checked wildlife cameras and performed maintenance, as necessary.	n/a	Disturbance area continuing to restore passively, noted erosion in this area.	Continue to monitor encroachment.

Date of Visit	Purpose of Visit	GLA/OCTA Staff	Tasks Completed	Covered/Sensitive Species Observed	GLA Notes/Actions	Notes/Recommendations to OCTA
Silverado Chaparral Preserve						
1/11/19	Biological Monitoring/Cactus Mapping	ZW, JS	Cactus mapping; checked for encroachment; general survey for covered species.	n/a	Completed cactus mapping/observed moderate mountain bike use.	GLA recommended installation of signage and cameras to capture images of unauthorized access.
5/7/19	Biological Monitoring	JA, DS	Checked for encroachment; placed two wildlife cameras – stations A and B.	n/a	Portions of main trail overgrown. A handful of areas in-between have been maintained by trespassers possibly to provide access to bike jump areas. Fresh dog scat detected. County park personnel at main gate indicated they encountered two hikers with a dog and advised them they were not allowed and turned them around.	GLA recommended installation of additional cameras to capture images of unauthorized access and wildlife.
5/20/19	Site Meeting	LH, ZW	Attended mountain bike meeting with County, OCTA, and contractors.	n/a	See mountain bike encroachment meeting memo attached as Appendix H.	See mountain bike encroachment meeting memo attached as Appendix H.
6/10/19	Site Meeting	LH, DM	Met to discuss signage and fencing with OCTA and contractors.	n/a	See mountain bike encroachment meeting memo attached as Appendix H.	See mountain bike encroachment meeting memo attached as Appendix H.
6/20/19	Biological Monitoring	JA, SC	Checked for encroachment, checked wildlife cameras and performed maintenance cameras as needed, mapped new Recon fence installations.	Coast horned lizard (including 1 gravid female and 1 male) and a third location with scat near an ant colony; intermediate mariposa lily; bobcat.	Portions of main trail overgrown. Confirmed deer, hikers with dogs, and bikers on Camera B. Bikers placed vegetation over camera to block view. Camera A was stolen. Mapped potential invasive ant species also that may warrant further intervention. Also mapped other native harvester ant colonies. Mapped erosional area made by bikers and old cut logs stacked on trail that leads down to Camera B station. Documented new camera placed by County parks facing main gate entrance near parking area.	Possibly secure new cameras at all main entrances that unauthorized people use to access the property. This may require increased visitation to remove material placed over cameras. Further discuss potential invasive ant issues.

Date of Visit	Purpose of Visit	GLA/OCTA Staff	Tasks Completed	Covered/Sensitive Species Observed	GLA Notes/Actions	Notes/Recommendations to OCTA
9/17/19	Biological Monitoring	JA, DS	Checked for encroachment and target species; removed remaining camera at rusted car; verified recently-installed Recon fence installations were intact.	Intermediate mariposa lily capsules along main trail by creek/camera area.	Majority of main trail is overgrown. Removed remaining camera at rusted car location. Deer and hiker with two dogs documented on camera. Documented several cairns (and several recent footprints) on easternmost trail facing the Abbey. One more cairn and beer can was detected on main trail before grade steepens. Northwest gate was open, but within the overall County lands that are locked.	Continue to monitor for encroachment.
Wren's View Preserve						
5/9/2019	Biological Monitoring	JA, KL	Checked for encroachment; checked wildlife cameras and performed maintenance, as necessary; listened for cactus wren and coastal California gnatcatcher.	Cactus wren	Three cactus wren territories noted. A fourth was unconfirmed. Further erosion of small section of uppermost road near eastern boundary was noted. Sections of fence were down from several fallen trees.	None
6/14/2019	Biological Monitoring	SC, KL	Checked wildlife cameras and performed maintenance, as necessary; listened for cactus wren and coastal California gnatcatcher.	Intermediate mariposa lily	GPS-mapped intermediate mariposa lily along access road.	None
6/26/2019	Nesting Bird Survey	ZW, LK	Conducted nesting bird survey for removal of oak tree infested with gold spotted oak borer.	n/a	No active nests observed in removal area and 500-foot buffer.	None
10/2/2019	Biological Monitoring	ZW, JS	Checked for encroachment; collected wildlife cameras; checked for sign of covered species.	Mountain lion (tracks), bobcat (scat), cactus wren	Mountain lion tracks observed with mule deer tracks on central ridge road.	None
Live Oak Creek Preserve						
5/24/19	Biological Monitoring	DM, TM	Checked wildlife cameras	n/a	Detected and removed clump of stink net.	Check for sink net and remove as detected.

Date of Visit	Purpose of Visit	GLA/OCTA Staff	Tasks Completed	Covered/Sensitive Species Observed	GLA Notes/Actions	Notes/Recommendations to OCTA
11/4/19	Biological Monitoring	ZW, LK	Collected wildlife cameras	n/a	None	None
Eagle Ridge Preserve						
1/28/2019	Biological Monitoring	ZW, SC	Confirmed no cactus present; checked wildlife cameras and performed maintenance, as necessary.	n/a	n/a	None
4/25/2019	Biological Monitoring	JA, SC	Assessed pond turtle suitability. Checked wildlife cameras and performed maintenance, as necessary. Moved Camera Station A to new location due to weeds (became Camera Station D).	n/a	Pond turtle suitability is low - no ponding on the property. No evidence of trespassers. Cow tracks were detected. Cameras show hikers on two separate days. Cameras routinely detected cows.	Check cameras more frequently in spring due to growth of vegetation.
6/25/2019	Biological Monitoring	JA, SC	Checked wildlife cameras and performed maintenance, as necessary.	n/a	No evidence of trespassers. Cow sign detected.	None
10/7/2019	Biological Monitoring	JA, SC	Removed all 3 cameras; checked for trespass.	n/a	Removed all 3 cameras. No evidence of trespassers.	None

B. Monitoring Results

Trabuco Rose Preserve

a. Trabuco Rose - Plants and Wildlife

i. Trabuco Rose - Covered Wildlife Species

While performing biological monitoring, GLA generally watched for OCTA M2 Covered Species, including the coastal California gnatcatcher, coastal cactus wren, orangethroat whiptail, and coast horned lizard. For any species detected incidentally, its location was recorded through Global Positioning System (GPS), as well as noting whether it was a new occurrence/location, or a likely confirmation of a previously noted occurrence. GLA biologists did not detect the gnatcatcher within the property but did confirm the cactus wren in some of the areas of previous detections [Exhibit 3 – OCTA Covered Species Map]. GLA did not detect the orangethroat whiptail or coast horned lizard during the various monitoring visits, although the whiptail is expected to occur throughout the Preserve since it has been detected multiple times during past monitoring visits. Although not previously detected at the Preserve, the horned lizard also has the potential to occur.

In support of the protection of Covered Species, including cactus wren, GLA mapped the locations of cactus scrub to identify key habitat areas for cactus wren, and for use in the management of sensitive resources in the context of fire management. A total of 35.03 acres of cactus scrub was mapped at Trabuco Rose. A memo was prepared detailing the methodology, results, and mapping [Appendix B].

1. Recommendations

Continue to map incidental detections through ongoing biological monitoring, or otherwise note the absence of detections in areas where species were previously detected, in order to detect potential trends in population growth or decline. Consider the implementation of focused efforts for reptiles such as pit arrays in order to more accurately determine the presence/absence of coast horned lizard.

ii. Trabuco Rose - Covered Plant Species

GLA timed biological monitoring visits in the spring to coincide with the blooming periods of the OCTA M2 covered plant species, specifically many-stemmed dudleya and intermediate mariposa lily. GLA did not detect any many-stemmed dudleya at the property but did observe the intermediate mariposa lily in multiple locations where it had been previously documented.

GLA evaluated the potential effect of road maintenance on intermediate mariposa lily and did not document impacts to intermediate mariposa lily (or suspected any) as a result of road maintenance. Additionally, with the exception of one intermediate mariposa lily that was observed about a foot from the road edge, the rest of the past

observations, and those that were observed in 2019, intermediate mariposa lily at the Preserve are far enough from the roads that impacts are not expected from typical road maintenance.

The table below is being incorporated into the annual monitoring report to track new intermediate mariposa lily detections. No new locations were documented in 2019. The table will continue to be updated annually in future annual monitoring reports.

Table 2. Trabuco Rose - Intermediate Mariposa Lily Ledger

	Locations	Population
Baseline Surveys	20	69
Previous Monitoring	42	208
2016-2018 GLA Monitoring	43	148
2019 GLA Monitoring	0	0
Total in GIS through 2019	105	425

1. **Recommendations**
   Continue to monitor known populations of intermediate mariposa lily during spring blooming periods in order to detect potential trends in population growth or decline. Document additional locations in the Preserve not previously documented. For the many-stemmed dudleya, continue to survey areas within the Preserve with the greatest potential to support the dudleya as a function of both soil suitability and topography. Although no impacts are expected as stated above, monitoring should continue to include areas of documented mariposa lily and suitable habitat along access roads where maintenance occurs, to confirm that the maintenance activities are not adversely affecting mariposa lily populations.

iii. Trabuco Rose - Non-Covered Sensitive Wildlife Species

GLA did not detect non-covered sensitive wildlife species while performing biological monitoring.

1. **Recommendations**
   GLA has no recommendations pertaining to the non-covered sensitive wildlife species, other than that the detection of non-covered sensitive species will be documented during ongoing biological monitoring, and the locations of species will be added to the GIS database as is applicable based on the species detected.

iv. Trabuco Rose - Non-Covered Sensitive Plant Species

GLA did not map any new locations of non-covered sensitive plant species while performing biological monitoring in 2019. GLA also did not confirm non-covered sensitive plants in previously-known locations, although the biologists did not

specifically survey previously-mapped locations as this was not the focus of biomonitoring efforts in 2019.

1. **Recommendations**
   GLA has no recommendations pertaining to the non-covered sensitive plant species, other than that the detection of non-covered sensitive species will be documented during ongoing biological monitoring, and the locations of species will be added to the GIS database as applicable based on the species detected.

v. Trabuco Rose - Wildlife Cameras

The Preserve RMP established a management program designed to conserve and manage the Preserve for the benefit of wildlife movement. The RMP identifies several Landscape and Species Goals specific to wildlife movement, including to protect and enhance natural and semi-natural landscapes important to maintain wildlife movement, and to protect and manage habitat for the use and movement of certain mammal species, including bobcat and mountain lion. The RMP includes as a specific management action to develop a fencing approach that protects the Preserve while facilitating wildlife movement. The RMP further notes the requirement for a biologist to review the conditions of biological resources (including wildlife movement) on a regular basis to ensure that resources are adequately protected and that threats are adequately addressed. Table 4-1 of the RMP noted that prior to effectiveness monitoring, wildlife cameras would be set up and monitored for at least six months to assess movement and connectivity for bobcat and mountain lion.

As part of the effectiveness monitoring, GLA biologists conducted a review of the Preserve's perimeter fencing to note any recommendations to OCTA. GLA inspected the fencing for any areas where fencing had been removed, damaged, or was otherwise in a condition requiring maintenance. This included fencing with slackened wire that may pose an entanglement threat to wildlife.

Wildlife cameras were installed on the Preserve in September 2013. GLA biologists continued to operate and monitor wildlife cameras at various stations throughout the Preserve in 2019. Cameras were monitored at Stations A, B, E, and J, including video camera at Station E due to a relatively greater frequency of mountain lion detections [Exhibit 4 – Photo Stations]. As with past monitoring, GLA observed a range of wildlife with the cameras, including mountain lion, bobcat, mule deer, coyote, and gray fox. Mountain lions were detected at Camera Stations A, B, E, and J, including three mountain lions detected at the same time at Camera Station A or August 21, 2019, and at Camera Station J on August 31, 2019. The cameras at Station A and J detected numerous trespassers, including hikers and people on mountain bikes. Each of these incidences were documented and OCTA was notified.

Through coordination with OCTA, GLA removed the wildlife cameras on an interim basis in October 2019 due to the level of effort and costs associated with

maintenance, checking the cameras, and managing the data combined with the lack of new data being collected.

1. **Recommendations**
   The perimeter fencing should continue to be inspected at least annually, per the RMP. Since the wildlife cameras continue to provide useful data for wildlife use, especially for mountain lions, as well as human use, at least some cameras should be re-installed and remain on the property as long as there is a budget to cover such monitoring.

vi. Trabuco Rose - Invasive Plant Species

Implementation of the Invasive Species Management Plan is ongoing. RECON conducted initial treatment of the Priority 1 invasive species and some of the Priority 2 invasive species in fall 2018. RECON conducted follow-up treatment in spring 2019. The primary invasive species that was retreated was artichoke thistle/cardoon (*Cynara cardunculus*). For pampas grass (*Cortaderia selloana*), initial treatments were very effective as there were only a few plants with limited green growth observed this spring. No retreatment of salt cedar (*Tamarix* spp.) was necessary. RECON's report is attached as Appendix C.

1. **Recommendations**
   Continue to implement the ISMP, including monitoring areas that have been treated.

vii. Trabuco Rose - Invasive Animal Species

GLA did not observe any animal species within the Preserve that would be classified as invasive.

1. **Recommendations**
   The property has the potential to support the brown-headed cowbird, which is a nest parasite. GLA will note the presence of the brown-headed cowbird, as detected, and will provide future recommendations to address the cowbird, if applicable.

b. Trabuco Rose Human Environment

i. Trabuco Rose - Land Use

GLA noted multiple occurrences of unauthorized public use at the Preserve during biological monitoring and through the wildlife cameras, including hikers and people on mountain bikes. People have also been detected with their dogs in the Preserve, which is prohibited by the RMP. GLA notified OCTA when occurrences of unauthorized land use were detected.

1. **Recommendations**
   The Preserve will continue to be monitored to document unauthorized access and activities, including by OCTA's private security company, the Orange County Sheriff Department's mounted unit, and GLA's monitoring

team. As part of GLA's efforts, the biological monitors will periodically check the perimeter fencing for signs of encroachment, as well as any evidence of habitat disturbance within the Preserve due to human activity.

The RMP describes that compliance with the RMP restrictions on public access is partly dependent on the self-monitoring behavior of the public, including those individuals that are authorized to access properties located north of the Preserve through the main gate. The public education and outreach program identified in the RMP is in part intended to communicate the importance of self-monitoring in reinforcing the value and purpose of the Preserve. GLA recommends that the public use restrictions be reinforced as frequently as necessary during the various public outreach events. Additional methods should be continued as identified in the RMP, including the encouragement of two-way communication with adjacent residents to collect and disseminate Preserve information.

The RMP notes that through regular patrols by the Preserve Manager and staff, enforcement of public access guidelines falls into two categories of offenses: minor and major infractions. Enforcement of minor infractions such as hiking on closed trails and bringing dogs into the Preserve would consist of discussing the infraction with the offending party and a warning process. Major infractions may require coordination between the Preserve Manager and law enforcement.

ii. Trabuco Rose - Adjacent Land Use

GLA did not observe any (new) unauthorized activities in the Preserve as a result of adjacent land uses, including vegetation encroachments, excessive irrigation runoff from adjacent property owners, or other types of encroachment.

1. Recommendations

GLA will continue to monitor adjacent properties for signs of unauthorized access/encroachment. As noted above, public education should be continued through public outreach events as described in the RMP.

iii. Trabuco Rose - Site/Trail Use

The Preserve contains numerous existing roads and trails that historically supported multiple uses. The main system of dirt roads continues to be maintained for vehicle access, including for emergency access, general OCTA management use, and in some instances for public access where an easement is granted. Some smaller trails are being maintained for public access or Preserve management, while the remainder of the trails are designated for passive restoration.

A total of 13 trails or trail segments were initially identified in the Preserve RMP for "passive restoration", all of which were assessed in 2018. On March 27 and April 11, 2019, GLA staff re-inspected and re-evaluated all of the trails and found that the former T12 has fully grown in and as such, is no longer subject to monitoring. Appendix D - Exhibits 1 and 2 provide trail and former trail locations and

corresponding photographs. Most trails were passively restoring with natives; however, hand weeding was recommended for T1, T2, T9, and T10. Although T3, T6, and T11 were also passively restoring, active restoration may be necessary. Hand-seeding may be needed for T4 since the condition has not changed much from the previous year. Exhibit 5 [Trails Map] depicts the location and type of each trail use.

As noted above, GLA documented several occurrences of unauthorized trail use, including hikers and people on an off-road vehicle. One encounter with hikers and dogs occurred at the top of decommissioned T4. The other occurrences were limited to the main roads/trails. GLA assisted with a public outreach event at the Trabuco Rose Preserve held by OCTA on April 6 (family event). The RMP includes as a management action to protect Covered Plants from public access and educational activities. Although some of the mapped occurrences of Covered Plants (i.e. intermediate mariposa lily) are immediately adjacent to access roads/trails that are hiked during the public outreach events, hiking activities were confined to the trails themselves and did not impact Covered Plants. GLA biologists leading the hikes educated the participants about sensitive species and habitats adjacent to the trails and monitored the participants to ensure they remained within the trails.

1. **Recommendations**
   GLA will continue to monitor the site to document unauthorized trail use and will assist with public outreach events. GLA recommends the continued annual monitoring of "passive restoration" trails to qualitatively note the condition of the trails, to document the gradual extent of recovery over time, and to recommend active restoration, as applicable.

c. Trabuco Rose - General Maintenance

i. Trabuco Rose - Fencing/Gates

GLA conducted focused fence and gate monitoring on January 30, 2019. Fencing and gates were mostly in good condition. One area of fence line was documented as leaning and another area was documented as having slack. Photographs and GPS location points were provided to OCTA.

1. **Recommendations**
   Repair fence line as needed.

ii. Trabuco Rose - Trash/Dumping

No issues with trash or dumping were observed.

1. **Recommendations**
   None.

iii. Trabuco Rose - Erosion/Sedimentation

The large area of stream erosion adjacent to the access road east of the main gate (near the secondary gate) worsened in 2019 as a result of large storm events. OCTA continues to monitor this area. GLA observed typical erosion in access roads throughout the Preserve, but these areas were maintained during the year by RECON.

1. Recommendations

Repair/control erosion as needed. GLA will continue to monitor the site for erosion effects and will report any changes to OCTA.

iv. Trabuco Rose - Trees

Due to the 2017 and 2018 on-site identification of invasive shot hole borer (*Euwallacea fornicatus*; ISHB) by Dudek, ISHB monitoring and evaluation surveys were conducted in 2019 to evaluate levels of ISHB infestation within the Preserve. Dudek arborists evaluated a total 134 riparian trees within the Trabuco Rose Preserve. Of the 134 trees evaluated, a total of eight trees exhibited signs and symptoms of ISHB, of which seven were determined to have low infestation rates and one had moderate infestation rate (same results as 2018; no newly infested trees were observed). In addition, to evaluate for the presence of ISHB in areas previously found to not be infested with ISHB, Dudek conducted emergent pest trapping over a 1-month period in July 2019 to evaluate for the presence of ISHB. Two panel traps were submitted to the State of California Department of Food and Agriculture (CDFA) Plant Health and Pest Prevention Services for identification/ confirmation of ISHB. Both traps submitted for evaluation were found to not have ISHB. Two traps positively identified scolytid beetle (*Euwallacea spp*), a common ambrosia beetle that attacks distressed trees. No new pests and/or disease were observed on the Trabuco Rose Preserve.

Based on the results of the 2019 surveys and supplemental emergent pest trapping, ISHB is considered active within the Trabuco Rose Preserve. However, based on the findings of the 2019 ISHB survey, ISHB continues to be in the early stages of infestation. Furthermore, with the exception of three interior trees found on the Trabuco Rose Preserve, the majority of ISHB signs and symptoms continue to be found on the periphery of the western boundary. The observation of ISHB along the site's western boundary along Trabuco Canyon is believed to be due to high infestation levels observed throughout O'Neill Regional Park and ISHB's active spread throughout the region. Alternatively, the observation of ISHB sign within the interior of the Preserve continues to be considered an outlier from the observed population along the edge of the property. However, based on the ISHB's potential for spread, it is within the ISHB's zone of influence/impact for the area.

The report containing detailed information of this study dated January 14, 2020 is attached as Appendix E.

1. **Recommendations**

The observation of ISHB signs and symptoms within the interior of Trabuco Rose Preserve is significant due to the risk presented to the adjacent California sycamore tree population. However, all eight of the trees exhibited low to moderate signs of ISHB. Furthermore, observed levels of ISHB within the Preserve was consistent with the 2018 survey, and no new occurrences of ISHB were observed. As such, the following treatment options are recommended:

- ISHB Treatment – As with many insect infestations, it is at the early stages that the outbreak/infestation can be controlled. In an effort to maintain and limit the spread of ISHB throughout the remaining areas of the Preserve, it is recommended that the eight trees observed to have low to moderate signs and symptoms of ISHB be treated by means of a trunk spray with Bifenthrin, Bacillus subtilis, and Pentra-Bark or similar. The above recommended pesticide and fungicide treatments should be conducted by a reputable licensed company that specializes in such and has a Pest Control Advisor and Applicator on staff.

- Monitoring – It is recommended that OCTA maintain an active ISHB monitoring and treatment program that focuses on the mapped riparian tree species in Appendix E. Specifically, it is recommended that this program focus on high-priority areas located throughout the Preserve. Areas that should be considered for monitoring include but are not limited to high-use recreation areas, native oak woodlands, and riparian areas that do not contain ISHB, and those areas identified in Appendix E. The frequency of ISHB monitoring within the selected areas should be conducted on a biweekly (i.e., every other week) basis during peak flight season (November through March). Active and frequent monitoring would allow OCTA land managers to quickly identify ISHB and to remove infested material before ISHB spreads into uninfested areas. As previously stated, with many insect infestations, it is at the early stages that the outbreak/infestation can be controlled. As such, routine monitoring of the site will play an important role in managing ISHB within the Preserve.

Pacific Horizon Preserve

a. Pacific Horizon - Plants and Wildlife

i. Pacific Horizon - Covered Wildlife Species

While performing biological monitoring, GLA generally watched for OCTA M2 Covered Species, including the coastal California gnatcatcher, orangethroat whiptail, and coast horned lizard. For any species detected incidentally, its location

was recorded through GPS, as well as noting whether it was a new occurrence/location, or a likely confirmation of a previously noted occurrence. GLA detected at least one gnatcatcher through vocalizations in the northern portion of the property on March 14, 2019. However, birds were not observed directly to determine the number of individuals present, or whether the detection consisted of a single male versus a pair.

In support of the protection of Covered Species, including cactus wren, GLA mapped the locations of cactus scrub to identify key habitat areas for cactus wren, and for use in the management of sensitive resources in the context of fire management. A total of 2.76 acres of cactus scrub was mapped at Pacific Horizon. A memo was prepared detailing the methodology, results, and mapping [Appendix B].

1. **Recommendations**
   Map incidental detections through ongoing biological monitoring, or otherwise note the absence of detections in areas where species were previously detected, in order to detect potential trends in population growth or decline. Consider the implementation of focused efforts for reptiles such as pit arrays in order to more accurately determine the presence/absence of coast horned lizard.

ii. Pacific Horizon - Covered Plant Species

GLA timed biological monitoring visits in the spring to coincide with the blooming periods of the OCTA M2 covered plant species, specifically many-stemmed dudleya and intermediate mariposa lily. GLA observed both many-stemmed dudleya and intermediate mariposa lily at the locations that had been documented during previous baseline surveys and/or monitoring [Exhibit 3 – OCTA Covered Species Map]. GLA was directed by OCTA to determine the approximate population size of dudleya. GLA detected approximately 180 dudleya individuals.

1. **Recommendations**
   Continue to monitor known populations of many-stemmed dudleya and intermediate mariposa lily during spring blooming periods in order to detect potential trends in population growth or decline. Document additional locations in the Preserve not previously documented.

iii. Pacific Horizon - Non-Covered Sensitive Wildlife Species

GLA did not detect non-covered sensitive wildlife species while performing biological monitoring.

1. **Recommendations**
   GLA has no recommendations pertaining to non-covered sensitive wildlife species, other than that the detection of non-covered sensitive species will be documented during ongoing biological monitoring, and the locations of species will be added to the GIS database as is applicable based on the species detected.

iv. Pacific Horizon - Non-Covered Sensitive Plant Species

GLA documented additional large populations of western crownbeard (*Verbesina dissita*), a non-covered sensitive plant species, in the western-northern portion of the site as shown on Exhibit 3. Note this mapping consists of the general areas where crownbeard was observed in 2019 and does not represent relative size of the population or the density. The GIS database was updated to reflect these areas.

1. Recommendations

GLA has no recommendations pertaining to the non-covered sensitive plant species, other than that the detection of non-covered sensitive species will be documented during ongoing biological monitoring, and the locations of species will be added to the GIS database as is applicable based on the species detected.

v. Pacific Horizon - Wildlife Cameras

There are currently no wildlife cameras at Pacific Horizon Preserve. In the previous annual monitoring report, GLA recommended the use of wildlife cameras for tracking wildlife use and abundance throughout the Preserve and for noting unauthorized access as a secondary benefit. OCTA, GLA, California Coastal Commission (CCC), and County Parks representatives met at the Preserve on March 4, 2019 to review proposed wildlife camera locations. Installation of wildlife cameras at the Preserve requires a coastal development permit (CDP) from the CCC, which was recently issued on February 5, 2020. Cameras have been purchased for installation.

1. Recommendations

Install wildlife cameras on the Preserve pursuant to the CDP.

vi. Pacific Horizon - Invasive Plant Species

A CDP was recently issued authorizing implementation of the ISMP. As part of the CDP application, a separate restoration plan, Disturbed Lands Restoration Plan (DLRP) (attached as Appendix F), addressing trail decommissioning and implementation of the ISMP was prepared at the request of the CCC. The DRLP is consistent with the ISMP and RMP for the Preserve. The first phase of that plan focuses on removing Priority 1 plants consistent with the ISMP and planting disturbed areas, which is expected to occur in 2020. An area of hottentot fig (*Carpobrotus edulis*) is located on County of Orange property, bordering the Preserve. OCTA, GLA, CCC, and County Parks met on March 4, 2019 to review this area and discuss a coordinated effort. OCTA subsequently obtained an encroachment permit from the County to perform removal of iceplant on County lands to ensure the success of restoration activities.

1. Recommendations

Implement ISMP and DLRP based on priorities outlined in the plans.

vii. Pacific Horizon - Invasive Animal Species

GLA did not observe any animal species within the Preserve that would be classified as invasive.

1. Recommendations

The property has the potential to support the brown-headed cowbird, which is a nest parasite. GLA will note the presence of the brown-headed cowbird, as detected, and will provide future recommendations to address the cowbird, if applicable.

b. Pacific Horizon - Human Environment

i. Pacific Horizon - Land Use

GLA observed mountain biking and hiking at the Pacific Horizon Preserve, which are authorized activities. GLA observed evidence of dog use at the Preserve, including dog scat and tracks. In 2018, GLA assisted OCTA with obtaining a CCC waiver to repair unauthorized trail modifications for mountain bike use to return the areas to pre-existing topographical contours, and also to erect signage along the trails to indicate property ownership. As previously reported, this work was conducted in late 2018 by OCTA's maintenance contractor, RECON. However, trail modifications for mountain bike use are ongoing and as a result, OCTA requested to extend the authorization to repair trail modifications for an additional five years. That request was authorized via issuance of the CDP and approval of the DLRP on February 5, 2020 and also includes decommissioning of a duplicative trail segment which is a threat to many-stemmed dudleya and restoring other disturbed areas in the vicinity of the trail which support intermediate mariposa lily and coastal sage scrub habitats. Additionally, "Restoration in Progress – Do Not Enter" signs will be placed around the restoration areas and wildlife cameras will be installed as a part of the DLRP. GLA did not observe any evidence of encroachment into Pacific Horizon Preserve due to activities such as fuel modification, landscaping, etc.

1. Recommendations

Implement the DLRP and continue to monitor the Preserve to document unauthorized access and activities. As part of GLA's efforts, the biological monitors will periodically check any evidence of habitat disturbance within the Preserve due to human activity.

The RMP for the Preserve describes that compliance with the RMP restrictions on public access is partly dependent on the self-monitoring behavior of the public, including trail user groups. The public education and outreach program identified in the RMP is in part intended to communicate the importance of self-monitoring in reinforcing the value and purpose of the Preserve. GLA recommends that the public use restrictions be reinforced as frequently as necessary during the various public outreach events. Additional methods should be continued as identified in the RMP, including the encouragement of two-way communication with adjacent residents to collect and disseminate Preserve information.

The RMP notes that through regular patrols by the Preserve Manager and staff, enforcement of public access guidelines falls into two categories of offenses: minor and major infractions. Enforcement of minor infractions such as bringing dogs into the Preserve, unauthorized equestrian use, and excess irrigation running onto the Preserve from an adjacent property would consist of discussing the infraction with the offending party and a warning process. Major infractions such as illegal off-road vehicle use, cutting new trails, illegal dumping, etc., may require coordination between the Preserve Manager and law enforcement.

ii. Pacific Horizon - Adjacent Land Use

Lands adjacent to the Preserve consist of residential development to the west, a resort and golf course to the south, with the remaining lands consisting of open space. GLA did not observe any unauthorized activities in the Preserve a result of adjacent land uses, including vegetation encroachments, excessive irrigation runoff from adjacent property owners, or other types of encroachment.

1. Recommendations

GLA will continue to monitor adjacent properties for signs of encroachment/irrigation runoff. As noted above, public education should be continued through public outreach as described in the RMP.

iii. Pacific Horizon - Site/Trail Use

The Aliso and Wood Canyons' Moulton Meadows Linkage Trail (north of the Preserve) extends south through the Pacific Horizon Preserve, and then crosses onto City-owned lands to the south. The trail can also be accessed from trails that originate at the eastern edge of Moulton Meadows Park. These trails are currently used by hikers and mountain bikers and some are included on Orange County Parks' trail maps. Some are also depicted in the trail network of the Laguna Beach General Plan Open Space/Conservation Element as "trails on private property." Exhibit 5 [Trails Map] depicts the location and type of each trail use. Pages 3-16 and 3-17 of the RMP note that there are currently three access points into the Preserve from the north, including the Linkage Trail at the northeast corner. Through coordination with OC Parks, one access point has been identified. The RMP states that the other two access points to the west will be decommissioned and actively restored in the future through collaboration with OC Parks, which is covered in the CDP. Note that the two additional access points referenced by the RMP represent just one pedestrian access to a single side trail that splits from the Linkage Trail north of the Preserve boundary. The second "access" point consists of a disturbed area where mountain bikers have been accessing the site and does not really represent a trail access. The side trail also contains a spur to the west and does not consist of two separate trails. Furthermore, the side trail is duplicative of the main Linkage Trail accessing the same general area of the Preserve. Trail modifications for mountain bike use are ongoing and OCTA received CCC authorization to repair trail modifications for an additional five years. That authorization also includes decommissioning of a duplicative trail segment pursuant to the DLRP which is a threat to many-stemmed dudleya and restoring other

disturbed areas in the vicinity of the trail which support intermediate mariposa lily and coastal sage scrub habitats. Along with the decommissioning of the access points, the duplicative trial and spur will be restored per the DLRP.

As noted above, GLA documented hikers and mountain bikers on the trails, which are authorized activities. GLA assisted with a public outreach event held by OCTA on August 17, 2019.

1. **Recommendations**
   Implement the DLRP to decommission duplicative access points and trails through sensitive habitats. GLA will continue to monitor the site to document unauthorized trail use and will assist with public outreach events.

c. Pacific Horizon - General Maintenance

i. Pacific Horizon - Fencing/Gates/Signage

Existing barbed-wire fencing is located along the northern and eastern edge of the Preserve, demarcating the boundary between Pacific Horizon Preserve and County of Orange property. The barbed-wire fencing along the northern edge is rusty and damaged will be replaced with three-strand smooth wire during implementation of the DLRP, as discussed above. As part of the CDP waiver in 2018, OCTA installed signage at the Preserve's entrance/exit points and property boundaries, which are intact. As part of the DLRP, "Restoration in Progress – Do Not Enter" signage will be installed in the restoration areas. The boundary between The Ranch golf course property and the Pacific Horizon Preserve is clearly demarcated with rope and signage. There are no gates on the Preserve.

1. **Recommendations**
   Implement the DLRP including replacement of the damaged barbed-wire fencing and restoration work signage installation.

ii. Pacific Horizon - Trash/Dumping

No issues with trash or dumping were observed.

1. **Recommendations**
   None.

iii. Pacific Horizon - Erosion/Sedimentation

GLA noted varying degrees of trail erosion on public access trails throughout the Preserve, including the more steeply sloping trails in the northern portion of the Preserve.

1. **Recommendations**
   Repair/control erosion as needed. GLA will continue to monitor the site for erosion effects and will report any changes to OCTA.

iv. Pacific Horizon - Trees

The only trees onsite are non-native species, Canary Island pine and eucalyptus.

1. Recommendations

Remove as prioritized in the ISMP and/or as directed by the GLA team's arborist and in coordination with OCTA.

Bobcat Ridge Preserve

a. Bobcat Ridge - Plants and Wildlife

i. Bobcat Ridge - Covered Wildlife Species

While performing biological monitoring, GLA generally watched for OCTA M2 Covered Species, including the coastal California gnatcatcher, coastal cactus wren, orangethroat whiptail, and coast horned lizard. For any species detected incidentally, its location was recorded through GPS, as well as noting whether it was a new occurrence/location, or a likely confirmation of a previously noted occurrence. GLA detected a pair of cactus wren during a monitoring visit and heard cactus wren on a separate visit.

In support of the protection of Covered Species, including cactus wren, GLA mapped the locations of cactus scrub to identify key habitat areas for cactus wren, and for use in the management of sensitive resources in the context of fire management. A total of 1.47 acres of cactus scrub was mapped at Pacific Horizon. A memo was prepared detailing the methodology, results, and mapping [Appendix B].

1. Recommendations

Continue to monitor for incidental detections through ongoing biological monitoring, or otherwise note the absence of detections in areas where species were previously detected, in order to detect potential trends in population growth or decline. Consider the implementation of focused efforts for reptiles such as pit arrays in order to more accurately determine the presence/absence of coast horned lizard.

ii. Bobcat Ridge - Covered Plant Species

GLA timed biological monitoring visits in the spring to coincide with the blooming period of intermediate mariposa lily, which has been previously detected onsite. GLA documented intermediate mariposa lily throughout the Preserve, including locations of the mariposa lily that had been documented during previous baseline surveys and/or monitoring, and multiple occurrences that had not been previously documented totaling approximately 55 individuals [Exhibit 3 – OCTA Covered Species Map]. The GIS database was updated to include previously undocumented locations.

1. **Recommendations**
   Continue to monitor known populations of intermediate mariposa lily during spring blooming periods in order to detect potential trends in population growth or decline. Document additional locations in the Preserve not previously documented. The monitoring of known populations of intermediate mariposa lily should include the area of disturbance along the southern boundary to determine the potential extent of impact due to the disturbance.

iii. Bobcat Ridge - Non-Covered Sensitive Wildlife Species

GLA did not detect non-covered sensitive wildlife species at Bobcat Ridge Preserve while performing biological monitoring.

1. **Recommendations**
   GLA has no recommendations pertaining to the non-covered sensitive wildlife species, other than that the detection of non-covered sensitive species will be documented during ongoing biological monitoring, and the locations of species will be added to the GIS database as is applicable based on the species detected.

iv. Bobcat Ridge - Non-Covered Sensitive Plant Species

GLA did not document any new non-covered sensitive plant species in 2019.

1. **Recommendations**
   GLA has no recommendations pertaining to the non-covered sensitive plant species, other than that the detection of non-covered sensitive species will be documented during ongoing biological monitoring, and the locations of species will be added to the GIS database as is applicable based on the species detected.

v. Bobcat Ridge - Wildlife Cameras

GLA established two wildlife camera stations (A and B) on the Preserve in July 2019. Both are located in the southern portion of the site near the unauthorized road clearing/grading, which is further described under "Adjacent Land Use" below. This location is ideal for wildlife access as well as potentially monitoring unauthorized activities. Wildlife detected by the cameras included deer and fox. No trespassers were observed.

1. **Recommendations**
   GLA recommends the continued use of wildlife cameras at the Preserve for tracking wildlife use, as well as for the secondary benefit of noting unauthorized activities.

vi. Bobcat Ridge - Invasive Plant Species

GLA prepared an ISMP, which was approved by the Wildlife Agencies in 2019. In addition, GLA biologists detected and removed a clump of an invasive plant (stink net, *Oncosiphon piluliferum*) located adjacent to the Preserve boundary.

1. **Recommendations**
   Implement ISMP based on priorities outlined in the plan and continue to monitor for stink net.

vii. Bobcat Ridge - Invasive Animal Species

GLA did not observe any animal species within the Preserve that would be classified as invasive.

1. **Recommendations**
   The property has the potential to support the brown-headed cowbird, which is a nest parasite. GLA will note the presence of the brown-headed cowbird, as detected, and will provide future recommendations to address the cowbird, if applicable.

b. Bobcat Ridge - Human Environment

i. Bobcat Ridge - Land Use

Public access is not authorized at the Bobcat Ridge Preserve. GLA did not observe any new trail cuts or other evidence of people accessing the Preserve.

1. **Recommendations**
   The site will continue to be monitored to document unauthorized access and activities, including by OCTA's private security company and GLA's monitoring team. As part of GLA's efforts, the biological monitors will periodically check any evidence of habitat disturbance within the Preserve due to human activity. Wildlife cameras placed strategically at the Preserve may also provide the secondary benefit of documenting unauthorized activities.

   As needed, implement the public education and outreach program identified in the RMP to communicate the biological values, goals, and activity restrictions within the Preserve so that management goals and guidelines will be respected and followed, as needed. Additional methods should be continued as identified in the RMP, including the encouragement of two-way communication with adjacent residents to collect and disseminate Preserve information.

   The RMP notes that through regular patrols by the Preserve Manager and staff, enforcement of public access guidelines falls into two categories of offenses: minor and major infractions. Enforcement of minor infractions such as public access or excess irrigation running onto the Preserve from an adjacent property would consist of discussing the infraction with the offending party and a warning process. Major infractions such as illegal off-road vehicle use, cutting new trails, illegal dumping, etc., may require coordination between the Preserve Manager and law enforcement.

ii. Bobcat Ridge - Adjacent Land Use

GLA continues to monitor the disturbance at the southern boundary of the Preserve. As previously documented, the adjacent resident had cleared and graded a dirt road to provide access to an additional part of his property, which OCTA became aware of in January 2017. The approximately 0.135 acre (617 linear feet) area is mapped as California sagebrush-California buckwheat scrub and scrub oak chaparral. Three individual intermediate mariposa lily points and one intermediate mariposa lily point mapped as a population of three were located in the disturbance footprint. OCTA coordinated with the resident concerning the property boundary location and to communicate the sensitivity of the Preserve's resources in 2017. CDFW reported the incident to the County of Orange, as CDFW lands were also impacted. Although the County contacted the property owner on May 23, 2017 to request that the impacted areas be restored, GLA has not observed any active restoration on multiple visits since that date. OCTA and CDFW have contacted the County multiple times to obtain an update of the required restoration efforts by the adjacent property owner; however, OCTA and CDFW have not received any additional information from the County. Additionally, on November 21, 2017, GLA biological monitors noted that the area of road disturbance appeared to have been recently weed whipped running approximately the length of the property at the bottom of the canyon. It appeared that this may have happened by mistake during fuel modification activities associated with the slope.

On December 18, 2018, GLA conducted a focused qualitative monitoring visit and established photo location points along the road encroachment area. The road encroachment area exhibited a high percentage of bare ground at approximately 85-percent cover; however, recruitment of native young shrubs and seedlings at the central portion of the road suggested there is ample seed input from the surrounding habitat for successful habitat re-establishment. Since 2017-2018 was a below average rainfall year, habitat re-establishment was expected to be successful.

GLA continued to monitor the disturbance area in 2019 and conducted a focused qualitative monitoring on May 2, 2019. The area exhibited significant growth of native and non-native vegetation since the 2018 monitoring event as a result of significant rainfall events in the winter of 2018/2019. Total vegetative cover was approximately 70-percent, of which native plant species contributed approximately 48-percent cover and non-native species contributed approximately 22-percent cover. In comparison to species coverage observed in 2018, total vegetative coverage was approximately 15-percent, of which native plant species contributed approximately 10-percent cover and non-native species contributed approximately 5-percent cover. Given that there is noted growth in native vegetation within the western and central portions since the 2018 monitoring event along with continuing natural recruitment, passive habitat reestablishment is expected to succeed assuming there is no future disturbance. GLA's monitoring memo dated May 16, 2019 is attached as Appendix G. On June 10, 2019, GLA biologists reviewed the encroachment area and it appeared that someone had recently driven on the disturbance area, likely with an off-road vehicle. Plants were depressed and broken from tires (Appendix G - Exhibit 2). GLA biologists reviewed the encroachment area

again on November 4, 2019 and it appeared that no further disturbance had taken place and that the area had likely rebounded to the condition in Spring 2019 (Appendix G – Exhibit 2). GLA installed a camera in a security box along the disturbance area on July 1, 2019. No trespassers were observed.

No other vegetation encroachments or adjacency issues related to habitat management such as landscape encroachment or excessive irrigation were observed.

1. **Recommendations**
   GLA will continue to monitor the disturbed area for recovery including areas where IML was potentially affected as well as other adjacent properties for signs of unauthorized access/encroachment. Continue to use a camera for noting unauthorized activities. As noted above, public education should be continued through public outreach and education as described in the RMP for the Preserve, including the use of two-way communication with adjacent residents to collect and disseminate Preserve information.

iii. Bobcat Ridge - Site/Trail Use

The Preserve contains two dirt trails in the eastern portion of the property [Exhibit 5 - Trails Map]. One of the trails jogs back and forth between OCTA-owned property and property owned by State of California (CDFW). The other trail is found along the ridge line of the Preserve and provides good vantages of the site. As such, this is the main trail for providing access for management and monitoring purposes. As noted above, GLA did not document unauthorized trail use such as hikers or mountain bikers.

1. **Recommendations**
   None.

c. Bobcat Ridge - General Maintenance

i. Bobcat Ridge - Fencing/Gates/Signage

GLA did not observe any fence maintenance issues. One OCTA Preserve sign has faded and a photo and location was provided to OCTA. In addition, two new OCTA Preserve signs were installed by RECON under GLA supervision. One is located at the southern boundary where the access road from the adjacent property meets the Preserve boundary and the second is located along the north-south trail in the northeastern portion of the Preserve.

1. **Recommendations**
   At this time fencing is not recommended for the Bobcat Ridge Preserve. No additional signage is currently recommended. GLA may map fencing and gates along Live Oak Canyon Road as directed by OCTA for inclusion in the GIS database.

ii. Bobcat Ridge - Trash/Dumping

No issues with trash or dumping were observed.

1. Recommendations

None.

iii. Bobcat Ridge - Erosion/Sedimentation

No erosion/sedimentation issues were documented.

1. Recommendations

None.

iv. Bobcat Ridge - Trees

The team arborist, Dudek, conducted invasive shot hole borer (ISHB; *Euwallacea* sp.) surveys in June and July 2017. No sign and/or symptom of ISHB was observed. Dudek conducted emergent pest trapping over a 1-month period in July 2019 to re-evaluate for the presence of ISHB, and again found no sign and/or symptom of ISHB. The report containing detailed information of this study dated January 14, 2020 is attached as Appendix E.

1. Recommendations

Continue to monitor the site for signs and/or symptoms of ISHB following recommendations in Appendix E.

Silverado Chaparral Preserve

a. Silverado Chaparral - Plants and Wildlife

i. Silverado Chaparral - Covered Wildlife Species

While performing biological monitoring, GLA generally watched for OCTA M2 Covered Species, including the coastal California gnatcatcher, coastal cactus wren, orangethroat whiptail, and coast horned lizard. For any species detected incidentally, its location was recorded through GPS, as well as noting whether it was a new occurrence/location, or a likely confirmation of a previously noted occurrence. GLA detected two coast horned lizards (including 1 gravid female and 1 male) and a third area with coast horned lizard scat [Exhibit 3 – Covered Species Map] by an ant colony. GLA mapped potential invasive ant species also that may warrant further intervention due to potential threat to coast horned lizards, as well as other native harvester ant colonies. GLA detected bobcat onsite. GLA did not detect gnatcatcher, cactus wren, or orangethroat whiptail.

In support of the protection of Covered Species, including cactus wren, GLA mapped the locations of cactus scrub to identify key habitat areas for cactus wren, and for use in the management of sensitive resources in the context of fire management. A total of 0.61 acre of cactus scrub was mapped at Silverado

Chaparral. A memo was prepared detailing the methodology, results, and mapping [Appendix B].

1. **Recommendations**
   Continue to map incidental detections through ongoing biological monitoring, or otherwise note the absence of detections in areas where species were previously detected, in order to detect potential trends in population growth or decline. Discuss the presence of potential invasive ant species due to potential threat to coast horned lizards. Consider the implementation of focused efforts for reptiles such as pit arrays in order to more accurately determine the population of coast horned lizard, as necessary.

ii. Silverado Chaparral - Covered Plant Species

GLA timed a Spring 2019 biological monitoring visit to coincide with the blooming periods of the OCTA M2 covered plant species, specifically many-stemmed dudleya and intermediate mariposa lily. GLA did not detect many-stemmed dudleya; however, multiple new occurrences of intermediate mariposa lily were detected at the property, totaling approximately 100 individuals. Locations of the mariposa lily are depicted on Exhibit 3 – OCTA Covered Species Map.

1. **Recommendations**
   Continue to monitor known populations of intermediate mariposa lily during spring blooming periods in order to detect potential trends in population growth or decline. Document additional locations in the Preserve not previously documented. For the many-stemmed dudleya, continue to survey areas within the Preserve with the greatest potential to support the dudleya as a function of both soil suitability and topography.

iii. Silverado Chaparral - Non-Covered Sensitive Wildlife Species

GLA did not detect non-covered sensitive wildlife species while performing biological monitoring.

1. **Recommendations**
   GLA has no recommendations pertaining to non-covered sensitive wildlife species, other than that the detection of non-covered sensitive species will be documented during ongoing biological monitoring, and the locations of species will be added to the GIS database as is applicable based on the species detected.

iv. Silverado Chaparral - Non-Covered Sensitive Plant Species

GLA did not document any new non-covered sensitive plant species in 2019.

1. **Recommendations**
   GLA has no recommendations pertaining to non-covered sensitive plant species, other than that the detection of non-covered sensitive species will be documented during ongoing biological monitoring, and the locations of

species will be added to the GIS database as is applicable based on the species detected.

v. Silverado Chaparral - Wildlife Cameras

Two cameras were installed in May 2019. Camera A was documented as stolen by GLA biologists on June 20, 2019. Wildlife cameras detected deer and bobcat. Wildlife cameras also detected unauthorized people on the Preserve including a man, a woman hiking with several dogs, and another hiker with two dogs.

Through coordination with OCTA, GLA removed the remaining wildlife camera on an interim basis in September 2019 due to the theft risk as well as reducing the effort through the winter months to save funding for spring monitoring.

1. Recommendations

GLA recommends re-installing cameras for tracking wildlife use and to capture images of unauthorized access throughout the Preserve. Note that GLA recommends increased security for the cameras such as cemented poles and boxes.

vi. Silverado Chaparral - Invasive Plant Species

GLA prepared an ISMP, which was approved by the Wildlife Agencies in 2019.

1. Recommendations

Implement ISMP based on priorities outlined in the plan.

vii. Silverado Chaparral - Invasive Animal Species

GLA did not observe any animal species within the Preserve that would be classified as invasive.

1. Recommendations

The property has the potential to support the brown-headed cowbird, which is a nest parasite. GLA will note the presence of the brown-headed cowbird, as detected, and will provide future recommendations to address the cowbird, if applicable.

b. Silverado Chaparral - Human Environment

i. Silverado Chaparral - Land Use

Public access is not currently authorized at the Silverado Chaparral Preserve. During monitoring visits, GLA documented and mapped the locations of unauthorized encroachment and habitat disturbance in the form of active trail improvements associated with unauthorized mountain bike activity at the Preserve. During the monitoring, GLA noted progressively escalating trail improvements, as well as apparent ingress/egress points, and notified OCTA of the encroachment. GLA recommended several measures to OCTA, including increased signage and fencing, as well suggested locations for the placement of trail cameras to document the encroachment. A field meeting was held on May 20, 2019 with Lesley Hill

(OCTA), Adam Shuck (OC Parks), Raquel Atik (Recon Environmental), Adam Maywhort (Irvine Ranch Conservancy), Tony Castillo (High level Security Solutions, Inc.), and Zack West (GLA) to review the severity of encroachment, and to identify locations for the installation of additional fencing, signage, and trail cameras; as well as to review access and routes for regular security patrols by High level Security Solutions, Inc. and OC Parks law enforcement staff. As a result of the meeting, additional fencing with signage was installed to block access to newly cut trails and demarcate property boundaries [Exhibit 5]. A memo detailing the meeting is attached as Appendix H.

In addition, GLA documented several cairns on the easternmost trail facing the Abbey and an additional cairn and beer can on the main trail before the grade steepens.

1. **Recommendations**

   The site will continue to be monitored to document unauthorized access and activities, including by OCTA's private security company and GLA's monitoring team. As part of GLA's efforts, the biological monitors will periodically check any evidence of habitat disturbance within the Preserve due to human activity. GLA also recommends re-installing cameras with a higher level of security (i.e. cemented poles and boxes) to capture images of unauthorized access. Continue to coordinate with the County of Orange and staff at Irvine Ranch Conservancy as-needed regarding mountain biking disturbance.

   As needed, implement the public education and outreach program identified in the RMP to communicate the biological values, goals, and activity restrictions within the Preserve so that management goals and guidelines will be respected and followed, as needed. This should include a public outreach meeting. Additional methods should be continued as identified in the RMP, including the encouragement of two-way communication with adjacent residents to collect and disseminate Preserve information.

   The RMP notes that through regular patrols by the Preserve Manager and staff, enforcement of public access guidelines falls into two categories of offenses: minor and major infractions. Enforcement of minor infractions such as hiking on closed trails and bringing dogs into the Preserve would consist of discussing the infraction with the offending party and a warning process. Major infractions may require coordination between the Preserve Manager and law enforcement.

ii. Silverado Chaparral - Adjacent Land Use

No vegetation encroachments, excessive irrigation runoff from adjacent property owners, or other adjacency issues were observed.

2. **Recommendations**

   None.

iii. Silverado Chaparral - Site/Trail Use

The Preserve is bisected by one main vehicular access road, Black Star Helo Pad Road, which is an unpaved utility road utilized by Southern California Edison in order to service utility lines that run along the western property boundary of the Silverado Chaparral Preserve. There are two smaller unpaved private access roads that enter Silverado Chaparral from the northern portion of the Preserve off of Baker Canyon Road. Hall Canyon Road and an unnamed road traverse south onto the Silverado Chaparral Preserve. In addition, a series of dirt trails traverse the Preserve and travel predominantly from east to west. The Preserve RMP identifies three categories of trails/roads, including trails/roads for recreational use, trails/roads maintained for Preserve management, and trails to be decommissioned. Exhibit 5 [Trails Map] depicts the location and type of each trail use.

As noted above, GLA documented and mapped the locations of unauthorized encroachment and habitat disturbance in the form of active trail improvements associated with unauthorized mountain bike activity at the Preserve. GLA also documented several cairns on the easternmost trail facing the Abbey and an additional cairn and beer can on the main trail before the grade steepens. In addition, a Camera A was stolen from the property. Wildlife cameras detected a man, a woman hiking with several dogs, and another hiker with two dogs.

1. Recommendations

GLA will continue to monitor the site to document unauthorized trail use. GLA recommends re-installing cameras with a higher level of security (i.e. cemented poles and boxes) to capture images of unauthorized access.

c. Silverado Chaparral - General Maintenance

i. Silverado Chaparral - Fencing/Gates/Signage

GLA did not observe any maintenance issues with fencing, gates, or signage.

1. Recommendations

Monitor the newly installed fence lines to make sure they are intact and not cut for mountain biking use.

ii. Silverado Chaparral - Trash/Dumping

No issues with trash or dumping were observed.

1. Recommendations

None.

iii. Silverado Chaparral - Erosion/Sedimentation

No erosion/sedimentation was observed requiring action.

1. Recommendations

None.

iv. Silverado Chaparral - Trees

The team arborist, Dudek, conducted ISHB surveys in June and July 2017. No sign and/or symptom of ISHB was observed. Since the onsite trees primarily consist of coast live oak, the arborist determined that monitoring was not necessary in 2019.

1. Recommendations

None.

Wren's View Preserve

a. Wren's View - Plants and Wildlife

i. Wren's View - Covered Wildlife Species

While performing biological monitoring, GLA generally watched for OCTA M2 Covered Species, including the coastal California gnatcatcher, coastal cactus wren, orangethroat whiptail, and coast horned lizard. For any species detected incidentally, its location was recorded through GPS, as well as noting whether it was a new occurrence/location, or a likely confirmation of a previously noted occurrence. GLA biologists detected cactus wrens in three separate locations at the property in 2019 [Exhibit 3 – OCTA Covered Species Map]. Two of the territories corresponded with locations noted by CDFW biologist Christine Beck (accompanied by Lesley Hill) during focused surveys performed in 2017. The third group was detected near the northern property boundary. No gnatcatchers were detected during GLA's monitoring visits. A gnatcatcher pair was detected at the site in 2012, but was not confirmed in 2017 during focused surveys conducted by CDFW biologist Christine Beck (accompanied by Lesley Hill) or in 2018-2019 during GLA's general biological monitoring, although suitable habitat is still present to support gnatcatchers and it is unclear why gnatcatchers were absent from the site. Mountain lion and bobcat were both detected on the remote cameras.

In support of the protection of Covered Species, including cactus wren, GLA mapped the locations of cactus scrub to identify key habitat areas for cactus wren, and for use in the management of sensitive resources in the context of fire management. A total of 14.73 acres of cactus scrub was mapped at Wren's View. A memo was prepared detailing the methodology, results, and mapping [Appendix B].

1. Recommendations

Continue to map incidental detections through ongoing biological monitoring, or otherwise note the absence of detections in areas where species were previously detected, in order to detect potential trends in population growth or decline. Consider the implementation of focused efforts for reptiles such as pit arrays in order to more accurately determine the presence/absence of coast horned lizard.

ii. Wren's View - Covered Plant Species

GLA timed biological monitoring visits in Spring 2019 to coincide with the blooming periods of intermediate mariposa lily. GLA biologists mapped multiple locations of intermediate mariposa lily that were not previously documented, totaling approximately 250 individuals [Exhibit 3 – OCTA Covered/Sensitive Plant Species Map]. Note that GLA observed some disturbance to no more than ten intermediate mariposa lily as a result of maintenance of the main road going up to the gate. In one instance, the intermediate mariposa lily was growing out of the road itself off to the side. In other instances, the intermediate mariposa lily was mixed in with vegetation growing on the immediately adjacent berm that was encroaching into the road. In all instances it appeared that the intermediate mariposa lily was cut from mechanical trimming of the vegetation. Note that for those that are growing in the road or at the very edge, it would be difficult to avoid completely to keep the road clear for access. The disturbance was not the result of overzealous trimming.

1. Recommendations

If maintenance is necessary when intermediate mariposa lily is present, schedule biological monitors to flag the plants so that individuals can be seen more easily for avoidance and consider biological monitoring during work activities, especially for areas where intermediate mariposa lily is located within the road or adjacent. Continue to monitor known populations of intermediate mariposa lily during spring blooming periods in order to detect potential trends in population growth or decline. Document additional locations in the Preserve not previously documented.

iii. Wren's View - Non-Covered Sensitive Wildlife Species

GLA did not detect non-covered sensitive wildlife species while performing biological monitoring.

1. Recommendations

GLA has no recommendations pertaining to non-covered sensitive wildlife species, other than that the detection of non-covered sensitive species will be documented during ongoing biological monitoring, and the locations of species will be added to the GIS database as is applicable based on the species detected.

iv. Wren's View - Non-Covered Sensitive Plant Species

GLA did not document any new non-covered sensitive plant species in 2019.

1. Recommendations

GLA has no recommendations pertaining to non-covered sensitive plant species, other than that the detection of non-covered sensitive species will be documented during ongoing biological monitoring, and the locations of species will be added to the GIS database as is applicable based on the species detected.

v. Wren's View - Wildlife Cameras

The Preserve RMP established a management program designed to conserve and manage the Preserve for the benefit of wildlife movement. The RMP identifies several Landscape and Species Goals specific to wildlife movement, including to protect and enhance natural and semi-natural landscapes important to maintain wildlife movement, and to protect and manage habitat for the use and movement of certain mammal species, including bobcat and mountain lion. The RMP includes as a specific management action to develop a fencing approach that protects the Preserve while facilitating wildlife movement. The RMP further notes the requirement for a biologist to review the conditions of biological resources (including wildlife movement) on a regular basis to ensure that resources are adequately protected and that threats are adequately addressed. Table 4-1 of the RMP noted that prior to effectiveness monitoring, wildlife cameras would be set up and monitored for at least six months to assess movement and connectivity for bobcat and mountain lion.

As part of the effectiveness monitoring, GLA biologists conducted a review of the Preserve's perimeter fencing to note any recommendations to OCTA. GLA inspected the fencing for any areas where fencing had been removed, damaged, or was otherwise in a condition requiring maintenance. This included fencing with slackened wire that may pose an entanglement threat to wildlife.

GLA established three camera stations (A, B, and C) on the Preserve in 2018, which were maintained at the Preserve until October 2019. Camera Station A is located adjacent to the access road just past the main entrance gate. Camera Station B is located on the main ridge. Camera Station C is located on the northern side of the main ridge in the adjacent canyon. Wildlife detected at the camera stations include mountain lion, bobcat, deer, coyote, and gray fox. People were detected multiple times hiking and using mountain bikes.

Through coordination with OCTA, GLA removed the wildlife cameras on an interim basis in October 2019 due to the level of effort and costs associated with maintenance, checking the cameras, and managing the data combined with the lack of new data being collected.

1. Recommendations

GLA recommends re-installing cameras during Spring 2020 monitoring visits for tracking wildlife use and to capture images of unauthorized access throughout the Preserve. Since the wildlife cameras continue to provide useful data for wildlife and human use, at least some cameras should be re-installed and remain on the property as long as there is a budget to cover such monitoring.

vi. Wren's View - Invasive Plant Species

GLA prepared an ISMP, which was approved by the Wildlife Agencies in 2019.

1. **Recommendations**
   Implement ISMP based on priorities outlined in the plan.

vii. **Wren's View - Invasive Animal Species**
GLA did not observe any animal species within the Preserve that would be classified as invasive.

1. **Recommendations**
   The property has the potential to support the brown-headed cowbird, which is a nest parasite. GLA will note the presence of the brown-headed cowbird, as detected, and will provide future recommendations to address the cowbird, if applicable.

b. Wren's View - Human Environment

i. **Wren's View - Land Use**
OCTA-sponsored docent hikes are allowed on the Preserve; however, open public access is not allowed. GLA did not observe any new trail cuts or evidence of unauthorized access; however, the RMP notes that trespassing through the property has been a common daytime and nighttime occurrence, in part due to the location of the former homesite to the northeast of the Preserve, and in 2018, trespassing was documented by the OCTA private security company and warnings were issued.

1. **Recommendations**
   The site will continue to be monitored to document unauthorized access and activities, including by OCTA's private security company and GLA's monitoring team. As part of GLA's efforts, the biological monitors will periodically check any evidence of habitat disturbance within the Preserve due to human activity. If wildlife cameras are continued to be used at the Preserve, the cameras will be expected to further assist in documenting unauthorized activities.

   The RMP describes that compliance with the RMP restrictions on public access is partly dependent on the self-monitoring behavior of the public, including trail user groups. The public education and outreach program identified in the RMP is in part intended to communicate the importance of self-monitoring in reinforcing the value and purpose of the Preserve. GLA recommends that the public use restrictions be reinforced as frequently as necessary during the various public outreach events. Additional methods should be continued as identified in the RMP, including the encouragement of two-way communication with adjacent residents to collect and disseminate Preserve information.

   The RMP notes that through regular patrols by the Preserve Manager and staff, enforcement of public access guidelines falls into two categories of offenses: minor and major infractions. Enforcement of minor infractions

such as bringing dogs into the Preserve, unauthorized equestrian use, and excess irrigation running onto the Preserve from an adjacent property would consist of discussing the infraction with the offending party and a warning process. Major infractions such as illegal off-road vehicle use, cutting new trails, illegal dumping, etc., may require coordination between the Preserve Manager and law enforcement.

ii. Wren's View - Adjacent Land Use

No vegetation encroachments, excessive irrigation runoff from adjacent property owners, or other adjacency issues were observed.

1. Recommendations

GLA will continue to monitor adjacent properties for signs of unauthorized access/encroachment. As noted above, public education should be continued through public outreach events as described in the RMP for the Preserve.

iii. Wren's View - Site/Trail Use

The Preserve is bisected by one main unpaved vehicular access road (Trabuco Ridge Drive) that comes off of Trabuco Canyon Road and continues north off the Preserve onto private property to the north. There is an additional portion of this internal road that veers off of the main road and curves west towards an adjacent private property near Live Oak Canyon Road. There is one additional trail that comes in from the northern adjacent private property and connects down to Trabuco Ridge Road. This unmaintained trail is quite possibly a historic road bed, but due to lack of maintenance over the years is currently inaccessible with a vehicle. Exhibit 5 [Trails Map] depicts the location and type of each trail use. No unauthorized trail use was documented.

GLA assisted with a public outreach event at the Preserve held by OCTA on June 8, 2019.

1. Recommendations

GLA will continue to monitor the site to document any unauthorized trail use and will assist with public outreach events.

c. Wren's View - General Maintenance

i. Wren's View - Fencing/Gates/Signage

Monitoring focused on reviewing the portions of the Preserve where perimeter fencing exists and is being maintained, including along the western edge of the Preserve. GLA noted a fallen tree on a perimeter barbed-wire fence and a downed internal chain link fence along a road within the Preserve and provided the GPS locations to OCTA. Monitoring also included the gates and signage, which are in good condition.

1. **Recommendations**
   Repair the perimeter barbed-wire fence damaged by the fallen tree to prevent unauthorized entry into the Preserve. Repair or remove the downed internal chain link fence to avoid wildlife entanglement. Remove the previously discussed and mapped internal barbed-wire fencing that does not appear to have a present function and that could pose a risk to wildlife. Continue to coordinate with Transportation Corridor Agencies (TCA) as they are the new land owner of the parcel to the west, to determine appropriate fencing needs and improvements to promote wildlife movement between the two properties. In addition, as previously noted, there is a segment of pre-existing chain link fencing along the southern border of the Preserve which could be replaced with smooth wire fencing to facilitate wildlife movement.

ii. Wren's View - Trash/Dumping

No issues with trash or dumping were observed.

1. **Recommendations**
   None.

iii. Wren's View - Erosion/Sedimentation

Erosion was noted in the main access road up from the Trabuco Canyon Road entrance and was reported to OCTA. Erosion has been previously documented and repaired on this road and is an ongoing issue. Erosion was also noted in the road/trail located in the central-northern portion of the Preserve; however, since this road is not used for primary access, repair of the road/trail is not recommended at this time.

1. **Recommendations**
   Repair/control erosion as needed. GLA will continue to monitor the site for erosion effects and will report any changes to OCTA.

iv. Wren's View - Trees

Due to the 2017 and 2018 on-site identification of ISHB by Dudek, ISHB monitoring and evaluation surveys were conducted in 2019 to evaluate levels of ISHB infestation within the Preserve. Dudek arborists evaluated a total 28 riparian trees within the Wren's View Preserve. Of the 28 trees evaluated, a total of 13 trees exhibited signs and symptoms of ISHB, of which seven were determined to have low infestation rates, five had moderate infestation rates, and one had a high infestation rate (same results as 2018; no newly infested trees were observed). The individual tree observed to have high levels of ISHB is considered to be a reproductive tree (heavily infested with more than 150 entry holes). In addition, to evaluate for the presence of ISHB in areas previously found to not be infested with ISHB, Dudek conducted emergent pest trapping over a 1-month period in July 2019 to evaluate for the presence of ISHB. One panel trap was submitted to the CDFA Plant Health and Pest Prevention Services for identification/confirmation of ISHB. The trap submitted for evaluation was found to not have ISHB. The trap positively

identified scolytid beetle (*Euwallacea spp*), a common ambrosia beetle that attacks distressed trees, which was previously identified on the Preserve. As discussed below, goldspotted oak borer (*Agrilus auroguttatus*; GSOB) was positively identified on Wren's View Preserve. No other new pests and/or disease were observed on the Preserve.

Based on the results of the 2019 surveys and supplemental emergent pest trapping, ISHB is considered active within the Wren's View Preserve. However, based on the findings of the 2019 ISHB survey, ISHB continues to be in the early stages of infestation. Furthermore, with the exception of two interior trees found on the Wren's View Preserve, the majority of ISHB signs and symptoms continue to be found on the periphery of the western boundary. The observation of ISHB along the site's western boundary along Trabuco Canyon is believed to be due to high infestation levels observed throughout O'Neill Regional Park and ISHB's active spread throughout the region. Alternatively, the observation of ISHB sign within the interior of the Preserve continues to be considered an outlier from the observed population along the edge of the property. However, based on the ISHB's potential for spread, it is within the ISHB's zone of influence/impact for the area.

Potential signs of GSOB were observed by Mathew Karie (Field Supervisor, Audubon Starr Ranch) in May 2019. Due to the potential presence of GSOB on the Preserve, GSOB extent surveys were conducted in 2019. Dudek arborists conducted a site visit on June 7, 2020, to confirm the presence of GSOB within a coast live oak tree found to be exhibiting symptoms (D-shaped holes) of GSOB. The samples were confirmed to be GSOB by Kevin Turner (Southern California Invasive Pest Coordinator, Retired) at the University of California Division of Agriculture and Natural Resources. Following confirmation of the GSOB infested tree, Dudek conducted GSOB extent and presence/absence surveys of the Wren's View Preserve. In total, Dudek mapped and evaluated 690 coast live oak trees within the Preserve. Of the 690 mapped and evaluated trees, nine were found to exhibit signs of GSOB. Levels of potential GSOB within the nine trees ranged from low (five trees) to moderate (four trees). No trees were found to have high occurrences of GSOB exit holes. The nine trees are comprised of two trees in fair health, three trees in poor health, and four dead trees. The trees exhibiting signs of GSOB are located along Live Oak Canyon Road and along a site access road within the Preserve (Appendix E, Attachment 6). Overall, 1.3% of the trees inventoried on site were found to exhibit signs of GSOB. The remaining 681 trees were found to exhibit no sign of GSOB. This does not mean that these trees do not have GSOB, it only means that they did not exhibit sign of GSOB at the time of the inventory. Individual tree details are depicted in Appendix E, Attachment 7. The initial tree (Tree No. 1) was recommended for removal, which occurred in July 2019. A pre-construction nesting bird survey was conducted by GLA biologists and notification provided to the Wildlife Agencies prior to removal.

1. **Recommendations**

   The observation of ISHB signs and symptoms within the interior of Wren's View Preserve is significant due to the risk presented to the adjacent

California sycamore tree population. However, only one tree (Tree No. 17) was found to exhibit high levels of ISHB, while the remaining 12 trees exhibited low to moderate signs of ISHB. Furthermore, observed levels of ISHB within the Preserve were consistent with the 2018 survey, and no new occurrences of ISHB were observed. As such, the following treatment options are recommended:

- ISHB Treatment – As with many insect infestations, it is at the early stages that the outbreak/infestation can be controlled. In an effort to maintain and limit the spread of ISHB throughout the remaining areas of the Preserve, it is recommended that the 20 trees observed to have low to moderate signs and symptoms of ISHB be treated by means of a trunk spray with Bifenthrin, Bacillus subtilis, and Pentra-Bark or similar. The above recommended pesticide and fungicide treatments should be conducted by a reputable licensed company that specializes in such and has a Pest Control Advisor and Applicator on staff.

- Removal – Tree No. 17 on the Wren's View Preserve was found to have high levels of ISHB and has the potential to be an amplifier tree. As such, to protect the adjacent tree, Tree No. 17 is recommended for removal. Additionally, to minimize the spread of ISHB, it is recommended that tree material be disposed of so that bark- and wood-boring insects are not attracted to the fresh cuttings and do not emerge and begin seeking out other stressed trees. To address this specific issue, the University of California, Davis, recommends that "all material, not removed from the site, should be tightly sealed beneath thick (10 mil [millimeter]), clear plastic sheets in a sunny location for several months to exclude attacking beetles, and kill any beetles already infesting wood. To be effective, solar/plastic treatment requires vigilance and careful execution. It is important to keep wood piles small, use high-quality clear plastic resistant to UV (ultraviolet light) degradation, and thoroughly seal edges and promptly patch holes to prevent beetles from escaping. (Seybold et al. 2008)." Should solarization prove unfeasible, it is recommended that the material be chipped to less than 1 inch. According to UCR, chipping to less than 1 inch would reduce the spread of beetle by 95%–98%.

- Monitoring – Dudek recommends that OCTA maintain an active ISHB monitoring, removal, and treatment program that focuses on the identified and mapped riparian tree species in Appendix E. Specifically, it is recommended that this program focus on high-priority areas located throughout the Preserve. Areas that should be considered for monitoring include but are not limited to high-use recreation areas, native oak woodlands, and riparian areas that do

not contain ISHB, and those areas identified in Appendix E. The frequency of ISHB monitoring within the selected areas should be conducted on a biweekly (i.e., every other week) basis during peak flight season (November through March). Active and frequent monitoring would allow OCTA land managers to quickly identify ISHB and to remove infested material before ISHB spreads into uninfested areas. As previously stated, with many insect infestations, it is at the early stages that the outbreak/infestation can be controlled. As such, routine monitoring of the site will play an important role in managing ISHB within the Preserve.

The observation of GSOB within the Wren's View Preserve is the first such recorded observation in Trabuco Canyon, California, and as such is considered a threat to the canyon's oak tree resources. The total extent of GSOB within the canyon is unknown. However, based on the 2019 surveys conducted within the Preserve, the infestation is suspected to be at the early stages and, as such, may be controllable. To manage the observed GSOB outbreak within Wren's View, it is recommended that OCTA follow the protocol utilized to manage the GSOB outbreak in Weir Canyon, California. Specifically, it is recommended that any trees found to have high levels of GSOB be removed and debarked, and all other trees greater than 10 inches in diameter within 200–300 feet of an infested, including the infested tree, be chemically treated with carbaryl as a trunk spray. As such, based on the 2019 Wren's View Extent Survey, it is recommended that the initial tree (Tree No. 1) found to have GSOB be removed (it was retroactively removed in July 2019 as discussed above), eight trees found to have low to moderate levels be chemically treated, and all trees greater than 10 inches in diameter located within 200–300 feet of the infested trees be chemically treated. Chemical treatments will help to minimize the spread of GSOB and reduce current populations. Prior to performing the chemical treatments, it is recommended that OCTA develop a comprehensive GSOB treatment plan. Details regarding the Weir Canyon treatment method can be found in Appendix E, Attachment 9. In addition to treating and managing the outbreak in Wren's View, it is recommended that OCTA work with adjacent landowners, as feasible, to identify and manage GSOB. Similar to ISHB, it will be important to monitor the spread and/or containment of GSOB within Wren's View. As such, it is recommended that OCTA continue annual monitoring of the site for the presence/absence and spread of GSOB on site. It is recommended that the annual surveys occur during peak emergence/flight season for GSOB. This will allow surveyors to assess trees that exhibit newly emerged GSOB and recommend the appropriate treatment if needed.

Live Oak Creek Preserve

a. Live Oak Creek - Plants and Wildlife

i. Live Oak Creek - Covered Wildlife Species

While performing biological monitoring, GLA generally watched for OCTA M2 Covered Species, including the coastal California gnatcatcher, coastal cactus wren, orangethroat whiptail, and coast horned lizard. No covered wildlife species were detected during monitoring; however, bobcat was detected on the wildlife cameras.

In support of the protection of Covered Species, including cactus wren, GLA mapped the locations of cactus scrub to identify key habitat areas for cactus wren, and for use in the management of sensitive resources in the context of fire management. A total of 7.27 acres of cactus scrub was mapped at Live Oak Creek. A memo was prepared detailing the methodology, results, and mapping [Appendix B].

1. Recommendations

Map incidental detections through ongoing biological monitoring, or otherwise note the absence of detections in areas where species were previously detected, in order to detect potential trends in population growth or decline. Consider the implementation of focused efforts for reptiles such as pit arrays in order to more accurately determine the presence/absence of coast horned lizard.

ii. Live Oak Creek - Covered Plant Species

GLA timed a biological monitoring visit in Spring 2019 to coincide with the blooming period of intermediate mariposa lily. GLA did not detect new populations of intermediate mariposa lily.

1. Recommendations

Continue to monitor known populations of intermediate mariposa lily during spring blooming periods in order to detect potential trends in population growth or decline. Document additional locations in the Preserve not previously documented.

iii. Live Oak Creek - Non-Covered Sensitive Wildlife Species

GLA did not detect non-covered sensitive wildlife species while performing biological monitoring.

1. Recommendations

GLA has no recommendations pertaining to non-covered sensitive wildlife species, other than that the detection of non-covered sensitive species will be documented during ongoing biological monitoring, and the locations of species will be added to the GIS database as is applicable based on the species detected.

iv. Live Oak Creek - Non-Covered Sensitive Plant Species

GLA did not detect non-covered sensitive plant species while performing biological monitoring.

1. **Recommendations**

   GLA has no recommendations pertaining to non-covered sensitive plant species, other than that the detection of non-covered sensitive species will be documented during ongoing biological monitoring, and the locations of species will be added to the GIS database as is applicable based on the species detected.

v. Live Oak Creek - Wildlife Cameras

GLA established two wildlife camera stations (A and B) on the Preserve in 2018. Both are located adjacent to the main access road. Wildlife detected by the cameras included deer, coyote, bobcat, and gray fox. In addition, the cameras on separate occasions detected an individual trespassing through the Preserve at night and two hikers during the day on multiple occasions walking up and then down the road.

Through coordination with OCTA, GLA removed the wildlife cameras in November 2019 on an interim basis due to the level of effort and costs associated with maintenance, checking the cameras, and managing the data combined with the lack of new data being collected.

1. **Recommendations**

   Since the wildlife cameras continue to provide useful data for wildlife and human use, at least some cameras should be re-installed and remain on the property as long as there is a budget to cover such monitoring.

vi. Live Oak Creek - Invasive Plant Species

GLA prepared an ISMP, which was approved by the Wildlife Agencies in 2019. In addition, GLA biologists detected and removed a clump of an invasive plant (stink net).

1. **Recommendations**

   Implement ISMP based on priorities outlined in the plan and continue to monitor for stink net.

vii. Live Oak Creek - Invasive Animal Species

GLA did not observe any animal species within the Preserve that would be classified as invasive.

1. **Recommendations**

   The property has the potential to support the brown-headed cowbird, which is a nest parasite. GLA will note the presence of the brown-headed cowbird, as detected, and will provide future recommendations to address the cowbird, if applicable.

b. Live Oak Creek - Human Environment

i. Live Oak Creek - Land Use

Public access is not currently authorized at the Live Oak Creek Preserve. GLA did not observe any new trail cuts. However, wildlife cameras detected people hiking and using mountain bikes in the Preserve on multiple locations. An individual that was detected three separate occasions after dark in November and December 2018 (documented in the previous annual monitoring report) was documented again at night in January 2019 and again during the day in April 2019.

1. Recommendations

The site will continue to be monitored to document unauthorized access and activities, including by OCTA's private security company and GLA's monitoring team. As part of GLA's efforts, the biological monitors will periodically check any evidence of habitat disturbance within the Preserve due to human activity.

As needed, implement the public education and outreach program identified in the RMP to communicate the biological values, goals, and activity restrictions within the Preserve so that management goals and guidelines will be respected and followed, as needed. Additional methods should be continued as identified in the RMP, including the encouragement of two-way communication with adjacent residents to collect and disseminate Preserve information.

The RMP notes that through regular patrols by the Preserve Manager and staff, enforcement of public access guidelines falls into two categories of offenses: minor and major infractions. Enforcement of minor infractions such as public access and excess irrigation running onto the Preserve from an adjacent property would consist of discussing the infraction with the offending party and a warning process. Major infractions may require coordination between the Preserve Manager and law enforcement.

ii. Live Oak Creek - Adjacent Land Use

No vegetation encroachments, excessive irrigation runoff from adjacent property owners, or other adjacency issues were observed.

1. Recommendations

None.

iii. Live Oak Creek - Site/Trail Use

The Preserve contains one main dirt access road that enters the Preserve off of Live Oak Canyon Road. A series of small dirt trails also exists on the Preserve. Exhibit 5 [Trails Map] depicts the location and type of each trail use. As noted above, wildlife cameras detected an individual and two hikers trespassing through the Preserve on separate occasions.

1. **Recommendations**
   GLA will continue to monitor the site to document unauthorized trail use.

c. Live Oak Creek - General Maintenance

i. Live Oak Creek - Fencing/Signage/Gates

Fencing, signage and gates are in good condition. Monitoring focused on reviewing the perimeter fence and generally no issues were found. The Preserve RMP refers to a section of chain link fencing that demarcates the boundary between the Preserve and an adjoining property (19071 Live Oak Canyon Road). The RMP states that a portion of the fence that crosses a drainage feature may be altering the natural function of the waterway. In 2018, GLA reviewed this area of fencing with OCTA, as well as internal fencing recommended for removal, and provided the GPS location to OCTA. The RMP recommends to further coordinate with the adjoining landowner to identify alternate solutions that would not affect the functions of the waterway while maintaining a barrier with the adjoining property.

1. **Recommendations**
   GLA recommends ongoing coordination with the landowner at 19071 Live Oak Canyon Road regarding the section of fencing identified in the RMP. GLA also recommends the removal of the internal fencing mapped by GLA.

ii. Live Oak Creek - Trash/Dumping

No issues with trash or dumping were observed.

1. **Recommendations**
   None.

iii. Live Oak Creek - Erosion/Sedimentation

No erosion/sedimentation was observed requiring action.

1. **Recommendations**
   None.

iv. Live Oak Creek - Trees

The team arborist, Dudek, conducted invasive shot hole borer (ISHB; *Euwallacea* sp.) surveys in June and July 2017. No sign and/or symptom of ISHB was observed. Dudek conducted emergent pest trapping over a 1-month period in July 2019 to re-evaluate for the presence of ISHB, and again found no sign and/or symptom of ISHB. The report containing detailed information of this study dated January 14, 2020 is attached as Appendix E.

1. **Recommendations**
   Continue to monitor the site for signs and/or symptoms of ISHB following recommendations in Appendix E.

Eagle Ridge Preserve

a. Eagle Ridge - Plants and Wildlife

i. Eagle Ridge - Covered Wildlife Species

While performing biological monitoring, GLA generally watched for OCTA M2 Covered Species, including the western pond turtle, coastal California gnatcatcher, orangethroat whiptail, and coast horned lizard. GLA did not detect Covered Wildlife Species during biological monitoring. GLA assessed the property for pond turtle suitability on April 25, 2019 and found that the habitat potential is low due to limited hydrology and potentially other habitat factors, compounded by disturbance due to cattle. However, the site should be further investigated to determine if there are opportunities to create habitat for the pond turtle, based on the hydrology and topography of the creek.

1. Recommendations

Map incidental detections through ongoing biological monitoring. Consider the implementation of focused efforts for reptiles such as pit arrays in order to more accurately determine the presence/absence of coast horned lizard.

ii. Eagle Ridge - Covered Plant Species

GLA performed monitoring visits on April 25 and June 25, 2019, which coincided with the blooming periods of the OCTA M2 covered plant species, specifically many-stemmed dudleya, intermediate mariposa lily, and southern tarplant. GLA did not detect covered plant species during biological monitoring, although the monitoring visits did not constitute focused plant surveys. Therefore, the lack of detections of rare plants does necessarily infer absence of covered species.

1. Recommendations

Consider the implementation of a focused survey effort.

iii. Eagle Ridge - Non-Covered Sensitive Wildlife Species

GLA did not detect non-covered sensitive wildlife species while performing biological monitoring.

1. Recommendations

GLA has no recommendations pertaining to non-covered sensitive wildlife species, other than that the detection of non-covered sensitive species will be documented during ongoing biological monitoring, and the locations of species will be added to the GIS database as is applicable based on the species detected.

iv. Eagle Ridge - Non-Covered Sensitive Plant Species

GLA did not detect non-covered sensitive plant species while performing biological monitoring.

1. **Recommendations**
   GLA has no recommendations pertaining to non-covered sensitive plant species, other than that the detection of non-covered sensitive species will be documented during ongoing biological monitoring, and the locations of species will be added to the GIS database as is applicable based on the species detected.

v. Eagle Ridge - Wildlife Cameras

GLA established three wildlife camera stations in 2018, including two (A and B) within the Eagle Ridge property, and one (Station C) within State Parks land south of the Preserve. GLA coordinated with State Parks for permission to install the third camera. In 2019, GLA moved Camera A, which is now Camera D, to an area further inside the property boundary. Wildlife detected by the cameras include deer, coyote, and bobcat. The cameras have also regularly detected feral cattle using the property, as well as occasional occurrences of trespassing (mountain biking and hiking).

Under the direction of OCTA, GLA removed the wildlife cameras in October 2019 on an interim basis due to the level of effort and costs associated with maintenance, checking the cameras, and managing the data combined with the lack of new data being collected.

1. **Recommendations**
   GLA recommends re-installing cameras for tracking wildlife use and to capture images of unauthorized access throughout the Preserve as long as there is a budget to cover such monitoring.

vi. Eagle - Invasive Plant Species

GLA prepared an ISMP, which was approved by the Wildlife Agencies in 2019.

1. **Recommendations**
   Implement ISMP based on priorities outlined in the plan.

vii. Eagle Ridge - Invasive Animal Species

GLA did not observe any animal species within the Preserve that would be classified as invasive.

1. **Recommendations**
   The property has the potential to support the brown-headed cowbird, which is a nest parasite. GLA will note the presence of the brown-headed cowbird, as detected, and will provide future recommendations to address the cowbird, if applicable.

b. Eagle Ridge - Human Environment

i. Eagle Ridge - Land Use

Public access is not currently authorized at the Eagle Ridge Preserve. GLA did not observe any new trail cuts. However, the wildlife cameras have detected multiple occurrences of unauthorized access, including mountain biking, hiking including with dogs, and horseback riding. The cameras documented that the individuals on horseback appeared to be intentionally covering the cameras (with bandanas) to hide their faces. In addition, feral cattle are heavily using the property, and have been detected by GLA biologists in the field, as well as by the wildlife cameras. Approximately 12 to 13 cows have been observed at one time, including both adults and calves.

1. Recommendations

The site will continue to be monitored to document unauthorized access and activities by GLA's monitoring team. As part of GLA's efforts, the biological monitors will periodically check any evidence of habitat disturbance within the Preserve due to human activity. As applicable, wildlife camera photos will also be reviewed for this purpose.

As needed, implement the public education and outreach program identified in the RMP to communicate the biological values, goals, and activity restrictions within the Preserve so that management goals and guidelines will be respected and followed, as needed. Additional methods should be continued as identified in the RMP, including the encouragement of two-way communication with adjacent residents to collect and disseminate Preserve information.

The RMP notes that through regular patrols by the Preserve Manager and staff, enforcement of public access guidelines falls into two categories of offenses: minor and major infractions. Enforcement of minor infractions such as public access and excess irrigation running onto the Preserve from an adjacent property would consist of discussing the infraction with the offending party and a warning process. Major infractions may require coordination between the Preserve Manager and law enforcement.

The cattle should be removed from the property as soon as possible, since the cows are heavily degrading portions of the site through grazing, trampling, and manure. OCTA has been working with Chino Hills State Park to identify where the cattle are accessing the Preserve and how to safely remove them.

ii. Eagle Ridge - Adjacent Land Use

No vegetation encroachments, excessive irrigation runoff from adjacent property owners, or other adjacency issues were observed.

1. **Recommendations**
   None.

iii. **Eagle Ridge - Site/Trail Use**
The western portion of the Preserve contains a primary ridge road that is accessible from Carbon Canyon Road, as well as a trail in the bottom of the main canyon in the middle of the Preserve. Multiple occurrences of unauthorized use have been documented through the wildlife cameras, including mountain biking, hiking, and equestrian use.

1. **Recommendations**
   GLA will continue to monitor the site to document unauthorized use.

c. Eagle Ridge - General Maintenance

i. **Eagle Ridge - Fencing/Signage/Gates**
GLA did not observe any fence, sign, or gate maintenance issues.

1. **Recommendations**
   GLA will continue to monitor the site to document fencing, signage and gate issues.

ii. **Eagle Ridge - Trash/Dumping**
No issues with trash or dumping were observed.

1. **Recommendations**
   None.

iii. **Eagle Ridge - Erosion/Sedimentation**
No issues with erosion or sedimentation were noted on the Preserve.

1. **Recommendations**
   None.

iv. **Eagle Ridge - Trees**
No issues with trees were observed.

1. **Recommendations**
   None.

C. GIS Data

Included in this report submittal to OCTA is the comprehensive GIS dataset for the Preserves, which contains all biological monitoring data collected to date for the Preserves by any contractor, updated as appropriate.

D. CNDDB Submittals

GLA will submit CNDDB records for sensitive species detected during biological monitoring, including new detections of covered species.

IV. MANAGEMENT RECOMMENDATIONS

A summary of management recommendations for the ongoing management of resources at the M2 Preserves is provided below. General summaries of management recommendations applicable to all Preserves are included first, with management recommendations specific to each Preserve following. Adaptive management strategies related to public access and wildlife activity (i.e. covered animals), covered plants and vegetation management, and trails revegetation and/or decommissioning have been included to improve future management actions.

A. Covered Species

For covered plant species, continue to map incidental detections through ongoing biological monitoring, including the mapping of species in new locations, or confirming presence in locations of previous detections. Monitoring should include areas of documented mariposa lily and suitable habitat along access roads where maintenance occurs, to confirm that the maintenance activities are not adversely affecting mariposa lily populations. As part of adaptive management strategies, monitoring efforts for covered plants should be increased during good rainfall years. For covered animal species, incidental detections of cactus wren and/or coastal California gnatcatcher are effective for monitoring of those species in conjunction with periodic focused surveys to update baseline studies. However, incidental detections for the covered reptiles (orangethroat whiptail and coast horned lizard) and mammals (bobcat and mountain lion) are unpredictable, and oftentimes rare. Monitoring of the mammals are best achieved through the ongoing use of wildlife cameras (as discussed below), supplemented by the detection of tracks and/or scat during general monitoring. Regarding the reptiles, incidental detections note general presence, but are not effective in determining population size, or confirming presence for low-density populations. Focused survey efforts for reptiles, i.e. the installation and use of pit arrays should be considered. As applicable, analyze data in order to detect potential trends in population growth or decline. Non-covered sensitive species detected during general monitoring should be added to the GIS database as is applicable based on the species detected.

B. Wildlife Cameras

Wildlife cameras in general have the potential to be a valuable tool in tracking wildlife use and abundance throughout the Preserves, as well to provide a potential secondary benefit of documenting unauthorized human uses. Specific recommendations for each Preserve in regards to wildlife cameras are provided below. Where cameras are present, as part of adaptive management strategies, photographs should be reviewed regularly to determine whether cameras should be moved to provide better or additional data.

C. Unauthorized Access

The Preserves will continue to be monitored to document unauthorized access and activities, including by OCTA's private security company, the Orange County Sheriff Department's mounted unit, and GLA's

monitoring team. Where present, perimeter fencing will be checked periodically. As part of adaptive management strategies, the frequency of this monitoring will be adjusted as needed based on information collected during other monitoring visits, such as presence of trash, new trails, or vegetation encroachments. Also as part of adaptive management strategies, signage, fencing, placement of cactus, or other means may be recommended in areas where unauthorized access is occurring to help deter the public from entering the Preserve or sensitive areas (if public access is allowed).

Since the Pacific Horizon Preserve is open for public access, and the Silverado Chaparral Preserve may be accessed for scheduled/managed events with OC Parks, both present challenges for monitoring authorized versus unauthorized activities. The public education and outreach program for Trabuco Rose, Pacific Horizon, and Wren's View Preserves are in part intended to communicate the importance of self-monitoring in reinforcing the value and purpose of the Preserve. GLA recommends that the public use restrictions be reinforced as frequently as necessary during the various public outreach events at those three properties.

The RMPs note that through regular patrols by the Preserve Manager and staff, enforcement of public access guidelines falls into two categories of offenses: minor and major infractions. Enforcement of minor infractions such as hiking on closed trails and bringing dogs into the Preserves would consist of discussing the infraction with the offending party and a warning process. Major infractions may require coordination between the Preserve Manager and law enforcement.

D. General Maintenance

Maintenance should be performed as needed and as applicable to fencing, gates, and roads/trails at each of the Preserves, including checking for slacked wire that may pose an entanglement threat to wildlife. Remnant barbed wire fencing should be removed, as recommended. GLA will identify future maintenance concerns as part of ongoing monitoring. As part of adaptive management strategies, GLA recommends conducting Preserve monitoring visits after heavy rainfall events to inspect for erosion and sedimentation.

Trail/road erosion should be repaired and/or controlled, as needed. GLA will continue to monitor the Preserves for erosion effects and will report any issues to OCTA.

Trees within the Preserves should continue to be monitored for signs of infestation. GLA will continue to coordinate with OCTA regarding GSOB and ISHB and will consult with GLA's team arborist as needed for recommendations to monitor trees within the Preserves, and to track/control any documented infestations.

Trabuco Rose Preserve

The Trabuco Rose Preserve has the potential to support many-stemmed dudleya, so continue to monitor the site during the blooming period for the species to determine presence. Consider comprehensive survey efforts for dudleya in order to confidently determine presence/absence. Continue the monitoring of intermediate mariposa lily populations. Monitoring should include areas of documented mariposa lily and suitable habitat along access roads where maintenance occurs, to confirm that the maintenance activities are not adversely affecting mariposa lily populations. As part of adaptive management strategies, GLA recommends increasing monitoring efforts for intermediate mariposa lily and many-stemmed dudleya when good rainfall occurs and will continue to survey areas within the Preserve with the greatest potential to support the dudleya as a function of both soil suitability and topography.

The cactus wren was detected at the Preserve during past baseline studies/monitoring and was also detected incidentally in one location during biological monitoring in 2019 coinciding with a prior detection. Suitable cactus scrub should be inspected during ongoing monitoring to check for the presence of cactus wren. The coastal California gnatcatcher was not detected at the Preserve in 2019, although the gnatcatcher was detected during previous biological monitoring and during baseline surveys. Areas of suitable coastal sage scrub should be inspected at least annually during the peak breeding season (April to June) and any incidental detections should be noted.

Neither the orangethroat whiptail nor the coast horned lizard has been detected at the Preserve, although suitable habitat is present for both species. Ongoing monitoring should note any incidental detections of either species. However, surveying for reptiles in this manner is not effective in determining population size, or confirming presence for low-density populations. Focused survey efforts for reptiles, i.e. the installation and use of pit arrays should be considered.

Mountain lion and bobcat usage at the Preserve has been well-documented via wildlife cameras, as well as tracks, scat, and direct observation. Since the wildlife cameras continue to provide useful data for wildlife use, especially for mountain lions, at least some cameras should be re-installed and remain on the property as long as there is a budget to cover such monitoring.

Implementation of the ISMP is ongoing. RECON conducted initial treatment of the Priority 1 invasive species and some of the Priority 2 invasive species in fall 2018. RECON conducted follow-up treatment in spring 2019. The primary invasive species that was retreated was artichoke thistle/cardoon. For pampas grass, initial treatments were very effective as there were only a few plants with limited green growth observed this spring. No retreatment of salt cedar was necessary. Continue to implement the ISMP, including monitoring areas that have been treated.

The cameras at Station A and J detected numerous trespassers, including hikers and people on mountain bikes. Each of these incidences were documented and OCTA was notified. In addition, a woman was observed by GLA monitors with plants in her hand. The site will continue to be monitored to document unauthorized access and activities, including by OCTA's private security company and GLA's monitoring team. Since the wildlife cameras continue to provide useful data for human use, at least some cameras should be re-installed and remain on the property as long as there is a budget to cover such monitoring.

GLA will continue to monitor the decommissioned trails until they have passively revegetated. GLA will continue to monitor the site for erosion effects and will report any changes to OCTA.GLA did not identify any maintenance needs related to existing fencing, signage, or gates, but will continue to monitor for any issues.

The observation of ISHB signs and symptoms within the interior of Trabuco Rose Preserve is significant due to the risk presented to the adjacent California sycamore tree population. However, all eight of the trees exhibited low to moderate signs of ISHB. Furthermore, observed levels of ISHB within the Preserve was consistent with the 2018 survey, and no new occurrences of ISHB were observed. Chemical treatment and ongoing monitoring is recommended as detailed above and in Appendix E.

Pacific Horizon Preserve

The Pacific Horizon Preserve is the only Preserve where many-stemmed dudleya has been detected. Since the property contains more suitable habitat where dudleya has not been detected, continue to monitor the site to determine if the existing populations are larger than currently mapped, and/or to identify any currently unknown populations. Continue the monitoring of intermediate mariposa lily populations. As part of adaptive management strategies, GLA recommends increasing monitoring efforts for many-stemmed dudleya and intermediate mariposa lily when good rainfall occurs and for many-stemmed dudleya, GLA will continue to survey areas within the Preserve with the greatest potential to support the dudleya as a function of both soil suitability and topography.

The cactus wren has not been previously observed at the Preserve; however, the Preserve contains some limited suitable habitat for the species. Ongoing monitoring should inspect cactus scrub each season to note any detections of cactus wren. Although the site contains limited habitat for the coastal California gnatcatcher, a gnatcatcher has been detected in multiple years near the western boundary. A gnatcatcher was also detected in 2019 in the northern portion of the property. These areas should be inspected annually to note any incidental gnatcatcher detections.

Neither the orangethroat whiptail nor the coast horned lizard has been detected at the Preserve, although suitable habitat is present for both species. Ongoing monitoring should note any incidental detections of either species. However, surveying for reptiles in this manner is not effective in determining population size, or confirming presence for low-density populations. Focused survey efforts for reptiles, i.e. the installation and use of pit arrays should be considered.

The Preserve is likely utilized by bobcats, though none have been incidentally detected at the site during baselines studies or subsequent monitoring. However, the Preserve is not expected to be utilized by mountain lions due to its location. Wildlife cameras will assist in the detection of any bobcats at the Preserve.

Invasive species are present on the Preserve. GLA recommends that OCTA implement the approved ISMP based on priorities outlined in the plan.

Monitoring visits have confirmed that public access is occurring at the Pacific Horizon Preserve. To better understand the level of access GLA has recommended the placement of cameras. The cameras will also help document wildlife species and movement on the site.

Due to the public-use trail in the northern portion of the Preserve, the monitoring of authorized versus unauthorized uses along the trail is challenging. As discussed above, the RMP states that two existing trail access points at the northern boundary are proposed to be decommissioned in the future through further coordination between OCTA, OC Parks and the CCC, which was coordinated during processing of the CDP. However, since the trail segment[2] to be decommissioned extends through an area supporting both many-stemmed dudleya and intermediate mariposa lily, as part of adaptive management strategies GLA recommends implementing the DLRP as soon as possible in order to close the trails. Restoration in progress signage will be installed along the decommissioned trail to focus the public on the trails allowed for access.

[2] Note that the two additional access points referenced by the RMP represent just one pedestrian access to a single side trail that splits from the Linkage Trail north of the Preserve boundary. The second "access" point consists of a disturbed area where mountain bikers have been accessing the site and does not really represent a trail access.

The southern Preserve boundary with The Ranch will be monitored for unauthorized activities, including maintenance crews associated with the golf course.

Several areas of the trail have been modified for unauthorized mountain bike use. GLA documented several areas of trail modification and provided the information to OCTA. OCTA received authorization from the CCC to repair trail modifications for an additional five years. GLA recommends implementing the DLRP and continuing monitoring and reporting focused on these unauthorized activities.

GLA recommends the replacement of old barbed wire with three-strand smooth wire fencing along the northern Preserve boundary as it is in disrepair and may pose as a liability. This activity is included in the DLRP. As part of adaptive management strategies, trails should be inspected for erosion after large storm events. GLA will continue to note future maintenance needs during ongoing monitoring.

There are currently no recommendations regarding trees at Pacific Horizon Preserve.

Bobcat Ridge Preserve

GLA documented intermediate mariposa lily throughout the Preserve, including locations of the mariposa lily that had been documented during previous baseline surveys and/or monitoring, and multiple occurrences that had not been previously documented totaling approximately 55 individuals. GLA recommends monitoring known populations of intermediate mariposa lily during blooming periods to detect potential trends in population growth or decline. As part of adaptive management strategies, the monitoring of known populations of intermediate mariposa lily should include additional focus on the area of disturbance along the southern boundary to determine the potential extent of impact due to the disturbance. In addition, the Preserve has the potential to support many-stemmed dudleya, so continue to monitor the site during the blooming period for the species to determine presence. Consider comprehensive survey efforts for dudleya in order to confidently determine presence/absence. As part of adaptive management strategies, GLA recommends increasing monitoring efforts for intermediate mariposa lily and many-stemmed dudleya when good rainfall occurs and will continue to survey areas within the Preserve with the greatest potential to support the dudleya as a function of both soil suitability and topography.

The cactus wren was detected at the Preserve during past baseline studies/monitoring and was also detected during biological monitoring in 2020. GLA biologists detected a pair of cactus wren during a monitoring visit and heard cactus wren on a separate visit. Suitable cactus scrub should be inspected during ongoing monitoring to check for the presence of cactus wren. The coastal California gnatcatcher has not been previously detected at the Preserve, although the site does contain suitable habitat for the gnatcatcher. Ongoing monitoring should include a general review for gnatcatcher, and any incidental detections should be noted.

Neither the orangethroat whiptail nor the coast horned lizard has been detected at the Preserve, although suitable habitat is present for both species. Ongoing monitoring should note any incidental detections of either species. However, surveying for reptiles in this manner is not effective in determining population size, or confirming presence for low-density populations. Focused survey efforts for reptiles, i.e. the installation and use of pit arrays should be considered.

The Preserve is likely utilized by bobcat and mountain lion, although neither have been detected during baseline surveys/monitoring. Wildlife cameras were installed in July 2019 to assist in the detection of both species at the Preserve.

GLA biologists detected and removed a clump of stink net located adjacent to the Preserve boundary. Other invasive species are present on the Preserve. GLA recommends that OCTA implement the approved ISMP based on priorities outlined in the plan and to continue to monitor for stink net.

As noted above, two wildlife cameras were installed in 2019. Deer and fox were identified on the cameras. GLA recommends the continued use for tracking wildlife use, as well as for the secondary benefit of noting unauthorized activities.

As discussed in Section 3.1 of the RMP, public access is prohibited at the Bobcat Ridge Preserve. The Preserve has one north-south trail for access along the main ridge traversing the middle of the Preserve, with rural residential areas located to the north and south. The presence of private property on both the north and south establishes a definite need to monitor unauthorized access and activities within the Preserve. Monitoring is particularly critical along the southern boundary where the adjacent landowner created access during or before January 2017 and re-disturbed in November 2017 and May or June 2019, resulting in ongoing habitat disturbance within the Preserve. GLA biologists reviewed the encroachment area again on November 4, 2019 and it appeared that no further disturbance had taken place and the area had likely rebounded to the condition in Spring 2019. As part of adaptive management strategies, this area will continue to be monitored closely for recovery. The RMP also notes an unauthorized trail adjacent to the Preserve that was documented in 2014. The Preserve will continue to be monitored for unauthorized activities, including utilizing the wildlife cameras for this purpose.

GLA did not identify any maintenance needs related to existing fencing. Two new signs were installed by RECON under GLA supervision. One older sign had faded and GLA recommended replacement to OCTA.

No sign and/or symptom of ISHB was observed during surveys or emergent pest trapping in 2019. However, ongoing monitoring is recommended since it is at the early stages that any outbreak/infestation can be controlled.

Silverado Chaparral Preserve

The Silverado Chaparral Preserve has the potential to support many-stemmed dudleya, so continue to monitor the site during the blooming period for the species to determine presence. Consider comprehensive survey efforts for dudleya in order to confidently determine presence/absence. Continue the monitoring of intermediate mariposa lily populations. As part of adaptive management strategies, GLA recommends increasing monitoring efforts for intermediate mariposa lily and many-stemmed dudleya when good rainfall occurs and will continue to survey areas within the Preserve with the greatest potential to support the dudleya as a function of both soil suitability and topography.

The cactus wren is not expected to occur at the Preserve due to the general lack of suitable habitat. A small amount of cactus scrub was noted in the southwestern portion of the site during the last monitoring cycle, and future monitoring should include that area at least annually to inspect for cactus wren. The coastal California gnatcatcher has not been previously detected at the Preserve and is also not expected to occur

due to the general lack of suitable habitat. However, any gnatcatchers incidentally detected at the site during ongoing monitoring would be noted.

The coast horned lizard has been detected at the Preserve in multiple locations during the last monitoring cycle, and during previous baseline work. GLA mapped potential invasive ant species that could represent a threat to coast horned lizards, as well as other native harvester ant colonies. Eradication of invasive ant species would be achieved through chemical treatment, if it were determined that extent of invasive ants warranted treatment. However, the site would need to be studied to know the full extent of invasive ant colonies to determine the efficacy of treatment. The orangethroat whiptail was not detected during the last monitoring cycle but was detected in the past at one location. Ongoing monitoring should note any incidental detections of either species. However, surveying for reptiles in this manner is not effective in determining population size, or confirming presence for low-density populations. Focused survey efforts for reptiles, i.e. the installation and use of pit arrays should be considered.

GLA detected bobcat at the Preserve via wildlife cameras. The Preserve is likely utilized by mountain lion, and was detected via tracks during past visits by OCTA and OC Parks staff. Future wildlife cameras use at the Preserve will assist in the detection of both species at the Preserve.

Invasive species are present on the Preserve. GLA recommends that OCTA implement the approved ISMP based on priorities outlined in the plan.

As noted above, two wildlife cameras were installed in 2019. Wildlife cameras detected deer and bobcat. Cameras also detected unauthorized people on the Preserve including a man, a woman hiking with several dogs, and another hiker with two dogs. One camera was stolen approximately one month after installation. Through coordination with OCTA, GLA removed the remaining wildlife camera on an interim basis in September 2019 due to the theft risk as well as reducing the effort through the winter months to save funding for spring monitoring. The Preserve is large in size with multiple trails extending through both ridgelines and canyons, providing considerable opportunity for camera use; however, as noted above, posts are necessary to secure the cameras. As such, GLA recommends re-installing wildlife cameras for tracking wildlife use and to capture images of unauthorized access throughout the Preserve. Note that GLA recommends increased security for the cameras such as cemented poles and boxes.

Open public access is not currently authorized at the Silverado Chaparral Preserve. As part of GLA's efforts, the biological monitors will periodically check any evidence of habitat disturbance within the Preserve due to human activity. During monitoring visits, GLA documented and mapped the locations of unauthorized encroachment and habitat disturbance in the form of active trail improvements associated with unauthorized mountain bike activity at the Preserve and notified OCTA. OCTA, OC Parks, Recon, Irvine Ranch Conservancy, and OCTA's private security company met onsite to review the severity of encroachment, and to identify locations for the installation of additional fencing, signage, and trail cameras; as well as to review access and routes for regular security patrols by OCTA's private security company and OC Parks law enforcement staff. GLA also documented several cairns and a beer can. As noted above, wildlife cameras detected unauthorized people on the Preserve. Additional fencing with signage was installed to block access to newly cut trails and demarcate property boundaries. The site will continue to be monitored to document unauthorized access and activities, including by OCTA's private security company and GLA's monitoring team. As part of adaptive management, GLA will recommend future camera locations and fencing/signage needs to address mountain bike use.

Due to the unauthorized trail use, revegetation assessment of trails has not been conducted. For the trails to revegetate, the unauthorized use will need to cease. As part of adaptive management strategies, GLA will continue to assist OCTA with OC Parks and Irvine Ranch Conservancy coordination to deter unauthorized access and restore the mountain biking disturbed areas. GLA will continue to monitor the trail use and any vegetation changes on the trails (or new trails) within the Preserve.

Due the relative remoteness of the Silverado Chaparral Preserve and the observation of unauthorized activities related to mountain bike use, ongoing monitoring is critical. Public outreach is recommended to educate the public regarding allowable and unauthorized uses. OCTA and Irvine Ranch Conservancy have begun discussions to plan guided tours that would occur on the OCTA Preserve.

GLA did not identify any maintenance needs related to existing signs or fencing and will note any future maintenance needs during ongoing monitoring.

No issues with trees were observed. There are currently no recommendations regarding trees at Silverado Chaparral Preserve.

Wren's View Preserve

The Wren's View Preserve has the potential to support many-stemmed dudleya. It is recommended to continue to monitor the site during the blooming period for the species to determine presence. Consider comprehensive survey efforts for dudleya in order to confidently determine presence/absence. GLA observed some disturbance to no more than ten intermediate mariposa lily as a result of maintenance of the main road going up to the gate, some of which were actually in the road and others which were immediately adjacent to the road. The disturbance did not appear to be an issue with overzealous trimming or plant misidentification. As part of adaptive management strategies, if road maintenance is necessary when intermediate mariposa lily is present, schedule biological monitors to flag the plants so that individuals can be seen more easily for avoidance and consider biological monitoring during work activities, especially for areas where intermediate mariposa lily is located within the road or adjacent. Continue to monitor known populations of intermediate mariposa lily during spring blooming periods in order to detect potential trends in population growth or decline. As part of adaptive management strategies, GLA recommends increasing monitoring efforts for intermediate mariposa lily and many-stemmed dudleya when good rainfall occurs.

Ongoing monitoring of the Preserve will continue to include general inspections for the cactus wren and the coastal California gnatcatcher. The locations where cactus wrens were detected during the last monitoring cycle should be reviewed at least annually to determine current status, and additional cactus scrub with the potential for the cactus wren should also be monitored. Although the gnatcatcher was not observed during the previous monitoring cycle, areas of suitable coastal sage scrub should be inspected at least annually during the peak breeding season (April to June) and any incidental detections should be noted.

The orangethroat whiptail was detected at the Preserve in multiple locations during previous monitoring visits and during the baseline work. Although the coast horned lizard has not been previously detected at the Preserve, the site has the potential to support the species. Ongoing monitoring should include inspection of the site for coast horned lizard. Incidental detections should continue to be noted for the orange throat whiptail. However, surveying for reptiles in this manner is not effective in determining population size, or

confirming presence for low-density populations. Focused survey efforts for reptiles, i.e. the installation and use of pit arrays should be considered.

Bobcat scat and mountain lion tracks were observed by GLA at the Preserve. Both species were also previously documented by OC Parks as utilizing the site. Three wildlife cameras were installed at the Preserve in 2018 and discontinued in October 2019. Mountain lion and bobcat were identified on the wildlife cameras, as were coyote, fox, and deer. Continued monitoring is recommended.

The Wren's View Preserve has the potential for ongoing unauthorized public access, although no recent human encroachment has been observed resulting in habitat disturbance and no unauthorized trail use was documented by GLA. The site will continue to be monitored to document unauthorized access and activities, including by OCTA's private security company and GLA's monitoring team. As part of GLA's efforts, the biological monitors will periodically check any evidence of habitat disturbance within the Preserve due to human activity. As noted above, GLA recommends re-installing three wildlife cameras at the Preserve that may also provide the secondary benefit of documenting unauthorized activities. Future monitoring will continue to include perimeter fencing where encroachment potential exists. In general, the site will continue to be monitored for trespassing through the property.

GLA noted a fallen tree on a perimeter barbed-wire fence and a downed internal chain link fence along a road within the Preserve and provided the GPS locations to OCTA. Recommend repairing the perimeter barbed-wire fence damaged by the fallen tree to prevent unauthorized entry into the Preserve. Repair or remove the downed internal chain link fence to avoid wildlife entanglement. Internal barbed wire fencing has been mapped and is recommended for removal as it is non-functional and may pose a risk to wildlife. Through collaboration with TCA, the western edge of the property should continue to be assessed for potential fencing modifications to support wildlife movement. In addition, there is a segment of pre-existing chain link fencing that is also recommended to be replaced with smooth wire fencing to support wildlife movement. GLA will continue to note future maintenance needs during ongoing monitoring.

Erosion was noted in the main access road up from the Trabuco Canyon Road entrance and was reported to OCTA. Erosion has been previously documented and repaired on this road and is an ongoing issue. Erosion was also noted in the road/trail located in the central-northern portion of the Preserve; however, since this road is not used for primary access, repair of the road/trail is not recommended at this time. As part of adaptive management strategies, trails should be inspected for erosion after large storm events. GLA will continue to note future maintenance needs during ongoing monitoring.

The observation of ISHB signs and symptoms within the interior of Wren's View Preserve is significant due to the risk presented to the adjacent California sycamore tree population. However, only one tree (Tree No. 17) was found to exhibit high levels of ISHB, while the remaining 12 trees exhibited low to moderate signs of ISHB. Furthermore, observed levels of ISHB within the Preserve were consistent with the 2018 survey, and no new occurrences of ISHB were observed. Chemical treatment, removal of Tree No. 17 and ongoing monitoring is recommended as detailed above in and in Appendix E.

The observation of GSOB within the Wren's View Preserve is the first such recorded observation in Trabuco Canyon, California, and as such is considered a threat to the canyon's oak tree resources. The total extent of GSOB within the canyon is unknown. However, based on the 2019 surveys conducted within the Preserve, the infestation is suspected to be at the early stages and, as such, may be controllable. Development of a comprehensive GSOB treatment plan, including chemical treatment, is recommended. In addition to treating

and managing the outbreak in Wren's View, it is recommended that OCTA work with adjacent landowners, as feasible, to identify and manage GSOB. Ongoing monitoring is recommended. Details regarding recommendations for GSOB at Wren's View is in Appendix E.

Live Oak Creek Preserve

The Live Oak Creek Preserve has the potential to support many-stemmed dudleya, so continue to monitor the site during the blooming period for the species to determine presence. Consider comprehensive survey efforts for dudleya in order to confidently determine presence/absence. Continue the monitoring of intermediate mariposa lily populations. As part of adaptive management strategies, GLA recommends increasing monitoring efforts for intermediate mariposa lily and many-stemmed dudleya when good rainfall occurs.

Ongoing monitoring of the Preserve will continue to include general inspections for the cactus wren and the coastal California gnatcatcher. Cactus wrens were not detected during the 2019 monitoring cycle. The locations where cactus wrens were previously detected should be reviewed at least annually to determine current status, and additional cactus scrub with the potential for the cactus wren should also be monitored. Although the gnatcatcher was not observed during the previous monitoring cycle, areas of suitable coastal sage scrub should be inspected at least annually during the peak breeding season (April to June) and any incidental detections should be noted.

Neither the orangethroat whiptail nor the coast horned lizard have been previously detected at the Preserve, although the site has the potential to support the species. Ongoing monitoring should include inspection of the site for both species. However, surveying for reptiles in this manner is not effective in determining population size, or confirming presence for low-density populations. Focused survey efforts for reptiles, i.e. the installation and use of pit arrays should be considered.

Bobcat was detected at the Preserve using wildlife cameras. Wildlife cameras were installed at the Preserve in 2018 and discontinued in November 2019. Since the wildlife cameras continue to provide useful data for wildlife use, at least some cameras should be re-installed and remain on the property for tracking mountain lion and bobcat use as long as there is a budget to cover such monitoring

Invasive species are present on the Preserve as outlined in the ISMP. In addition, GLA biologists detected and removed a clump of stink net within the Preserve. GLA recommends that OCTA implement the approved ISMP based on priorities outlined in the plan and to continue to monitor for stink net. GLA recommends that OCTA implement the approved ISMP based on priorities outlined in the plan.

The team arborist initially conducted invasive shot hole borer (ISHB; *Euwallacea* sp.) surveys in June and July 2017. No sign and/or symptom of ISHB was observed. Emergent pest trapping was conducted over a 1-month period in July 2019 to re-evaluate for the presence of ISHB, and again no sign and/or symptom of ISHB was found. Monitoring for signs and/or symptoms of ISHB should continue as outlined in Appendix E.

Wildlife cameras detected an individual trespassing through the Preserve at night and two hikers during the day on multiple occasions walking up and then down the road. Wildlife cameras were installed at the Preserve in 2018 and discontinued on an interim basis in November 2019. Since the wildlife cameras continue to provide useful data for tracking unauthorized access, at least some cameras should be re-installed and

remain on the property as long as there is a budget to cover such monitoring. The Preserve will continue to be monitored for unauthorized activities, including where the Preserve is adjacent to rural residential properties to the west and east.

No specific issues were identified at the Preserve requiring future maintenance. The Preserve RMP refers to a section of chain link fencing that demarcates the boundary between the Preserve and an adjoining property (19071 Live Oak Canyon Road). The RMP states that a portion of the fence that crosses a drainage feature may be altering the natural function of the waterway. The RMP recommends to further coordinate with the adjoining landowner to identify alternate solutions that would not affect the functions of the waterway while maintaining a barrier with the adjoining property. GLA recommends ongoing coordination with the landowner at 19071 Live Oak Canyon Road regarding the section of fencing identified in the RMP. GLA also recommends the removal of the internal fencing mapped by GLA. GLA will note future maintenance needs during ongoing monitoring.

No sign and/or symptom of ISHB was observed during surveys or emergent pest trapping in 2019. However, ongoing monitoring is recommended since it is at the early stages that any outbreak/infestation can be controlled.

Eagle Ridge Preserve

The Eagle Ridge Preserve has the potential to support intermediate mariposa lily, many-stemmed dudleya, and southern tarplant. It is recommended to continue to monitor the site during the blooming period for the species to determine presence. Consider comprehensive survey efforts for these species in order to confidently determine presence/absence. As part of adaptive management strategies, GLA recommends increasing monitoring efforts for covered plants when good rainfall occurs.

The Preserve is generally not expected to support the cactus wren or the coastal California gnatcatcher due to a lack of habitat, particularly the cactus wren due to the lack of cactus scrub. However, the Preserve should still be generally reviewed annually for the gnatcatcher during ongoing monitoring.

Neither the orangethroat whiptail nor the coast horned lizard have been previously detected at the Preserve, although the site has the potential to support the species. Ongoing monitoring should include inspection of the site for both species. However, surveying for reptiles in this manner is not effective in determining population size, or confirming presence for low-density populations. Focused survey efforts for reptiles, i.e. the installation and use of pit arrays should be considered.

GLA assessed the property for western pond turtle suitability on April 25, 2019 and found that the habitat potential is low due to the lack of observed suitable hydrology and potentially other habitat factors, compounded by disturbance due to cattle. However, the site should be further investigated to determine if there are opportunities to create habitat for the pond turtle, based on the hydrology and topography of the creek.

GLA established three wildlife camera stations in 2018, including two within the Eagle Ridge Preserve, and one just south of the Preserve on State Park lands. Bobcat, deer, and coyote was detected at camera stations within the Preserve in 2018, but not in 2019. Mountain lion has not been detected. The cameras were uninstalled on an interim basis in October 2019. Since the wildlife cameras continue to provide useful

data for wildlife use, at least some cameras should be re-installed and remain on the property for tracking mountain lion and bobcat use as long as there is a budget to cover such monitoring

Invasive species are present on the Preserve. GLA recommends that OCTA implement the approved ISMP based on priorities outlined in the plan once the cattle are removed from the property.

Wildlife cameras have documented multiple occurrences of unauthorized mountain biking, hiking, and equestrian use. In addition, cattle are currently on the Preserve causing on-going impacts. The cattle should be removed from the property as soon as possible, since the cows are heavily degrading portions of the site through grazing, trampling, and manure. The Preserve will continue to be monitored for unauthorized activities. As part of GLA's efforts, the biological monitors will periodically check any evidence of habitat disturbance within the Preserve due to human activity. Since the wildlife cameras continue to provide useful data for tracking unauthorized access, at least some cameras should be re-installed and remain on the property as long as there is a budget to cover such monitoring. As part of adaptive management strategies, cameras will be moved around once re-installed to best capture unauthorized access.

GLA did not observe any maintenance needs at the Preserve. GLA will note future maintenance needs during ongoing monitoring.

No issues with trees were observed. There are currently no recommendations regarding trees at Eagle Ridge Preserve.

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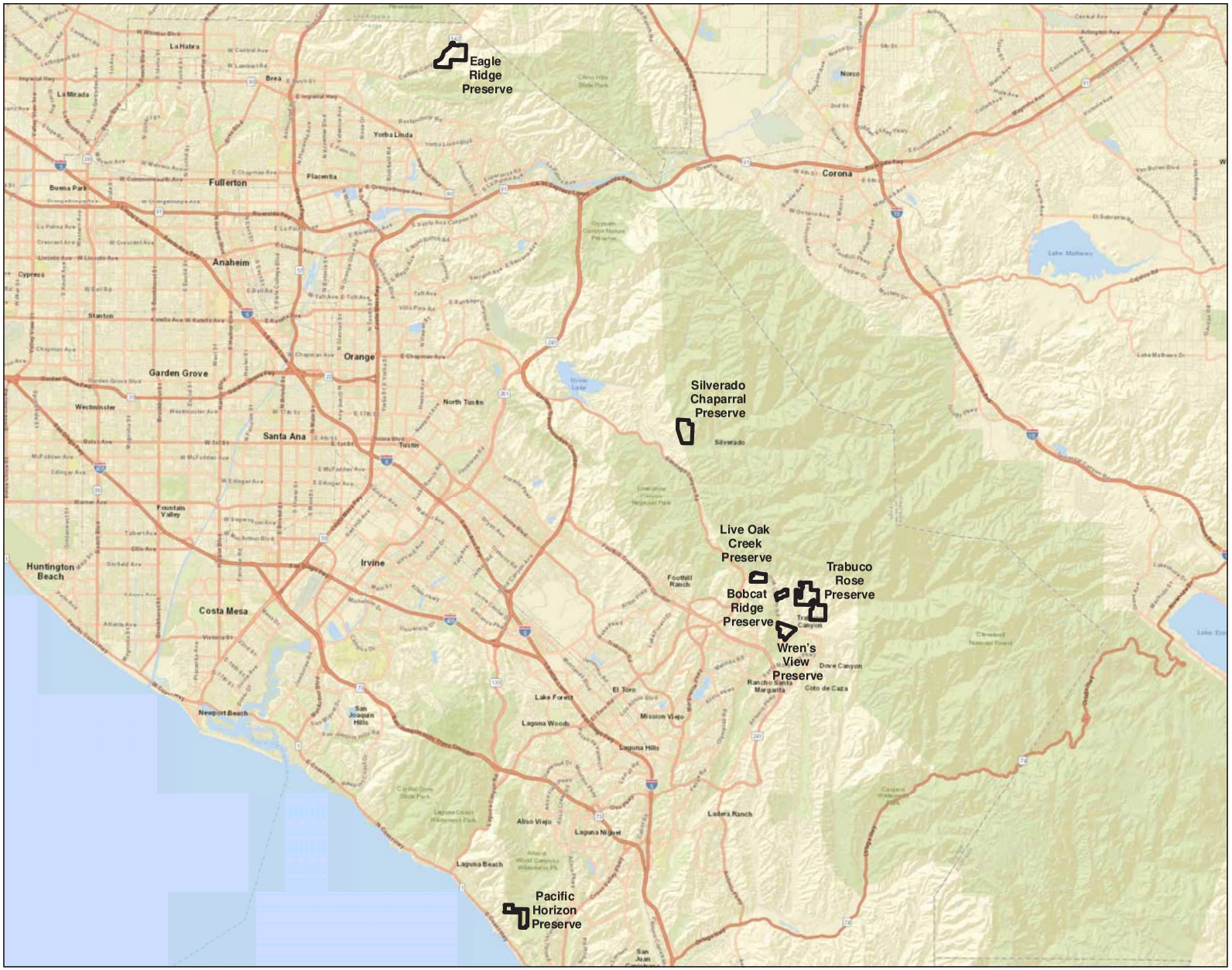

OCTA Preserve Boundaries

N

0 1.5 3 6

Miles

1 inch = 3 miles

OCTA PRESERVES

Location Map

GLENN LUKOS ASSOCIATES

Exhibit 1

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TRABUCO ROSE PRESERVE

Monitoring Photos

GLENN LUKOS ASSOCIATES

Exhibit 2A1

Photograph 1: View from Permanent Photo Station #1. Photo taken December 13, 2020.

Photograph 2: View from Permanent Photo Station #1. Photo taken September 26, 2013.

Photograph 3: View from Permanent Photo Station #2. Photo taken December 13, 2020.

Photograph 4: View from Permanent Photo Station #2. Photo taken September 26, 2013.

TRABUCO ROSE PRESERVE

Monitoring Photos

GLENN LUKOS ASSOCIATES

Exhibit 2A2

Photograph 5: View from Permanent Photo Station #3. Photo taken December 13, 2020.

Photograph 6: View from Permanent Photo Station #3. Photo taken September 26, 2013.

Photograph 7: View from Permanent Photo Station #4. Photo taken December 13, 2020.

Photograph 8: View from Permanent Photo Station #4. Photo taken September 26, 2013.

Photograph 9: View from Permanent Photo Station #5. Photo taken December 13, 2020.

Photograph 10: View from Permanent Photo Station #5. Photo taken September 26, 2013.

Photograph 11: Slanted fence line observed during fence line monitoring. Photo taken January 30, 2019.

Photograph 12: View of a mountain lion from Camera Station E. Photo taken December 29, 2018.

GLENN LUKOS ASSOCIATES

Exhibit 2A3

TRABUCO ROSE PRESERVE

Monitoring Photos

Photograph 1: View of rusted barbed wire fence to be repaired. Photo taken March 14, 2019.

Photograph 2: View of mountain bike disturbance area to be restored. Photo taken March 14, 2019.

Photograph 3: View of berm created for mountain biking. Area to be restored. Photo taken March 14, 2019.

Photograph 4: View of artichoke field to be treated. Photo taken March 14, 2019.

GLENN LUKOS ASSOCIATES

Exhibit 2B

PACIFIC HORIZON PRESERVE

Monitoring Photos

Photograph 1: View of cactus wren (*Campylorhynchus brunneicapillus*) nest. Photo taken May 2, 2019.

Photograph 2: Overview of cactus wren nest location. Photo taken May 2, 2019.

Photograph 3: View of cactus wren. Photo taken May 2, 2019.

Photograph 4: View of faded sign recommended for replacement. Photo taken May 2, 2019.

GLENN LUKOS ASSOCIATES

Exhibit 2C1

BOBCAT RIDGE PRESERVE

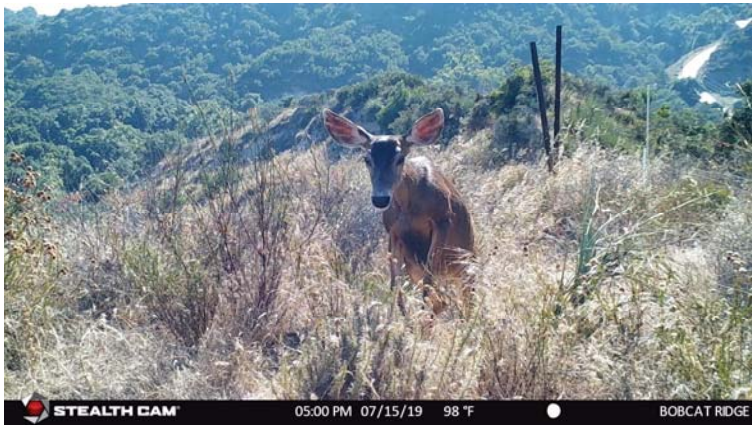
Monitoring Photos

Photograph 5: View of the unauthorized grading along the southern Preserve boundary looking east. Photo taken November 4, 2019.

Photograph 6: View of the unauthorized grading along the southern Preserve boundary looking northeast. Photo taken November 4, 2019.

GLENN LUKOS ASSOCIATES

Exhibit 2C2



Photograph 7: View of a mule deer at Camera Station A. Photo taken July 15, 2019.

Photograph 8: View of a gray fox at Camera Station A. Photo taken July 16, 2019.

BOBCAT RIDGE PRESERVE

Monitoring Photos

Photograph 1: View of unauthorized trail modification for mountain bike use. Photo taken May 2, 2019.

Photograph 2: View of intermediate mariposa lily (*Calochortus weedii* var. *intermedius*). Photo taken June 2, 2019.

Photograph 3: View of new fencing installed to prevent unauthorized access. Photo taken July 15, 2019.

Photograph 4: View of new sign installed to prevent unauthorized access. Photo taken July 15, 2019.

GLENN LUKOS ASSOCIATES

Exhibit 2D1

SILVERADO CHAPARRAL PRESERVE

Monitoring Photos

Photograph 5: View of a coast horned lizard. Photo taken June 2, 2019.

Photograph 6: View of a bobcat at Camera Station B. Photo taken May 22, 2019.

Photograph 7: View of a mule deer at Camera Station B. Photo taken July 19, 2019.

Photograph 8: View of a wood rat at Camera Station B. Photo taken May 12, 2019.

GLENN LUKOS ASSOCIATES

Exhibit 2D2

SILVERADO CHAPARRAL PRESERVE

Monitoring Photos

Photograph 1: View of downed oak tree on interior fence. Photo taken May 9, 2019.

Photograph 2: View of downed oak tree on perimeter fence. Photo taken May 9, 2019.

Photograph 3: Ongoing erosion issue leading up to main gate. Photo taken May 9, 2019.

Photograph 4: View of downed interior chain link fence. Photo taken June 14, 2019.

GLENN LUKOS ASSOCIATES

Exhibit 2E1

WRENS VIEW PRESERVE

Monitoring Photos

Photograph 5: View of intermediate mariposa lily (*Calochortus weedii* var. *intermedius*). Photo taken June 14, 2019.

Photograph 6: View of oak tree infested with Goldspotted Oak Borer, which was subsequently removed. Photo taken June 26, 2019.

Photograph 7: View of a mountain lion at Camera Station A. Photo taken May 18, 2019.

Photograph 8: View of a bobcat at Camera Station C. Photo taken December 14, 2018.

GLENN LUKOS ASSOCIATES

Exhibit 2E2

WRENS VIEW PRESERVE

Monitoring Photos

Photograph 1: View of three mule deer at Camera Station A. Photo taken March 8, 2019.

Photograph 2: View of a coyote at Camera Station B. Photo taken December 20, 2018.

Photograph 3: View of a bobcat at Camera Station B. Photo taken January 11, 2019.

Photograph 4: View of a gray fox at Camera Station B. Photo taken December 31, 2018.

GLENN LUKOS ASSOCIATES

Exhibit 2F

LIVE OAK CREEK PRESERVE

Monitoring Photos

Photograph 1: View of three mule deer at Camera Station B. Photo taken February 28, 2019.

Photograph 2: View of two coyotes at Camera Station A. Photo taken January 16, 2019.

Photograph 3: View of a bobcat at Camera Station A. Photo taken December 18, 2018.

Photograph 4: View of a rabbit at Camera Station A. Photo taken December 20, 2018.

GLENN LUKOS ASSOCIATES

Exhibit 2G

EAGLE RIDGE PRESERVE

Monitoring Photos

Trabuco Rose Preserve Boundary

Previous Surveys/Monitoring

Covered Species

- Intermediate Mariposa Lily

Non- Covered Sensitive Species

- Catalina Mariposa Lily
- Chaparral Nolina
- Cooper's Rein Orchid
- Coulter's Matilija Poppy
- Fish's Milkwort
- Humboldt Lily

N

0 275 550 1,100

Feet

1 inch = 550 feet

TRABUCO ROSE PRESERVE

OCTA Covered/Sensitive Plant Species Map

GLENN LUKOS ASSOCIATES

Exhibit 3A

X:\1100 AFTER THE REST\1184-1OCTA\1184-1_GIS\FerberRanch_GIS\MonitoringGIS\1184-1_CoveredSpeciesPlantsYR3.mxd

Trabuco Rose Preserve Boundary

Current Monitoring Period

- Cactus Wren

Previous Monitoring Periods

- California Gnatcatcher
- Cactus Wren
- Bobcat
- Mountain Lion
- Orangethroat Whiptail
- San Diego Desert Woodrat (Non-covered)

N

0 275 550 1,100

Feet

1 inch = 550 feet

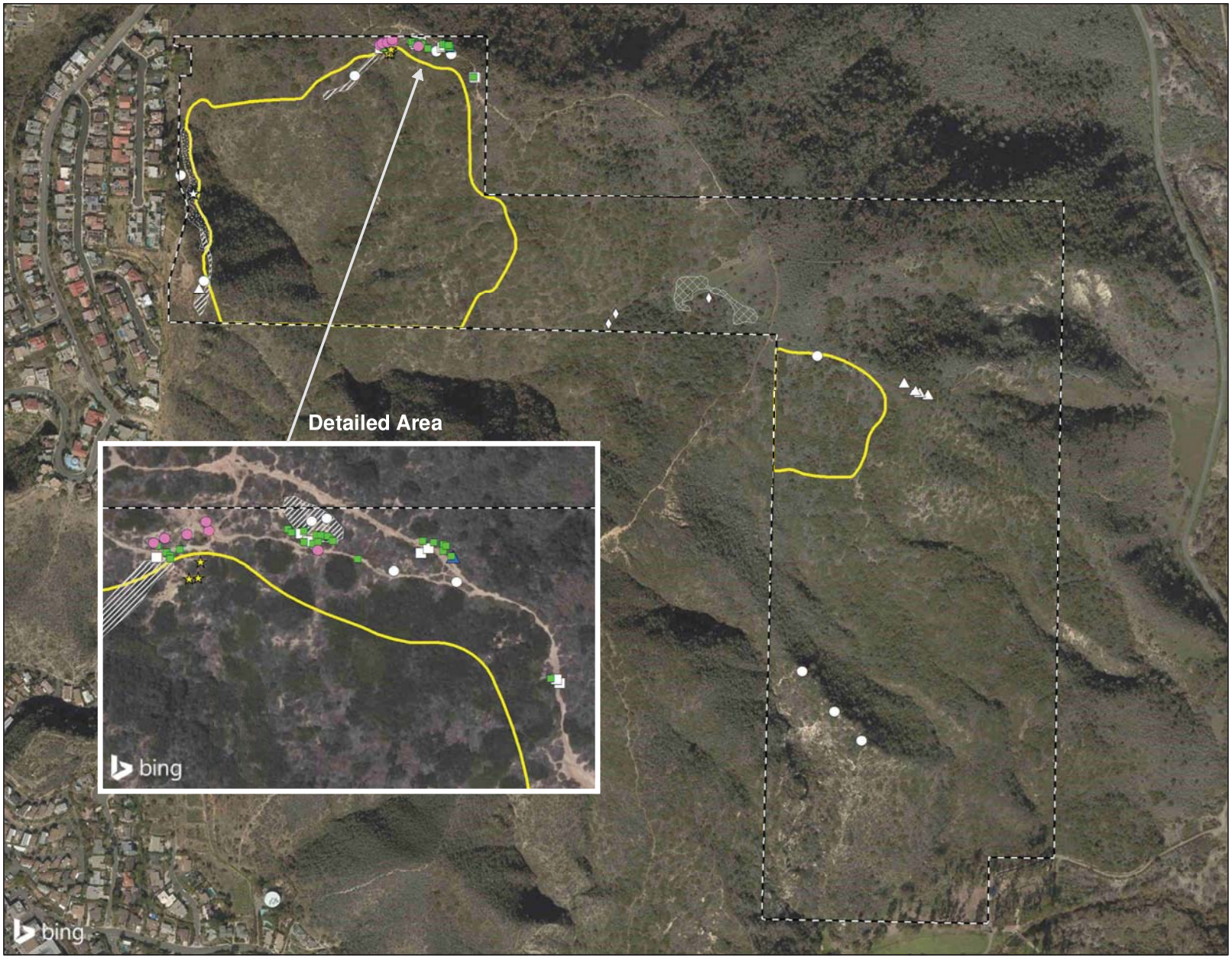
X:\1100 AFTER THE REST\1184-1OCTA\1184-1_GIS\FerberRanch_GIS\MonitoringGIS\1184-1_CoveredSpeciesAnimalsYR3.mxd

TRABUCO ROSE PRESERVE

OCTA Covered/Sensitive Animal Species Map

GLENN LUKOS ASSOCIATES

Exhibit 3B



Pacific Horizon Preserve Boundary

Current Monitoring Period

Covered Species

- Intermediate Mariposa Lily
- Many-stemmed Dudleya

Non- Covered Sensitive Species

- Crownbeard
- Western Dichondra
- Approximate Extent of Crownbeard of Various Densities

Previous Monitoring Periods

Covered Species

- Intermediate Mariposa Lily
- Intermediate Mariposa Lily
- Many-stemmed Dudleya

Non- Covered Sensitive Species

- Catalina Mariposa Lily
- Crownbeard
- Catalina Mariposa Lily
- Crownbeard
- Western Dichondra

N

0 212.5 425 850

Feet

1 inch = 425 feet

PACIFIC HORIZON PRESERVE

OCTA Covered/Sensitive Plant Species Map

GLENN LUKOS ASSOCIATES

Exhibit 3C

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\MonitoringGIS\2019\1184-2PacificHorizonPlants.mxd

Pacific Horizon Preserve Boundary

Previous Monitoring Periods

Covered Species

○ California Gnatcatcher

N

0 212.5 425 850

Feet

1 inch = 425 feet

PACIFIC HORIZON PRESERVE

OCTA Covered/Sensitive Animal Species Map

GLENN LUKOS ASSOCIATES

Exhibit 3D

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\MonitoringGIS\2019\1184-2PacificHorizonAnimals.mxd

Bobcat Ridge Preserve Boundary

Current Monitoring Period

Covered Species

- Intermediate Mariposa Lily

Previous Monitoring Periods

Covered Species

- Intermediate Mariposa Lily

N

0 100 200 400

Feet

1 inch = 200 feet

BOBCAT RIDGE PRESERVE

OCTA Covered/Sensitive Plant Species Map

GLENN LUKOS ASSOCIATES

Exhibit 3E

X:\1100 AFTER THE REST\1184-2MON\1184-2_GIS\MonitoringGIS\2019\1184-2BobcatRidgePlants.mxd

Bobcat Ridge Preserve Boundary

Current Monitoring Period

Covered Species

- Cactus Wren
- Orangethroat Whiptail

Previous Monitoring Periods

Covered Species

- Cactus Wren

N

0 100 200 400

Feet

1 inch = 200 feet

BOBCAT RIDGE PRESERVE

OCTA Covered/Sensitive Animal Species Map

GLENN LUKOS ASSOCIATES

Exhibit 3F

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\MonitoringGIS\2019\1184-2BobcatRidgeAnimals.mxd

Silverado Chaparral Preserve Boundary

Current Monitoring Period

Covered Species

- Intermediate Mariposa Lily

Previous Monitoring Periods

Covered Species

- Intermediate Mariposa Lily

Non- Covered Sensitive Species

- Chaparral Nolina
- Paniculate Tarplant

N

0 212.5 425 850

Feet

1 inch = 425 feet

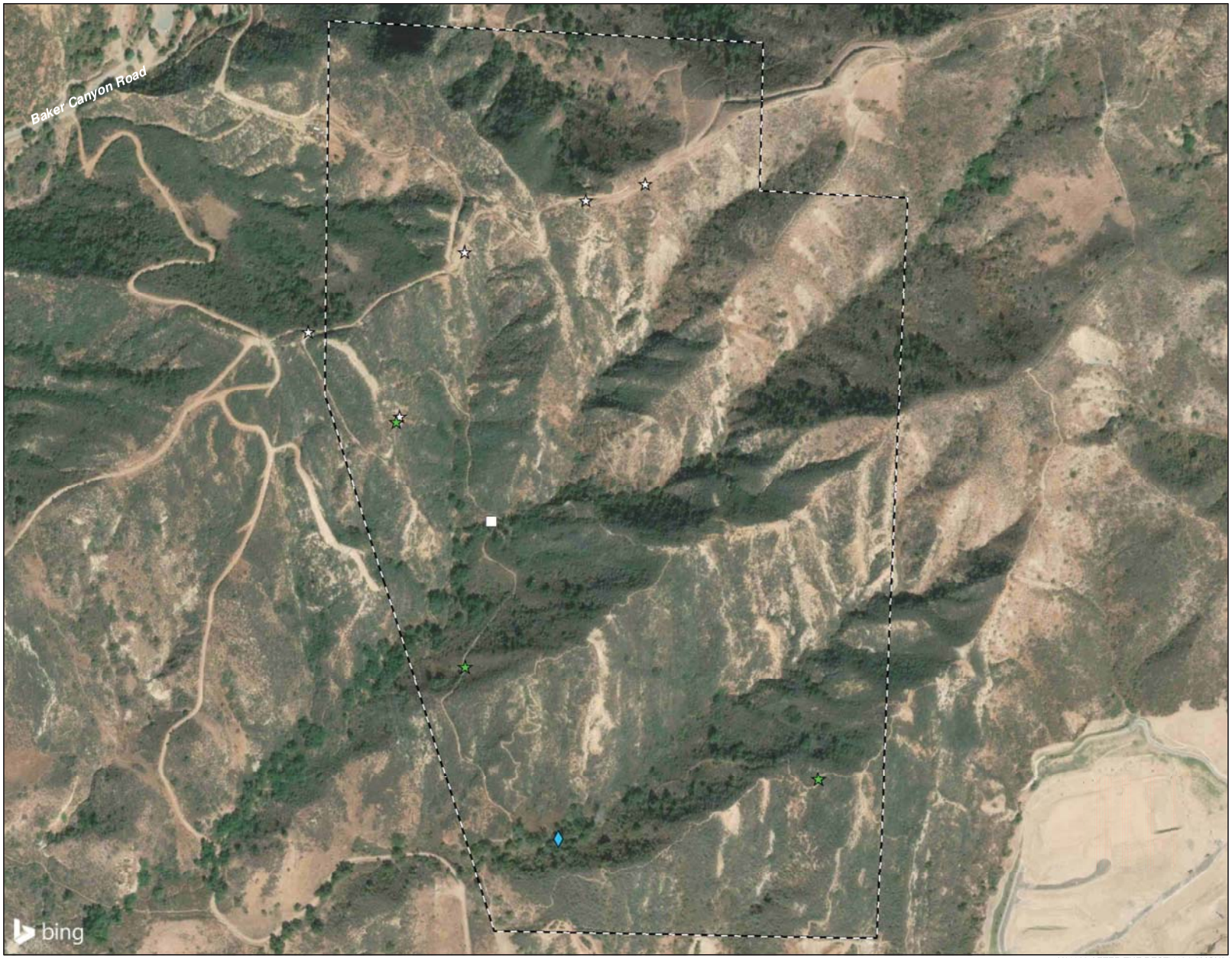
SILVERADO CHAPARRAL PRESERVE

OCTA Covered/Sensitive Plant Species Map

GLENN LUKOS ASSOCIATES

Exhibit 3G

X:\1100 AFTER THE REST\1184-2MON\1184-2_GIS\MonitoringGIS\2019\1184-2SilveradoChaparralPlants.mxd



Silverado Chaparral Preserve Boundary

Current Monitoring Period

Covered Species

Bobcat

Coast Horned Lizard

Previous Monitoring Periods

Covered Species

Coast Horned Lizard

Orangethroat Whiptail

N

0 212.5 425 850

Feet

1 inch = 425 feet

SILVERADO CHAPARRAL PRESERVE

OCTA Covered/Sensitive Animals Species Map

GLENN LUKOS ASSOCIATES

Exhibit 3H

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\MonitoringGIS\2019\1184-2SilveradoChaparralAnimals.mxd

Wren's View Preserve Boundary

Current Monitoring Period

Covered Species

Intermediate Mariposa Lily

Previous Monitoring Periods

Covered Species

Intermediate Mariposa Lily

N

0 175 350 700

Feet

1 inch = 350 feet

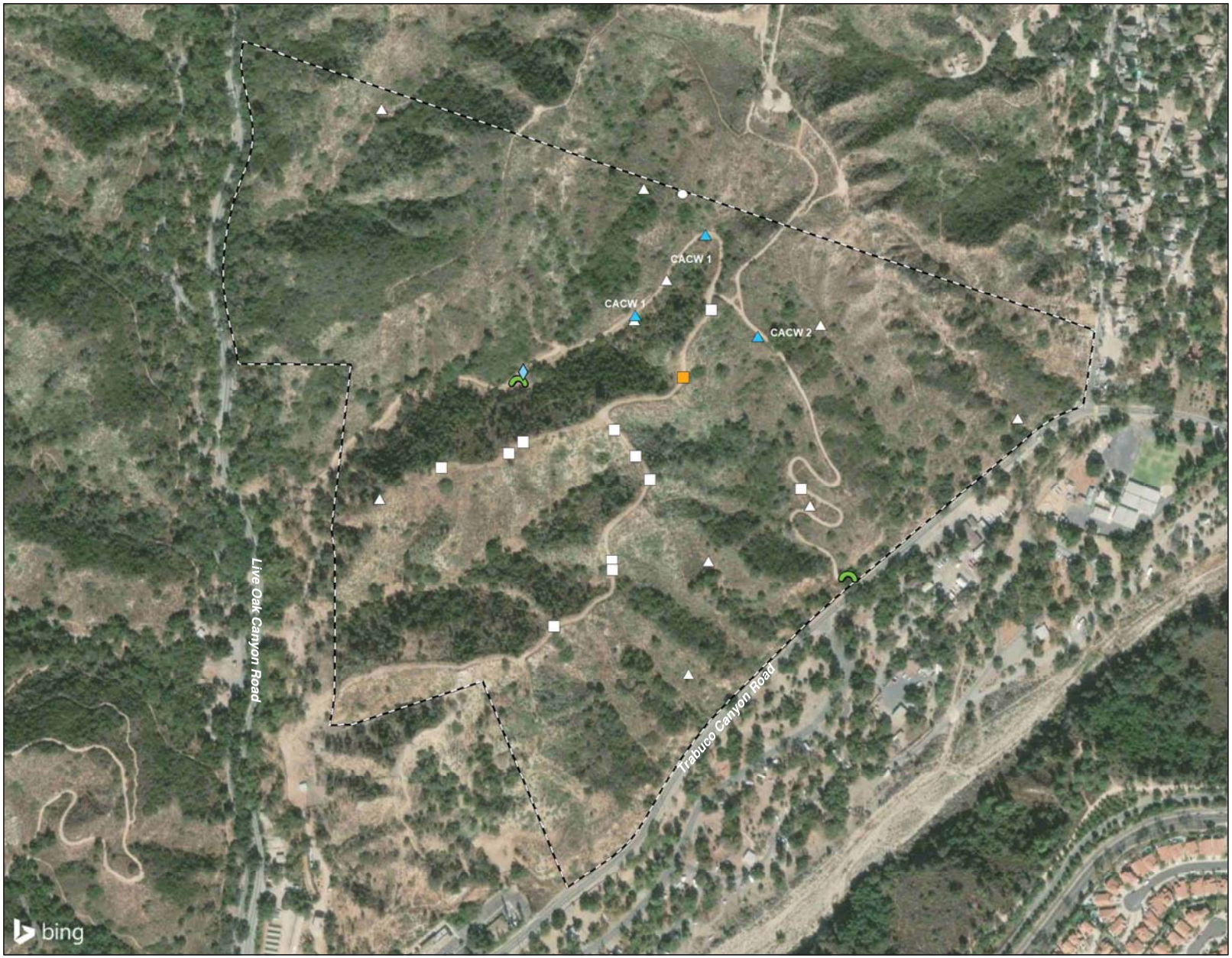
WREN'S VIEW PRESERVE

OCTA Covered/Sensitive Plant Species Map

GLENN LUKOS ASSOCIATES

Exhibit 3I

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\MonitoringGIS\2019\1184-2WrensViewPlants.mxd



Wren's View Preserve Boundary

Current Monitoring Period

Covered Species

- Bobcat
- Cactus Wren
- Mountain Lion
- Orangethroat Whiptail

Previous Monitoring Periods

Covered Species

- Cactus Wren
- California Gnatcatcher
- Orangethroat Whiptail

N

0 175 350 700

Feet

1 inch = 350 feet

WREN'S VIEW PRESERVE

OCTA Covered/Sensitive Animal Species Map

GLENN LUKOS ASSOCIATES

Exhibit 3J

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\MonitoringGIS\2019\1184-2WrensViewAnimals.mxd

Live Oak Creek Preserve Boundary

Previous Monitoring Periods

Covered Species

○ Intermediate Mariposa Lily

Non- Covered Sensitive Species

◊ Catalina Mariposa Lily

N

0 112.5 225 450

Feet

1 inch = 225 feet

LIVE OAK CREEK PRESERVE

OCTA Covered/Sensitive Plant Species Map

GLENN LUKOS ASSOCIATES

Exhibit 3K

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\MonitoringGIS\2019\1184-2LiveOakPlants.mxd

Live Oak Creek Preserve Boundary

Current Monitoring Period

Covered Species

Bobcat

Previous Monitoring Periods

Covered Species

Cactus Wren

N

0 112.5 225 450

Feet

1 inch = 225 feet

LIVE OAK CREEK PRESERVE

OCTA Covered/Sensitive Animal Species Map

GLENN LUKOS ASSOCIATES

Exhibit 3L

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\MonitoringGIS\2019\1184-2LiveOakAnimals.mxd

Eagle Ridge Preserve Boundary

Previous Monitoring Periods

Non- Covered Sensitive Species

Hubby's Phaceila

N

0 225 450 900

Feet

1 inch = 450 feet

EAGLE RIDGE PRESERVE

OCTA Covered/Sensitive Plant Species Map

GLENN LUKOS ASSOCIATES

Exhibit 3M

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\MonitoringGIS\2019\1184-2EagleRidgePlants.mxd

Eagle Ridge Preserve Boundary

Current Monitoring Period

Covered Species

Bobcat

Previous Monitoring Periods

Non- Covered Sensitive Species

Golden Eagle

N

0 225 450 900

Feet

1 inch = 450 feet

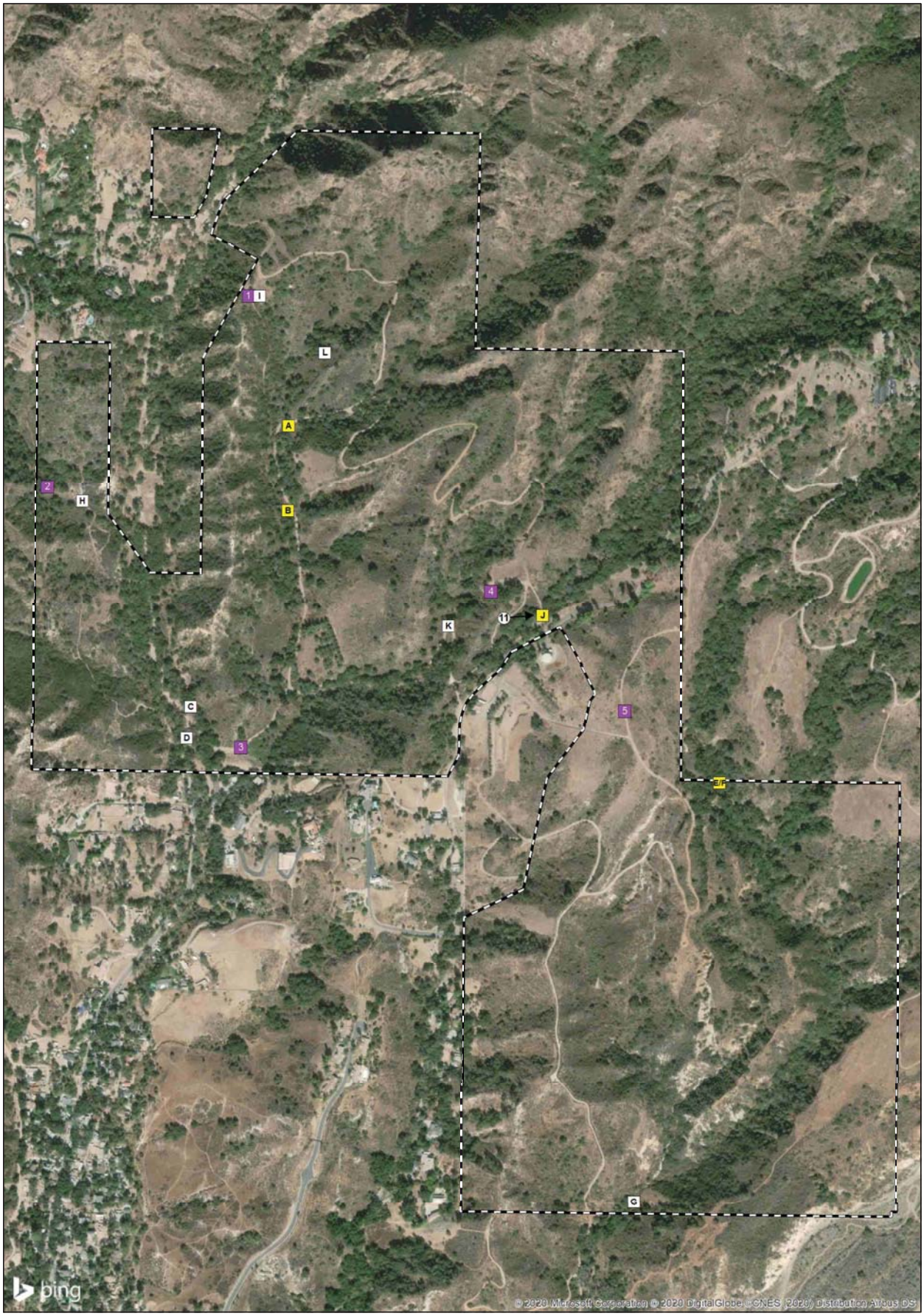
EAGLE RIDGE PRESERVE

OCTA Covered/Sensitive Animal Species Map

GLENN LUKOS ASSOCIATES

Exhibit 3N

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\MonitoringGIS\2019\1184-2EagleRidgeAnimal.mxd



Trabuco Rose Preserve Boundary
Wildlife Camera Station Active in 2019
Wildlife Camera Station Inactive in 2019
Permanent Photo Station
Photo Location

N

0 275 550 1,100
Feet

1 inch = 550 feet

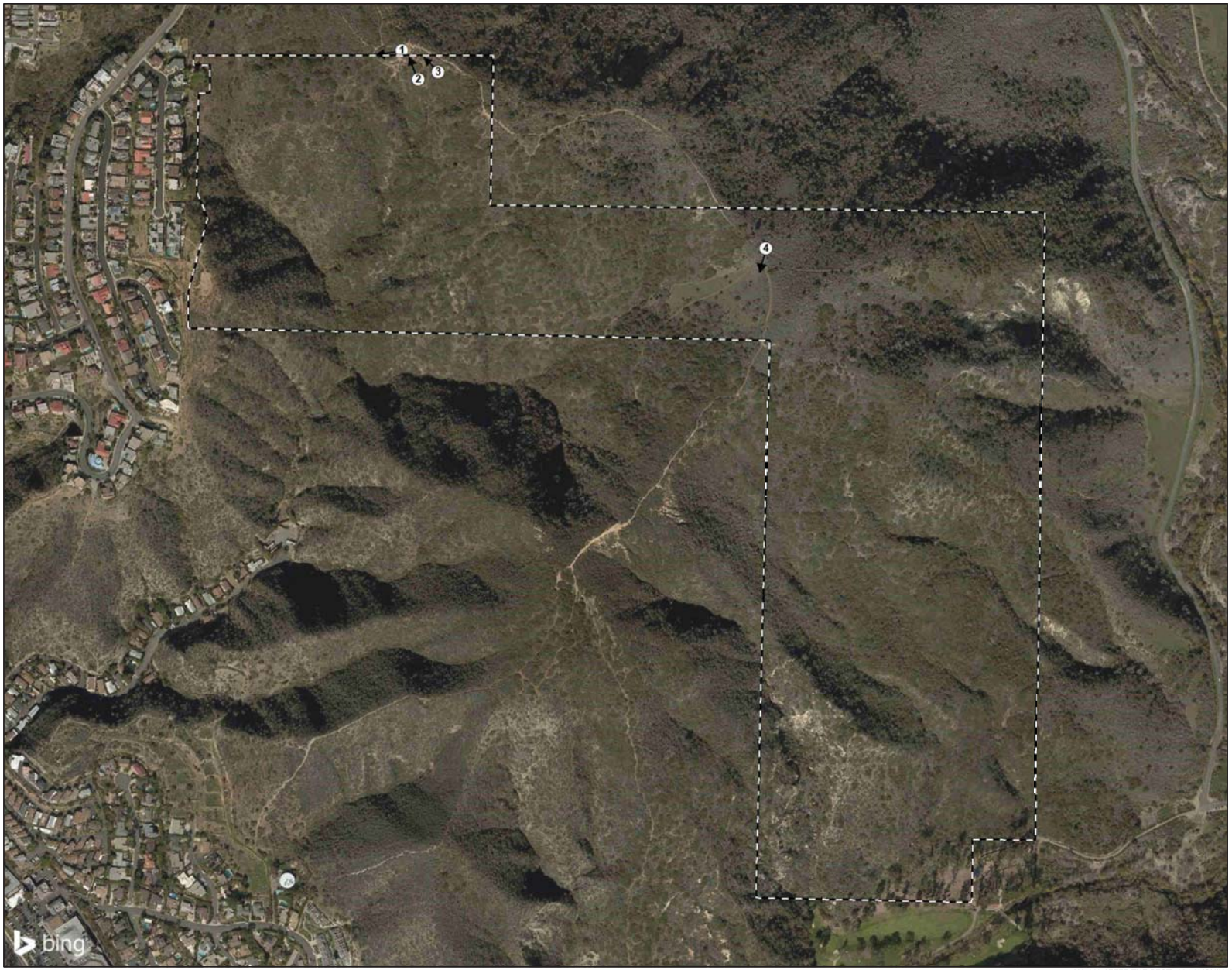
TRABUCO ROSE PRESERVE

Photo Locations Map

GLENN LUKOS ASSOCIATES

Exhibit 4A

X:\1100 AFTER THE REST\1184-1OCTA\1184-1_GIS\FerberRanch_GIS\1184-1_CameraLocationMap YEAR3.mxd



Pacific Horizon Preserve Boundary

① Photo Location

N

0 225 450 900

Feet

1 inch = 450 feet

PACIFIC HORIZON PRESERVE

Photo Locations Map

GLENN LUKOS ASSOCIATES

Exhibit 4B

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\PhotoLocationsGIS\2019\1184-2PacificHorizonPreserve_PhotoLocations.mxd

Bobcat Ridge Preserve Boundary

Wildlife Camera Station

1 Photo Locations

N

0 100 200 400

Feet

1 inch = 200 feet

BOBCAT RIDGE PRESERVE

Photo Locations Map

GLENN LUKOS ASSOCIATES

Exhibit 4C

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\PhotoLocationsGIS\2019\1184-2BobcatRidgePreserve_PhotoLocations.mxd

Silverado Chaparral Preserve Boundary

Wildlife Camera Station

① Photo Locations

N

0 212.5 425 850

Feet

1 inch = 425 feet

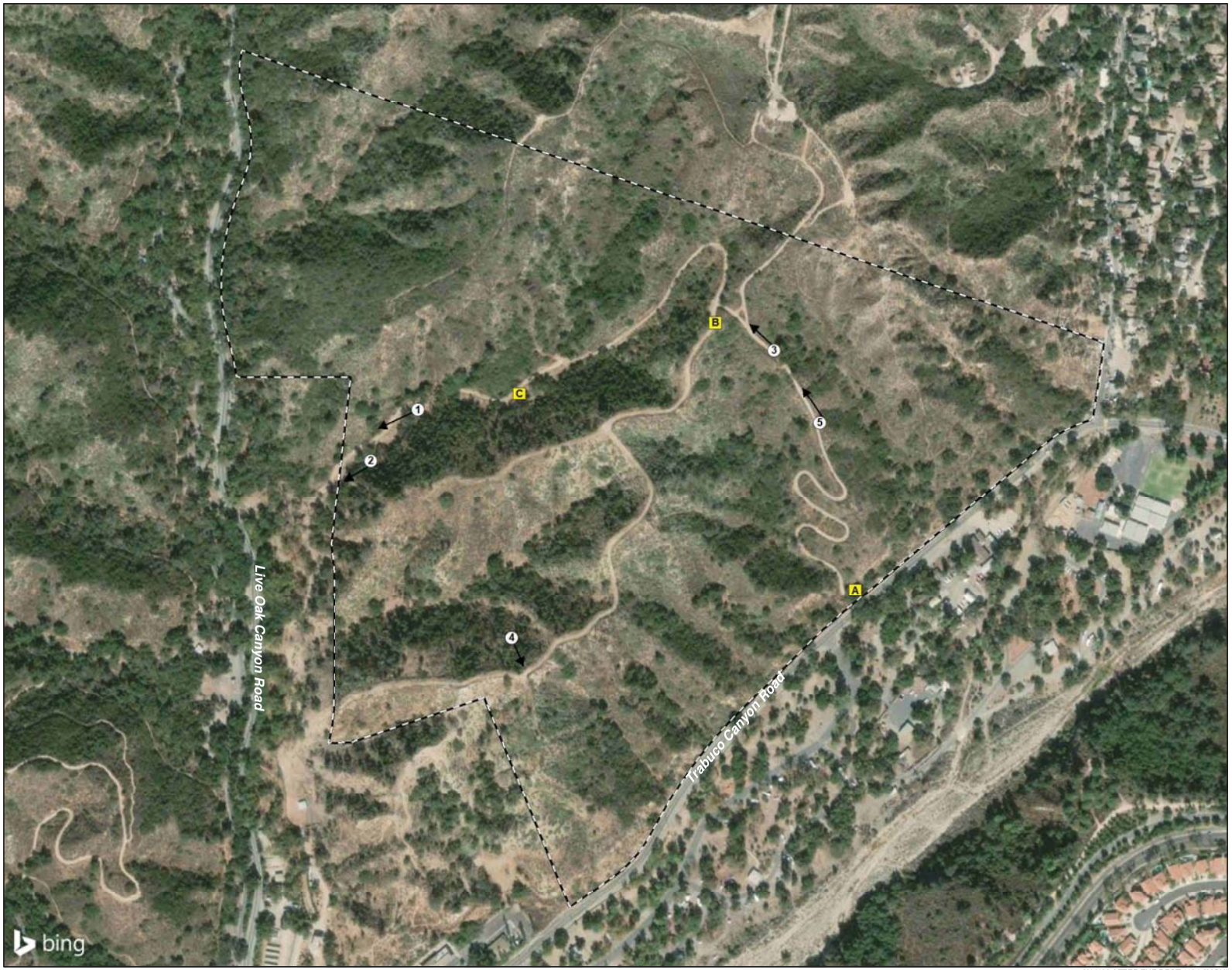
SILVERADO CHAPARRAL PRESERVE

Photo Locations Map

GLENN LUKOS ASSOCIATES

Exhibit 4D

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\PhotoLocationsGIS\2019\1184-2SilveradoChaparralPreserve_PhotoLocations.mxd



Wren's View Preserve Boundary

Wildlife Camera Station

① Photo Locations

N

0 175 350 700

Feet

1 inch = 350 feet

WREN'S VIEW PRESERVE

Photo Locations Map

GLENN LUKOS ASSOCIATES

Exhibit 4E

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\PhotoLocationsGIS\2019\1184-2WrensViewPreserve_PhotoLocations.mxd

Live Oak Creek Preserve Boundary

Wildlife Camera Station

N

0 125 250 500

Feet

1 inch = 250 feet

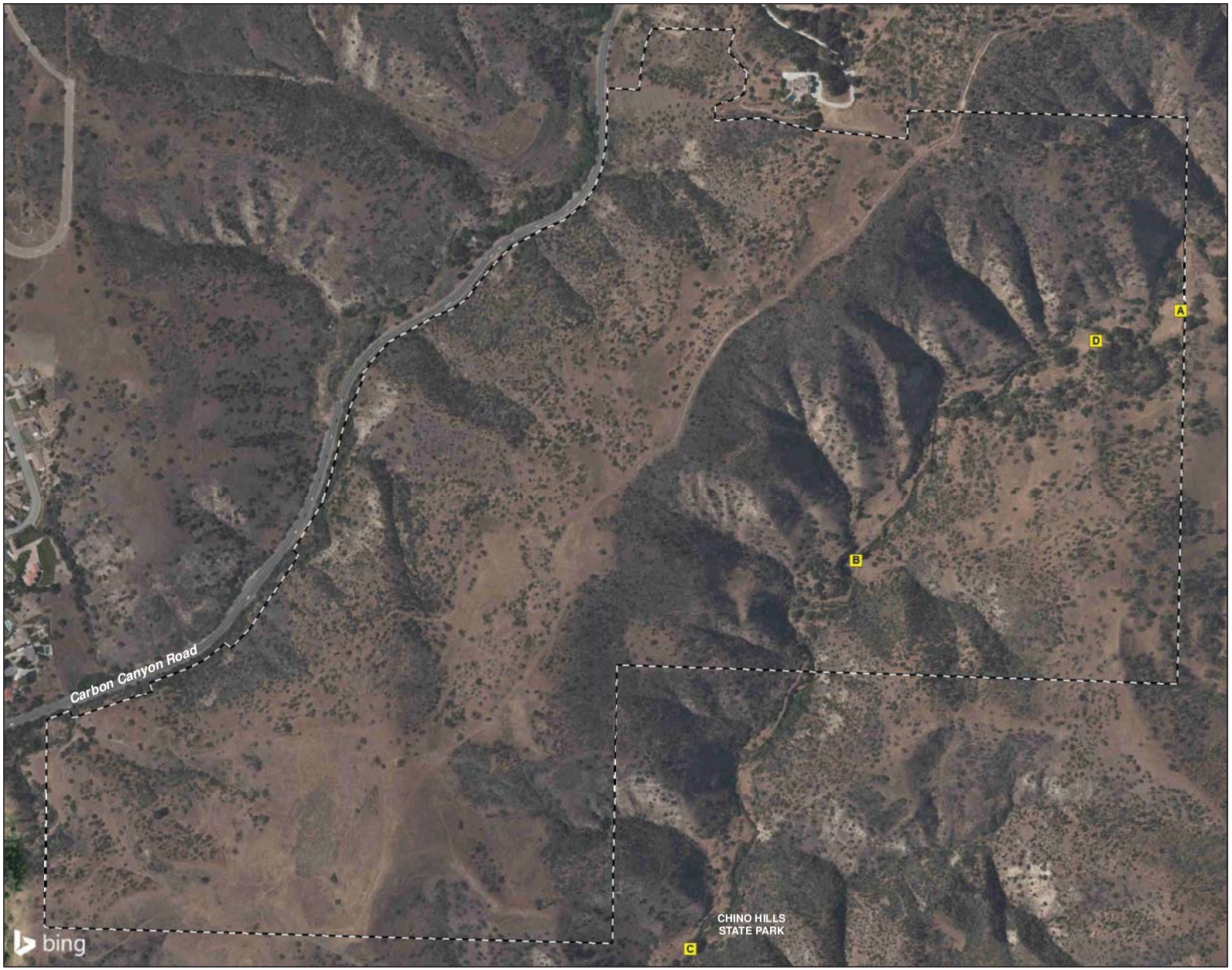
LIVE OAK CREEK PRESERVE

Photo Locations Map

GLENN LUKOS ASSOCIATES

Exhibit 4F

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\PhotoLocationsGIS\2019\1184-2LiveOakCreekPreserve_PhotoLocations.mxd



Eagle Ridge Preserve Boundary

Wildlife Camera Station

N

0 225 450 900

Feet

1 inch = 450 feet

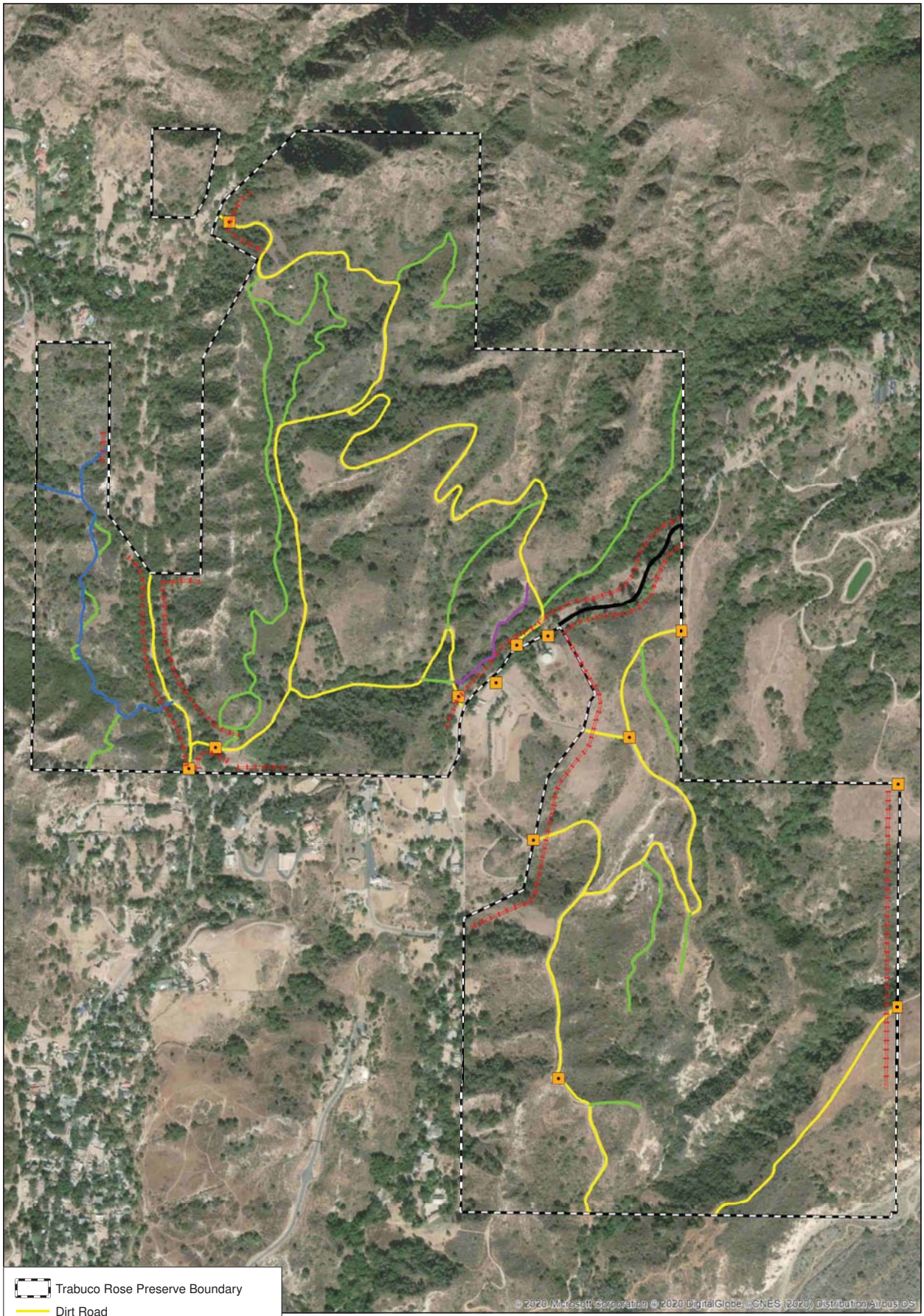
EAGLE RIDGE PRESERVE

Photo Locations Map

GLENN LUKOS ASSOCIATES

Exhibit 4G

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\PhotoLocationsGIS\2019\1184-2EagleRidgePreserve_PhotoLocations.mxd



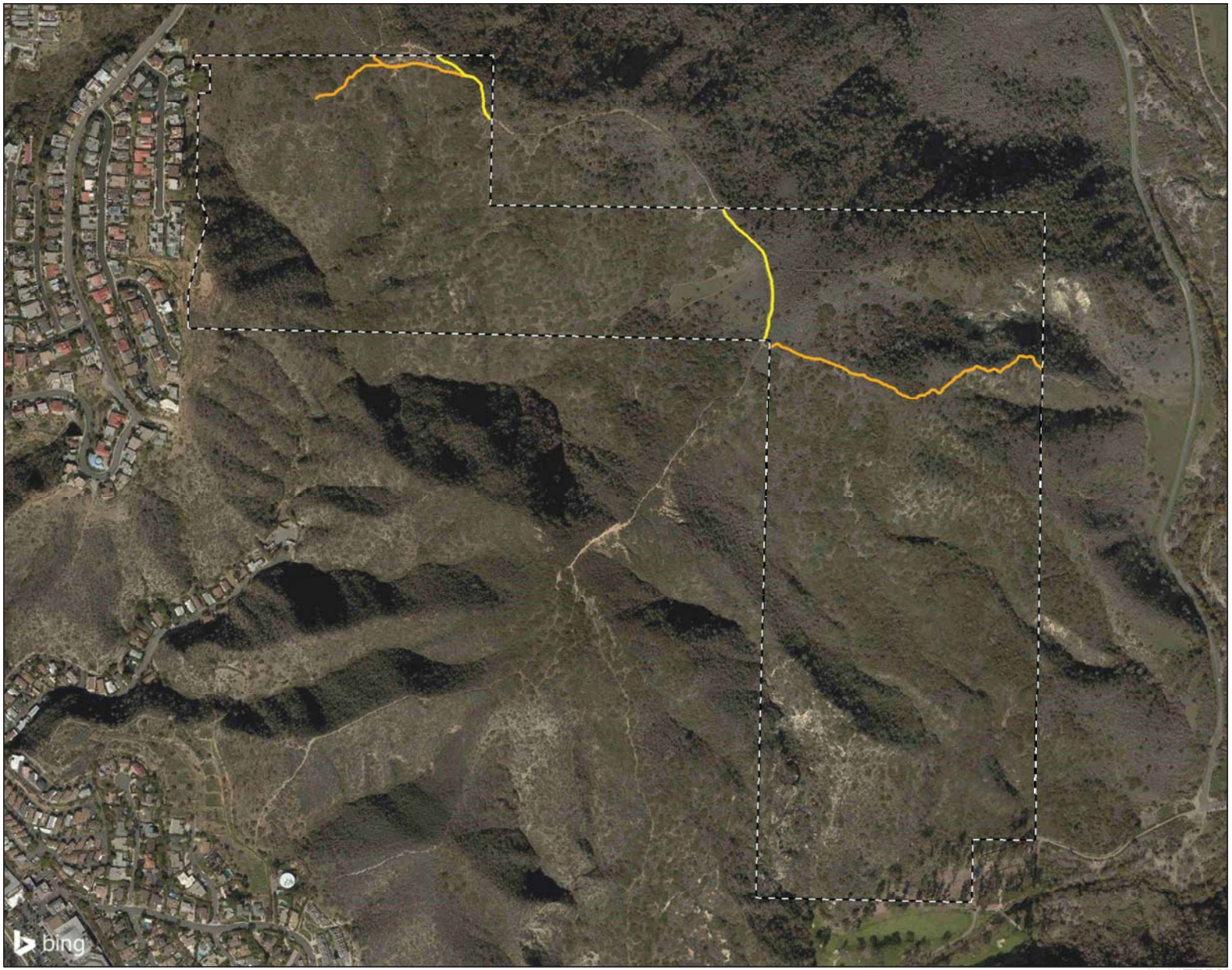
TRABUCO ROSE PRESERVE

Trails Map

GLENN LUKOS ASSOCIATES

Exhibit 5A

X:\1100 AFTER THE REST\1184-1OCTA\1184-1_GIS\FerberRanch_GIS\MonitoringGIS\1184-1_Trails_Fence YEAR 3.mxd



Pacific Horizon Preserve Boundary

Foot Trails Open for Recreational Use*

Foot Trails Proposed for Decommission

*Pursuant to the OCTA managed public access program

N

0 225 450 900

Feet

1 inch = 450 feet

PACIFIC HORIZON PRESERVE

Trails Map

GLENN LUKOS ASSOCIATES

Exhibit 5B

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\TrailsGIS\2019\1184-2PacificHorizonPreserve_Trails.mxd

Bobcat Ridge Preserve Boundary
Foot Trails Maintained for Preserve Management
Foot Trails (Decommissioned)
Unauthorized Trail
Offsite Trail

N

0 100 200 400
Feet

1 inch = 200 feet

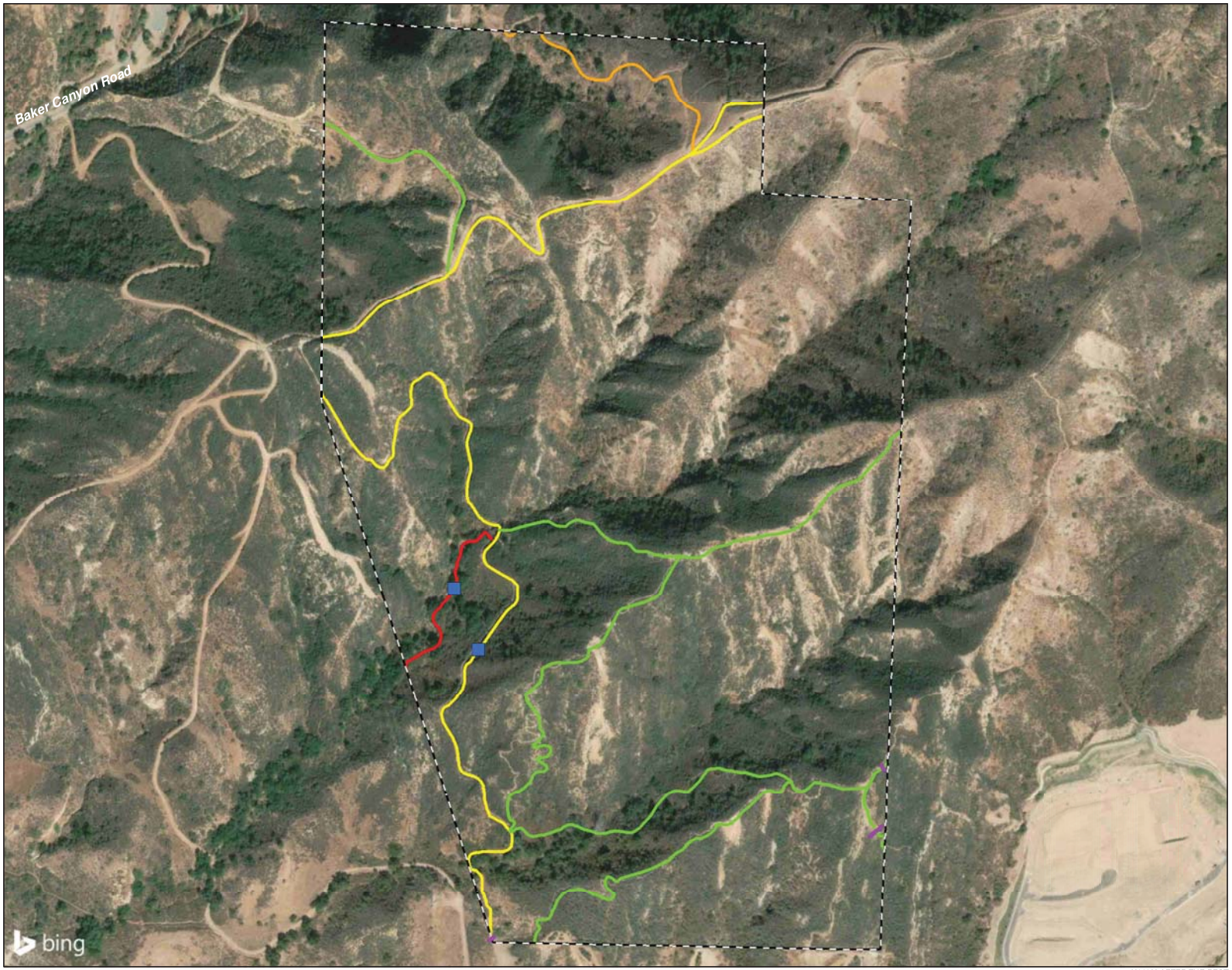
BOBCAT RIDGE PRESERVE

Trails Map

GLENN LUKOS ASSOCIATES

Exhibit 5C

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\TrailsGIS\2019\1184-2BobcatRidgePreserve_Trails.mxd



Silverado Chaparral Preserve Boundary
Foot Trails and Dirt Roads Maintained for Preserve Management
Foot Trails and Dirt Roads for Recreational Use*
Foot Trails (Decommissioned)
Unauthorized Trail Documented in 2018
*Pursuant to the OCTA managed public access program
New Fencing
Mountain Bike Habitat Disturbance

N

0 212.5 425 850
Feet

1 inch = 425 feet

SILVERADO CHAPARRAL PRESERVE

Trails Map

GLENN LUKOS ASSOCIATES

Exhibit 5D

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\TrailsGIS\2019\1184-2SilveradoChaparralPreserve_Trails.mxd

Wren's View Preserve Boundary
Foot Trails and Dirt Roads Maintained for Preserve Management
Dirt Roads Proposed for Recreational Use*
Unauthorized
Gate
Downed Perimeter Fence Caused by Fallen Tree
Downed Internal Barbed-wire Fence
Downed Chainlink Fence

*Pursuant to the OCTA managed public access program

N

0 175 350 700
Feet

1 inch = 350 feet

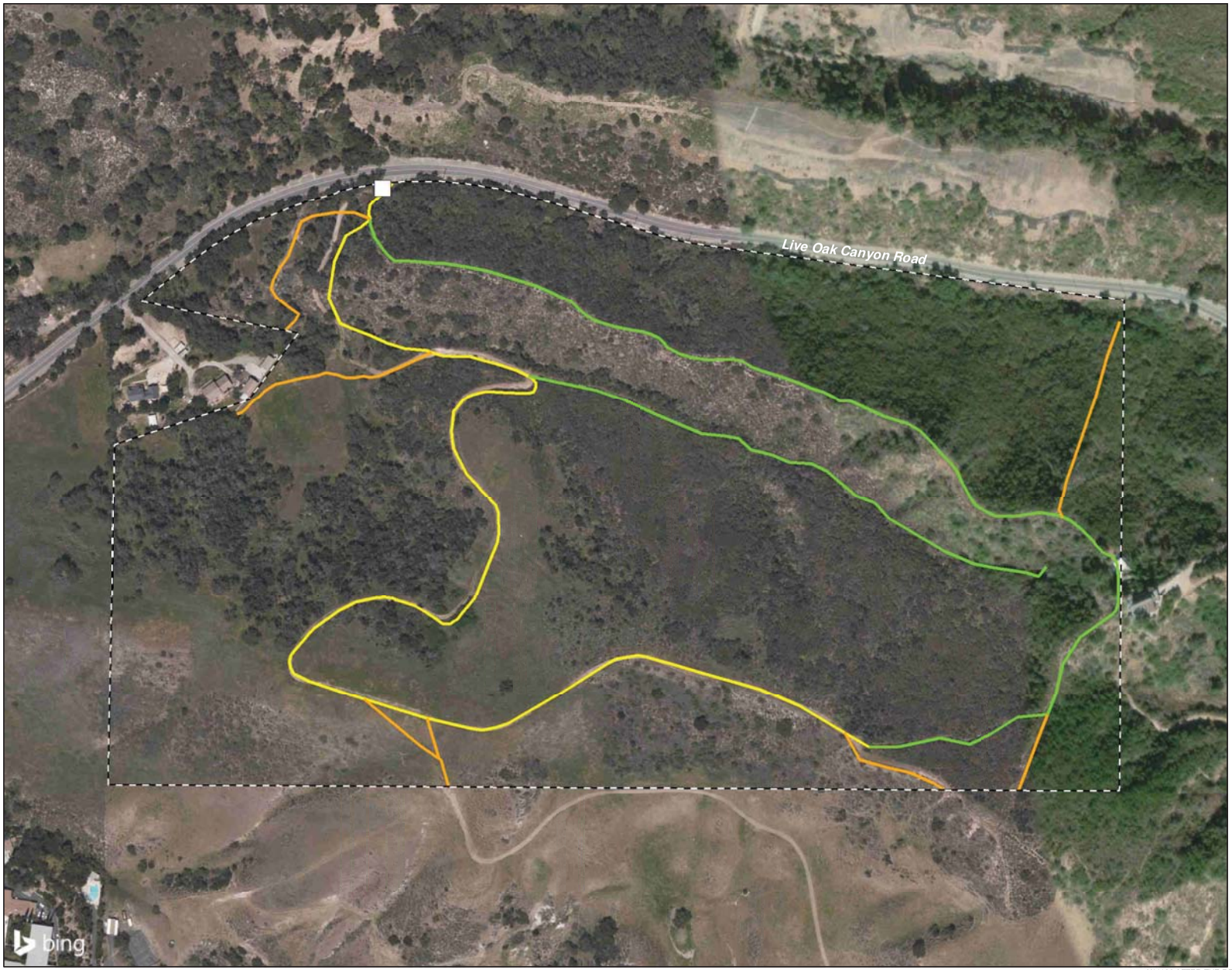
WREN'S VIEW PRESERVE

Trails Map

GLENN LUKOS ASSOCIATES

Exhibit 5E

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\TrailsGIS\2019\1184-2WrensViewPreserve_Trails.mxd



Live Oak Creek Preserve Boundary
Dirt Roads Maintained for Preserve Management
Foot Trails Maintained for Preserve Management
Foot Trails Decommissioned
Gate

N

0 125 250 500
Feet

1 inch = 250 feet

LIVE OAK CREEK PRESERVE

Trails Map

GLENN LUKOS ASSOCIATES

Exhibit 5F

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\TrailsGIS\2019\1184-2LiveOakCreekPreserve_Trails.mxd

Eagle Ridge Preserve

Foot Trails and
Dirt Roads Maintained for
Preserve Management

Gate

N

0 225 450 900

Feet

1 inch = 450 feet

EAGLE RIDGE PRESERVE

Trails Map

GLENN LUKOS ASSOCIATES

Exhibit 5G

X:\1100 AFTER THE REST\1184-2MONI\1184-2_GIS\TrailsGIS\2019\1184-2EagleRidgePreserve_Trails.mxd

APPENDIX A

TRABUCO ROSE PRESERVE
USACE/SWRCB ANNUAL MONITORING FORM

A total of 1.75 acres of waters of the U.S., of which 0.14 acre consists of wetlands, within Trabuco Rose Preserve is compensatory mitigation for U.S. Army Corps of Engineers (USACE) and California State Water Resources Control Board (SWRCB) in the form of preservation (Exhibit 1). While monitoring and reporting for the entire Preserve is related to the USACE/SWRCB mitigation sites since these are surrounding buffer areas, this appendix provides the USACE/SWRCB with the information they require regarding tasks within the Trabuco Rose RMP that are specific to their mitigation areas. The tasks also apply to a 50-foot buffer from these preserved waters of the U.S. to ensure the sustainability of the USACE mitigation site.

The Section 404 permit authorizing the use of mitigation at the Trabuco Rose Preserve for OCTA M2 freeway projects was issued by the USACE on December 8, 2017. The SWRCB issued a letter assuring the use of mitigation at the Preserve on January 22, 2018. The initial Section 401 and 404 permits requesting the use of Trabuco Rose Preserve mitigation were issued on October 25, 2018 (Section 401 Water Quality Certification File #SB18018IN) and October 29, 2018 (Section 404 Letter of Permission File Number SPL-2018-00129-TDK), respectively. While monitoring has been ongoing at the Preserve per the NCCP/HCP, monitoring specific to the USACE/SWRCB areas and tasks began on January 1, 2019, in advance of impacts associated with the first project requesting the use of Trabuco Rose mitigation.

A. Biological Resources

Element A.1 – Waters of the U.S., including wetlands

I. *Task: At least one annual walk-through survey will be conducted to qualitatively monitor the general condition of these habitats. General topographic conditions, hydrology, general vegetation cover and composition, invasive species, and erosion or aggradation will be noted, evaluated and mapped during a site examination in the spring. Notes to be made will include observations of species encountered, general water quality (i.e., turbidity, pollutants such as oil sheen), general extent and condition of non-wetland waters of the U.S., and any occurrences of erosion or aggradation, and weed/non-native species invasion.*

Monitoring Summary: GLA conducted an annual walk-through survey to qualitatively monitor the general condition of preserved waters of the U.S. on March 27, May 7, and June 25, 2019. Preserved waters of the U.S. are depicted on Exhibit 1. Reference photograph locations were established and are attached as Exhibit 2. A map depicting photograph locations is attached as Exhibit 1.

See below for a summary of the monitoring results:

1. **Drainage 1/Site Photo 1** – Drainage 1 consists of an ephemeral tributary in a steep canyon. No water was present during the monitoring. The drainage is mostly vegetated, primarily with healthy California sagebrush scrub and some coast live oak woodland. No invasive species or weed/non-native species invasion was noted. No erosion or aggradation was noted. Overall, the drainage is

in good condition, does not appear to have changed in extent since the baseline mapping, and no actions are recommended to maintain the current condition.

2. **Drainage 2/Site Photos 2, 3, 5, 6, and 7** – The upper ephemeral tributaries associated with Drainage 2 (photographs 2, 3, and 7) are within steep canyons and are mostly vegetated. No water was present during the monitoring. Vegetation includes California sagebrush scrub, coast live oak woodland, laurel sumac-lemonade berry chaparral, and California buckwheat scrub. No invasive perennial species were noted within the upper tributaries of Drainage 2; however, non-native grasses (i.e., ripgut brome (*Bromus diandrus*)) were present within the buffer of the road between photos 3 and 7. The non-native grasses appear to be contained to the disturbed area next to the road and are not encroaching into waters of the U.S. No active restoration is recommended at this time; however, monitoring will continue. No erosion or aggradation was noted. Overall, the upper tributaries associated with Drainage 2 are in good condition, do not appear to have changed in extent since the baseline mapping, and no actions are recommended to maintain the current condition.

   The lower portion of Drainage 2 (photograph 6) is a lower gradient ephemeral stream segment in the valley floor and is mostly vegetated. No water was present during the monitoring. Vegetation includes arroyo willow thickets, mulefat (*Baccharis salicifolia*), coast live oak woodland, and Eucalyptus. No invasive species or weed/non-native species invasion was noted in the portion of Drainage 2. No erosion or aggradation was noted. Overall, the lower portion of Drainage 2 is in good condition, does not appear to have changed in extent since the baseline mapping, and no actions are recommended to maintain the current condition.

   The wetland (photograph 5) at the southernmost point of USACE/SWRCB mitigation associated with Drainage 2 was almost completely filled with open water during the May 7, 2019 monitoring. Vegetation surrounding the open water consisted primarily of mulefat. The water was clear and no pollutants were observed. No erosion or aggradation was noted. The wetland appeared to have gotten larger, at least temporarily due to a heavy storm year, and the tamarisk (*Tamarix ramosissima*) was no longer present. The wetland is in good condition and no actions are recommended to maintain the current condition.

3. **Drainage 3/Site Photo 4** – Drainage 3 is a large drainage complex consisting of steep canyon ephemeral tributaries. No water was present during the monitoring. Vegetation includes California sagebrush scrub, coast live oak woodland, laurel sumac-lemonade berry chaparral, California buckwheat scrub, scrub oak chaparral, chamise chaparral, and needle grass grassland. A small amount of fennel (*Foeniculum vulgare*) and artichoke thistle (*Cynara cardunculus*) was present in the very upper portion of a tributary of Drainage 3, which was subsequently removed (photograph 4). Some areas are naturally erosive but are not actively eroding. No aggradation was noted. Overall, the drainage is in good condition, does not appear to have changed in extent since the baseline mapping, and no actions are recommended to maintain the current condition.

II. *Task: Hydrology and erosion control activities within preserved waters of the U.S. shall be coordinated with Regulatory Agencies. The Preserve Manager will inspect preserved waters of the U.S. immediately after a heavy rain storm to identify problems with erosion and sedimentation. Where erosion or sedimentation is identified, the Preserve Manager will coordinate with the USACE to implement BMPs (e.g., install control devices) as soon as possible to avoid further damage. In addition, access will be restricted to limit further damage or where required for safety purposes.*

Monitoring Summary: GLA was onsite several times through the rainy season and at the end of the rainy season (January 23, March 27, April 11, May 7, October 10, and December 13, 2019) to check for erosion and sedimentation issues within drainage areas onsite. No active erosion or sedimentation was identified within preserved waters of the U.S., which were specifically checked on March 27, May 7, and June 25, 2019. As such, no hydrology and erosion control activities within preserved waters of the U.S. were conducted during 2019.

III. *Task: CRAM will be updated using the existing baseline scores. This will be completed every 5 or 10 years depending on qualitative changes observed through the annual monitoring efforts. If no changes are clearly recorded in the overall habitats, species occurrences or erosional conditions on roads and trails, a CRAM can be updated every 10 years. If a large natural event occurs such as a fire or flood, CRAM should be completed at the next five year interval to assess changes to the system and help guide adaptive management, restoration, and enhancement activities.*

Status: Monitoring was initiated in 2019; the site will be assessed for the need for CRAM monitoring in 2024.

IV. *Task: During each annual site visit, record general areas of persistent or problematic trash and trespass. Record type, location, and management mitigation recommendations to avoid, minimize, or rectify a trash, trespass, and/or potential fire hazard impact.*

Monitoring Summary: No trash was observed in preserved waters of the U.S. No signs of fire hazards within preserved waters of the U.S. were identified. Although there are signs of occasional trespass documented via wildlife cameras on the Preserve (not documented in USACE/SWRCB mitigation areas), no vandalism (including trail/fence cutting or signage vandalism) has occurred on the Preserve within the recent past.

V. *Task: Reference photograph locations and a photo location map will be established. Site photographs depicting existing site conditions and documenting management activities will be taken from the reference sites.*

Monitoring Summary: Reference photograph locations and a photo location map were established in 2019. See attached Exhibits 1 and 2.

Element A.2 - Threatened/Endangered Animal Species Minimization

I. *Task: Avian Species: CAGN – Management activities during the breeding season[1] that have the potential to destroy active nests (e.g., spraying or pulling vegetation off existing roads or trails within coastal sage scrub) or disrupt nesting activities (e.g., weed whipping along roads and trails adjacent*

[1] The breeding season for gnatcatcher is February 15 through August 31.

to coastal sage scrub) will be conducted under the oversight[2] of a monitoring biologist[3] who will ensure that nesting activities for gnatcatcher nests are not disrupted and that no nests are destroyed. In addition, a specific nesting bird policy for Preserve management (Appendix D of the RMP) has been approved by the Wildlife Agencies. This policy conforms to existing regulations and procedures for protection of nesting birds.

As normal operating practice, routine management activities are conducted during the non-breeding season. Since no activities are anticipated to occur during the nesting season for any of the listed species, no funding specific to this task is allocated. The USACE mitigation sites were specifically located in areas that are not anticipated to be subject to emergency work. In the unlikely event that work is necessary, the contingency fund (i.e., 15% contingency added to the annual task total) would be used.

Monitoring Summary: RECON field crews performed maintenance work, with direction and oversight conducted by a RECON Restoration Biologist. Prior to maintenance tasks (performed during bird breeding season), a biologist would check work areas for nesting birds, and proceed accordingly based on findings of surveys. All work was done consistent with the OCTA Resource Management Plans (RMPs).

Element A.3 - Invasive Species

I. *Initial Task*: *A Restoration Ecologist shall prepare an invasive species management plan (see RMP Section 3.2) for the Preserve and include preserved waters of the U.S. in the plan to target the above species. The invasive species management plan must be approved prior to recordation of the conservation easement.*

Status: The USACE approved the invasive species management plan on January 18, 2018. Implementation is ongoing.

II. *Task: Each year's annual walk-through survey (or a supplemental survey) will include a qualitative assessment of potential or observed weed invasions, primarily in or around the waters of the U.S. Additional actions to control invasive species will be evaluated and prioritized on an annual basis, as necessary, to ensure that any new growth of invasive plant species is treated and not permitted to become large masses that degrade the functions and services provided by any of the conserved habitats.*[4]

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[2] "Oversight" includes, but is not limited to, the following activities, which will be conducted as necessary to ensure that no nests are destroyed and that nesting activities of listed species are not disrupted: training personnel on vegetation to be avoided and removed; flagging specific areas to be avoided; training personnel on avoidance and minimization measures; regularly inspecting work activities; and providing direct supervision of management activities when necessary.

[3] The monitoring biologist will be familiar with the listed species that potentially occur in the affected habitat (i.e., gnatcatcher) and its breeding behavior.

[4] Monitor and maintain control over target invasive plant species that threaten native plant communities within the USACE mitigation site, including cardoon (*Cynara cardunculus*), giant reed (*Arundo donax*), Mexican fan palm (*Washingtonia robusta*), pampas grass (*Cortaderia selloana*), shortpod mustard (*Hirschfeldia incana*), tree tobacco (*Nicotiana glauca*), salt cedar (*Tamarix ramosissima*), and wild oats (*Avena fatua* and *A. barbata*). These species are targeted due to their level of invasiveness within onsite habitats, rated as "high" or "moderate" by the California Invasive Plant Council (Cal-IPC). Monitor

Monitoring Summary: GLA conducted an annual walk-through survey to qualitatively monitor for weed invasions and invasive species within or adjacent to preserved waters of the U.S. on March 27 and May 7, 2019. In general, the USACE/SWRCB mitigation sites currently appear to be very stable with established native habitat present. As noted above, a small amount of fennel and artichoke thistle was present in the very upper portion of a tributary of Drainage 3, which was subsequently removed. No other issues or recommendations were made regarding invasive species or weed invasions.

III. *Task: Each year's annual walk-through survey (or a supplemental survey) will include an assessment of potential infestations of invasive insects and other pathogens that can threaten native habitat within preserved waters of the U.S. The Preserve Manager will stay current on the latest information and science of invasive insects or other pathogens (e.g. goldspotted oak borer) and monitor for signs of infestations as part of general stewardship monitoring. If an infestation is identified, the Preserve Manager will coordinate with the OCTA NCCP/HCP Administrator, Regulatory Agencies, and the Wildlife Agencies on any appropriate control actions.*

Monitoring Summary: On May 15 and 16, 2019, Dudek arborists evaluated trees within the USACE/SWRCB mitigation areas and 50-foot buffer for invasive shot hole borer (*Euwallacea fornicatus*; ISHB), goldspotted oak borer (*Agrilus auroguttatus*; GSOB), and other invasive insects and pathogens and none were found. A report detailing the results of the tree survey is attached to the Annual Monitoring Report as Appendix E.

B. Security, Safety, and Public Access

Element B.1 - Trash and Trespass Monitoring, Enforcement, and Repair

I. *Task: Approved trails, roads, and recreational activities (see Section 3.1.3 of RMP, "Ferber Ranch Public Access Plan") shall be located outside of preserved waters of the U.S. The Preserve Manager will be responsible for enforcing public access guidelines and ensuring that only permitted recreational and general access activities occur within the Preserve.*

Monitoring Summary: No trails, roads, and recreational activities were located within preserved waters of the U.S. The Preserve Manager enforced public access guidelines and ensured that only permitted recreation and general access activities occurred within the Preserve.

II. *Task: As needed, and at least once yearly collect and remove all observed trash and repair and rectify vandalism and trespass impacts within the USACE mitigation site.*

Monitoring Summary: The USACE mitigation sites were monitored for trash and none was observed. Although there are signs of occasional trespass documented wildlife cameras on the Preserve (not

other potential infestations of invasive insects and other pathogens that can threaten native habitat within preserved waters of the U.S. The site will be monitored on an annual basis to ensure that the property maintains its biological functions and conservation value and does not degrade due to invasive plant species, trespassing, or illegal dumping.

documented in USACE/SWRCB mitigation areas), no vandalism (including trail/fence cutting or signage vandalism) has occurred on the Preserve within the recent past.

C. Infrastructure and Facilities[5]

Element C.1 - Signs, Fences, and Gates

I. *Initial Task*: Develop a Fire Management Plan (FMP) that establishes policies and approaches to maximize protection of biological resources and preserved waters of the U.S. during fire suppression activities, to the degree feasible. Post-fire response shall be consistent with Section 3.5.3 of the RMP, "Post-Fire Response".

Status: In consultation with the local fire authority, OCTA is preparing fire management plans (FMPs) for each OCTA Preserve. The goal of this effort will be to develop FMPs that are easily implementable, establishes a framework for long-term benefits and protection, and guides decision-makers via policies and guidelines. The FMPs will address all stages of fire management: prevention, vegetation management, suppression, and post-fire responses and will help OCTA make decisions regarding fire management that also reflect conservation and stewardship responsibilities. The consultant has completed the first working draft of these FMPs and will be conducting outreach with Orange County Fire Authority, Laguna Beach Fire Department and Brea Fire Department in 2020. It is anticipated that these plans will be completed in late 2020.

II. *Task: During each annual site visit, record condition of signs, fences, and gates. Record location, type, and recommendations to implement fence and/or gate repair or replacement, if applicable.*

Monitoring Summary: No existing signs, fencing, or gates are in need of repair or replacement. The fencing is checked on an annual basis to ensure that the wires do not have slack that could ensnare wildlife. Although there are signs of occasional trespass documented wildlife cameras on the Preserve (not documented in USACE/SWRCB mitigation areas), no vandalism (including trail/fence cutting or signage vandalism) has occurred on the Preserve within the recent past.

III. *Task: Maintain fences and gates as necessary by replacing posts, wire, and/or gates. Replace signs, fences and/or gates, as necessary. Signage or fencing will be located at potential access points to deter unapproved access to preserved waters of the U.S. (see Section 3.7.4, "Signage" of the RMP).*

Monitoring Summary: No fence or gate maintenance was necessary.

[5] Signs, fences, and gates are not within the mitigation area, but are being utilized to control trespass into the mitigation site at other access points on the property. Fence and gate maintenance and repair frequency will be dependent on trespass and access control issues. There is no existing infrastructure within the USACE mitigation site that may require repairs such as culverts, riprip, and or gabion structures.

D. Cultural Resources

Element D.1 - Management of Cultural Resources

I. Task: Preserve Manager will follow directives set forth in the Archeological Sensitivity Assessment (ASA) of how and where cultural resources need to be protected, and the Preserve Manager will use this information to help ensure that activities on the Preserve do not impact any sensitive cultural resources. These include: monitoring by a qualified archaeologist for any ground-disturbing activities within 100 feet of culturally sensitive areas; and if significant portions of the Preserve are ever burned by a wildfire, sensitive areas will be resurveyed for archaeological resources.

Status: No management activities with the potential to affect cultural resources were conducted.

J. Reporting and Administration

Element E.1 – Program Management

I. Task: *Coordinate long-term management activities with land manager staff and/or third-party contractors conducting work on the Preserve (i.e., biologists, habitat restoration ecologists, and/or maintenance contractors).*

Status: The Preserve Manager (OCTA) coordinated long-term management activities as-necessary with the entities described above. Specifically, OCTA coordinated biological monitoring and habitat restoration activities with GLA as described in this Annual Report, while maintenance activities were coordinated with Recon.

II. Task: *Coordinate as needed with the fire department, police department, utility and easement holders, and/or adjacent land owners regarding encroachment issues, transients, or illegal activities, access, or other reasons, as needed.*

Status: No encroachment issues, transients, or illegal activities, access, etc., were documented in USACE/SWRCB mitigation areas on the Preserve and as such, this coordination was not necessary.

Element E.2 – Conservation Easement Enforcement

I. Task: This task will be carried out by OCTA or a third-party easement holder and consists of review of the conservation easement and one annual inspection to assess the condition of native and non-native plant species coverage; erosion and sedimentation; hydrology and water quality; signage, fencing, and gates; trespassing/vandalism; general site condition; and will identify remedial measures necessary to maintain site compliance, as applicable. The inspection results and completion of general and habitat maintenance activities described above, corrective actions (if any), and prohibited activities (if any) will be discussed in annual reports (described below).

Status: Although the conservation easement has not been recorded, biological monitoring is ongoing. As documented throughout this annual monitoring form, the Trabuco Rose Preserve is in good condition. Waters of the U.S. are in stable condition regarding erosion/aggradation and native vegetation communities and composition. No major issues with invasive species or weed invasions were noted. No water quality issues were observed. Signage, fencing, and gates were checked throughout the Preserve and are intact. The USACE/SWRCB mitigation and buffer areas were monitored for trash and none was observed. Although there are signs of occasional trespass documented via wildlife cameras on the Preserve (not documented in USACE/SWRCB mitigation or buffer areas), no vandalism (including trail/fence cutting or signage vandalism) has occurred on the Preserve within the recent past. As discussed above, a small amount of fennel and artichoke thistle was present in the very upper portion of a tributary of Drainage 3, which was subsequently removed. No other recommendations were necessary.

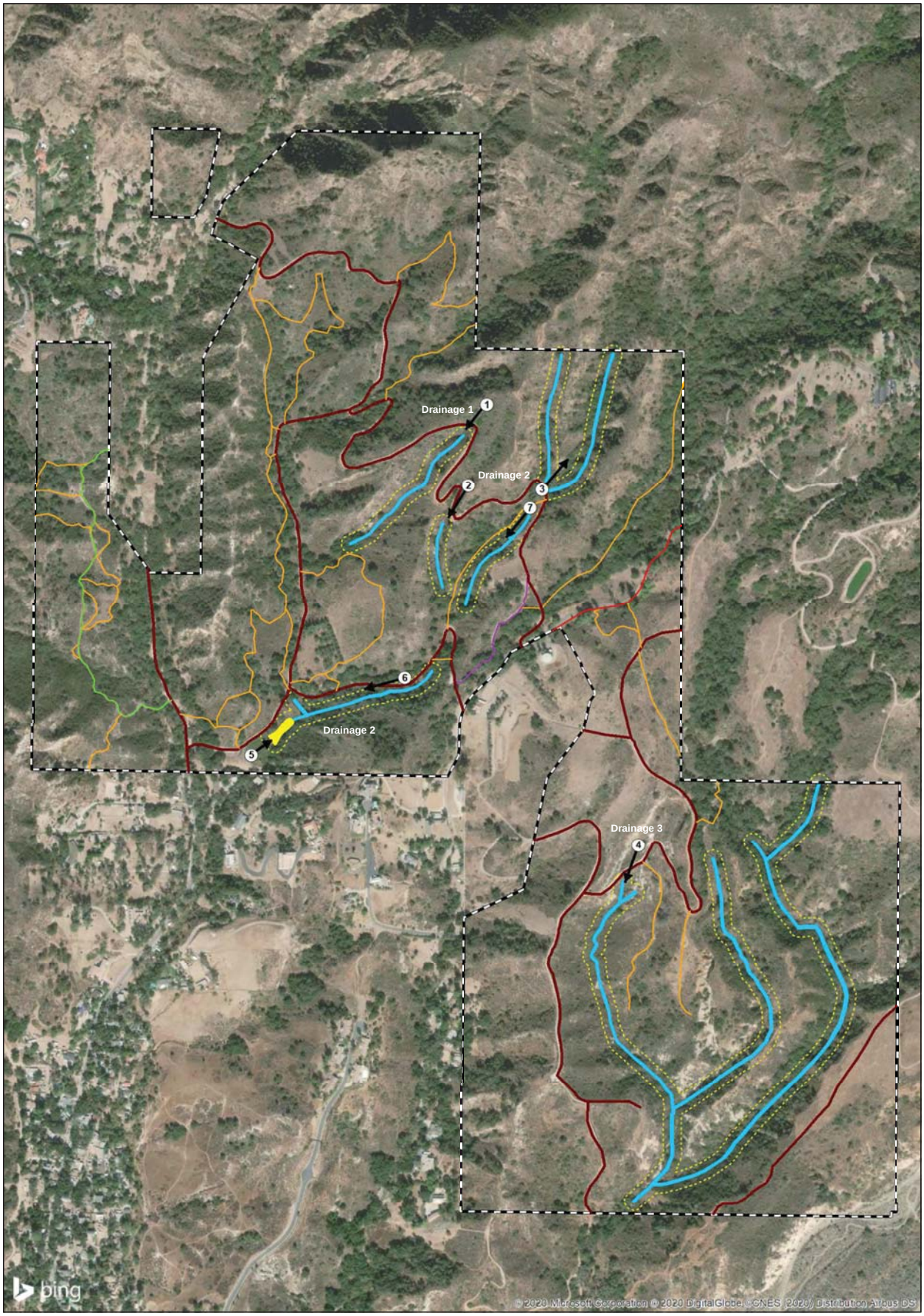
Element E.3 – Annual Report

I. *Task*: *Prepare a summary of general USACE mitigation site conditions/monitoring results and management activities for inclusion in the M2 NCCP/HCP Annual Progress Report, which will be submitted per the RMP.*

Monitoring Summary: GLA biologists conducted monitoring of the USACE/SWRCB mitigation site and adjacent buffer areas on the Trabuco Rose Preserve on March 27, May 7, and June 25, 2019. On May 15 and 16, 2019, arborists from Dudek evaluated trees within the USACE/SWRCB mitigation areas and 50-foot buffer for ISHB, GSOB, and other invasive insects and pathogens and none were found. Overall, the Preserve is in good condition. Waters of the U.S. are in stable condition regarding erosion/aggradation and native vegetation communities and composition. No major issues with invasive species or weed invasions were noted. No water quality issues were observed. Signage, fencing, and gates were checked throughout the Preserve and are intact. The USACE/SWRCB mitigation and buffer areas were monitored for trash and none was observed. Although there are signs of occasional trespass documented vi wildlife cameras on the Preserve (not documented in USACE/SWRCB mitigation or buffer areas), no vandalism (including trail/fence cutting or signage vandalism) has occurred on the Preserve within the recent past. As discussed above, a small amount of fennel and artichoke thistle was present in the very upper portion of a tributary of Drainage 3, which was subsequently removed. No other recommendations were necessary.

II. *Task*: *Make recommendations with regard to (1) any habitat enhancement or restoration measures deemed to be warranted, (2) any problems that need near term attention (e.g., weed removal, fence repair, erosion or aggradation control), and/or (3) any changes in the monitoring or management program that appear to be warranted based on monitoring results to date.*

Monitoring Summary: No habitat enhancement or restoration measures are warranted; no issues were documented that require near term attention, other than the fennel and artichoke thistle in Drainage 3, which was removed; and no changes in the monitoring or management program are currently warranted based on 2019 monitoring results.



Trabuco Rose Preserve Boundary
Non-Wetland Preservation/Mitigation - 1.61 ac.
Wetland Preservation/Mitigation - 0.14 ac.
Corps 50-foot Buffer
Dirt Roads
Foot Trails (Decommissioned)
Foot Trails (Preserve Management)
Foot Trails (Public Access)
Paved Road
1 Photo Location

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TRABUCO ROSE PRESERVE

USACE/SWRCB Preservation/Photo Location Map

GLENN LUKOS ASSOCIATES

Exhibit 1

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TRABUCO ROSE PRESERVE

Site Photographs

GLENN LUKOS ASSOCIATES

Exhibit 2

Photograph 1: Drainage 1 facing southwest. Photo dated May 7, 2019.

Photograph 2: Drainage 2 facing southwest. Photo dated June 25, 2019.

Photograph 3: Drainage 2 facing northeast. Photo dated June 25, 2019.

Photograph 4: Drainage 3 facing southwest. View Photo dated March 27, 2019.

TRABUCO ROSE PRESERVE

Site Photographs

GLENN LUKOS ASSOCIATES

Exhibit 2

Photograph 6: Drainage 2 facing southwest. Photo dated May 7, 2019.

Photograph 5: Drainage 2 facing northeast. Photo dated May 7, 2019.

Photograph 7: Drainage 2 facing south. Photo dated June 25, 2019.

APPENDIX B

MEMORANDUM

GLENN LUKOS ASSOCIATES
Regulatory Services

PROJECT NUMBER: 1184-02MONI

TO: Lesley Hill

FROM: David Moskovitz

DATE: April 9, 2019

SUBJECT: Cactus Resource Mapping at the OCTA M2 Preserves

Glenn Lukos Associates, Inc. (GLA) mapped and characterized cactus resources at the Orange County Transportation Authority (OCTA) M2 preserves for the purpose of resource management planning. The focus of the mapping was on habitat with known occupation by the coastal cactus wren (*Campylorhynchus brunneicapillus sandiegensis*), or with the potential to support cactus wrens, in order to identify cactus-dominated vegetation communities that have a greater degree of sensitivity relative to cactus wrens. It is GLA's understanding that OCTA will be utilizing this mapping for fire management planning since cactus acts as a fire sink. This memorandum identifies the methodology used to map the cactus resources and a summary of the results.

GLA biologists surveyed for cactus resources at the following preserves: Trabuco Rose, Wren's View, Bobcat Ridge, Live Oak Creek, Silverado Chaparral, Pacific Horizon, and Eagle Ridge. Exhibits are attached for all preserves with mapped cactus scrub resources, which included all preserves except Eagle Ridge Preserve. Table 1 below identifies the dates that cactus resources were assessed/mapped for the preserves.

Table 1. Cactus resource surveys at the OCTA preserves.

Preserve	Survey Dates	Biologists
Trabuco Rose	9/27/18 11/14/18 12/20/18 12/27/18	DM ZW, JS ZW, JS DM, JA
Wren's View	10/10/18	DM, JS
Live Oak Creek	10/26/18	DM, JA
Bobcat Ridge	12/18/18	SC, JS
Pacific Horizon	1/2/19	ZW, JS
Silverado Chaparral	1/11/19	ZW, JS
Eagle Ridge	1/28/19	ZW, SC

DM = David Moskovitz; ZW = Zack West; JS = Jillian Stephens; JA = Jeff Ahrens; SC = Stephanie Cashin

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GLA biologists mapped cactus resources based on methodology developed in 2006 by Robert Hamilton in conjunction with cactus/cactus wren studies performed for the Nature Reserve of Orange County (NROC) (Hamilton 2006). The Hamilton methodology identified three categories of cactus resources as follows:

- Cactus scrub – Expanses of mature cactus scrub judged as capable of supporting a cactus wren nest.
- Proto cactus scrub – Other cactus-containing habitats judged as likely incapable of supporting a cactus wren nest.
- Satellites – Individual cactus plants growing outside the boundaries of cactus scrub or proto cactus scrub.

GLA biologists mapped cactus resources qualitatively focusing on the "cactus scrub" category by including contiguous patches of cactus, or coastal sage scrub with a significant portion of cactus intermixed. "Proto cactus scrub" and "satellites" were not mapped since these categories lacked suitable habitat for cactus wrens. Potential habitat for cactus wrens was judged based on the species' known nesting requirements in southern California. In general, cactus wrens require cactus at least one-meter tall growing in a cactus patch expansive enough to protect the nest against predation and disturbance. Single cactus plants that were detached from larger areas of cactus scrub were not mapped, regardless of the size of the plants.

Cactus scrub mapping included habitat where cactus wrens have been documented during past surveys/monitoring at the preserves. Cactus wrens had been documented during baseline surveys performed by BonTerra in 2012, during biological monitoring performed by ICF and GLA, and during focused cactus wren surveys performed by Christine Beck of the California Department of Fish and Wildlife (CDFW) in 2017. Areas of cactus habitat with prior cactus wren detection were still mapped based on suitability, even if cactus wrens were not recently detected during the 2017 surveys or the 2018-2019 biological monitoring.

Prior to conducting fieldwork, GLA reviewed aerial images for each preserve to identify areas that appeared to support cactus resources. Expected areas of cactus scrub were in some cases corroborated through the review of cactus wren mapped through prior focused surveys and biological monitoring. Following the initial review, biologists visited each preserve to confirm mapping from the aerial image review, as well as to map additional cactus scrub not identified in the aerial images. Cactus resources were located and mapped by hiking accessible trails, driving access roads, and through the use of binoculars.

As noted above, cactus scrub resources were mapped at all of the preserves with the exception of the Eagle Ridge Preserve, which does not support any cactus scrub. Table 2 provides a summary of the mapped cactus scrub at the OCTA preserves. The results are based on the methodology detailed in this memo and do not constitute a complete mapping of each cactus patch on the preserves.

Table 2. Mapped cactus scrub summary at the OCTA preserves.

Preserve	Mapped Cactus Scrub (acres)
Trabuco Rose	35.03
Wren's View	14.73
Live Oak Creek	7.27
Bobcat Ridge	1.47
Pacific Horizon	2.76
Silverado Chaparral	0.61
Eagle Ridge	0

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TRABUCO ROSE PRESERVE

actus Scrub ocation Map

GLENN LUKOS ASSOCIATES

Exhibit 1

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WREN'S VIEW PRESERVE

actus Scrub ocation Map

GLENN LUKOS ASSOCIATES

Exhibit 2

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actus Scrub Mapping 7.27 ac.

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LIVE OAK CREEK PRESERVE

actus Scrub ocation Map

GLENN LUKOS ASSOCIATES

Exhibit

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BOBCAT RIDGE PRESERVE

actus Scrub ocation Map

GLENN LUKOS ASSOCIATES

Exhibit

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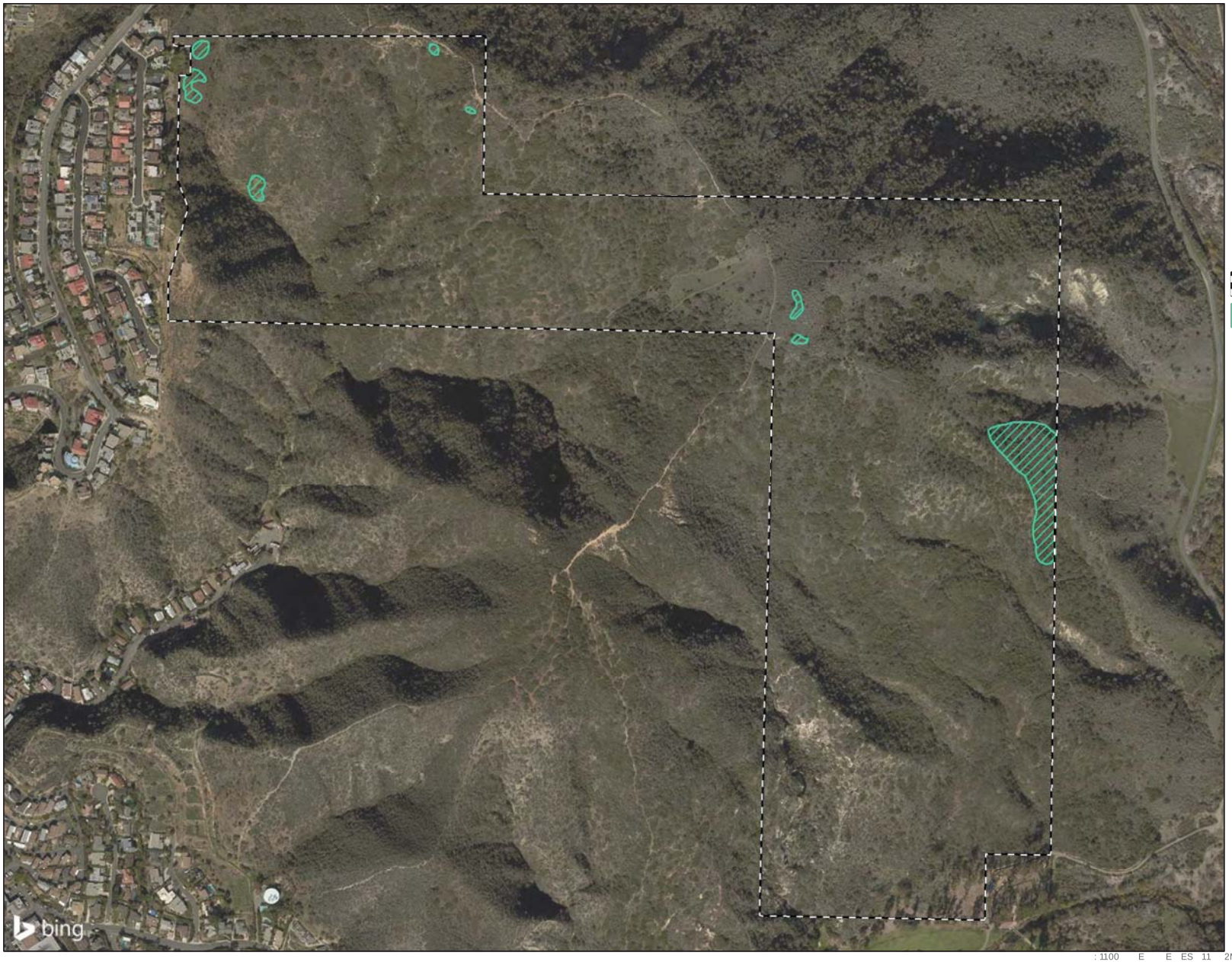

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actus Scrub Mapping 2.76 ac.

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PACIFIC HORIZON PRESERVE

actus Scrub ocation Map

GLENN LUKOS ASSOCIATES

Exhibit 5

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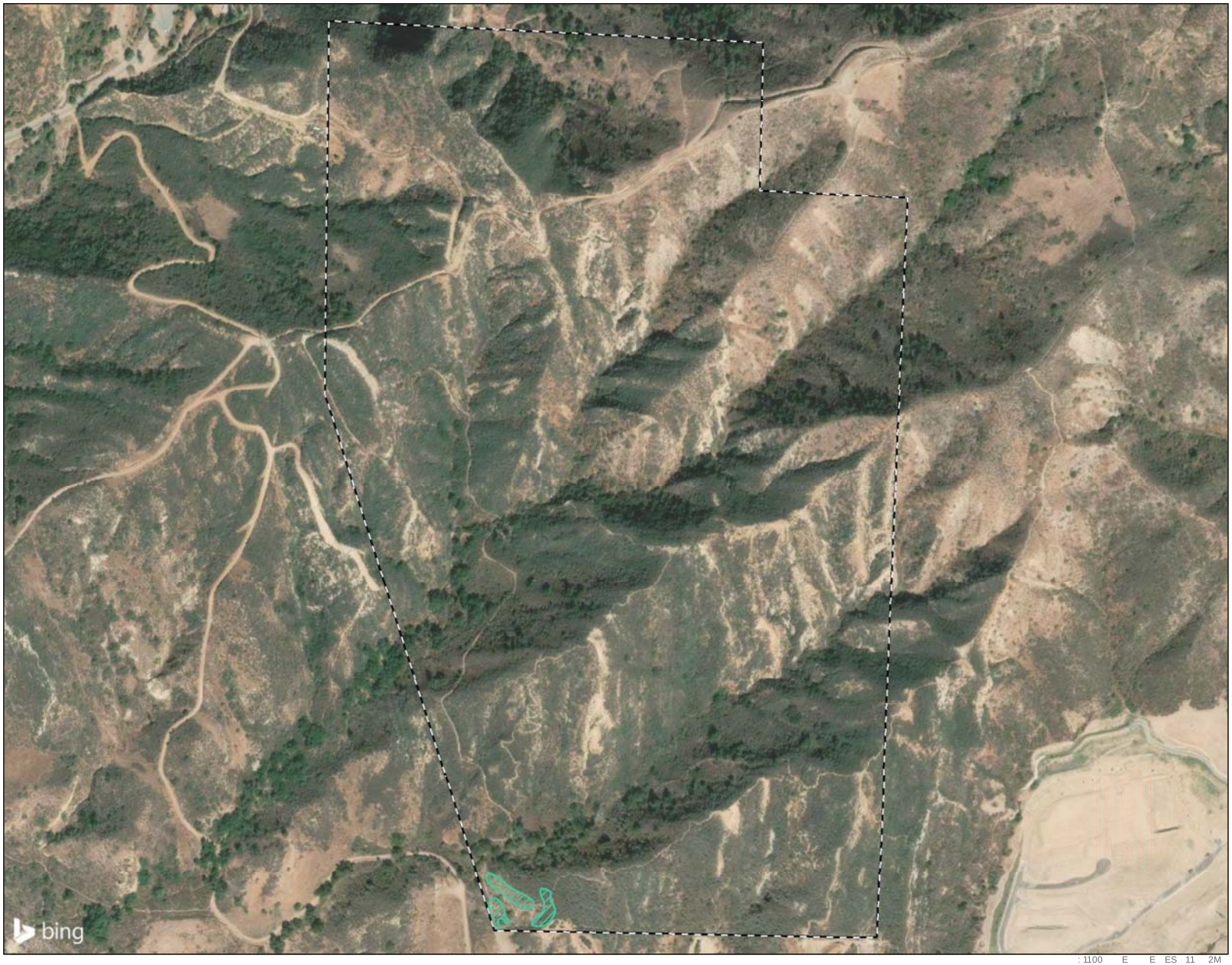

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actus Scrub Mapping 0.61 ac.

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SILVERADO CHAPARRAL PRESERVE

actus Scrub ocation Map

GLENN LUKOS ASSOCIATES

Exhibit 6

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APPENDIX C

RECON

An Employee-Owned Company

May 20, 2019

Ms. Lesley Hill
Project Manager, Environmental Mitigation Program
Orange County Transportation Authority
550 South Main Street
P.O. Box 14184
Orange, CA 92863-1584

Reference: Progress Report for Invasive Species Control Retreatments at Trabuco Rose
(RECON Number 8316)

Dear Ms. Hill:

This letter summarizes the retreatment of invasive species, conducted by RECON Environmental, Inc. (RECON), at the Trabuco Rose (formerly Ferber Ranch) Preserve. Invasive species control work followed the methodology in the approved Invasive Species Management Plan for OCTA M2 Preserves – Trabuco Rose Preserve, prepared by Glen Lukos Associates (GLA; 2017). The initial treatment of the Priority 1 invasive species and some of the Priority 2 invasive species, as classified by GLA (2017), was completed in fall 2018, with results included in a letter report (RECON 2018). This letter documents the retreatment of the invasive species at Trabuco Rose in spring 2019.

The areas of the Trabuco Rose Preserve that were treated for invasive species are presented in Figure 1. Photographs of the work areas have also been included as Attachment 1, Photographs 1 through 12. A summary of the work performed from February 19 through May 6, 2019 is included in Table 1.

Table 1
Summary of Work Completed

Date	Task*
February 19–20, 2019	Invasive treatment work was conducted at (going in the order they were treated): Areas 22, 17, 13, 14, 15, 24, 25, and 26.
March 4–5, 2019	Invasive treatment work was conducted at (going in the order they were treated): Areas 35, D, a portion of 36, a portion of 37, and a portion of 32; the entire areas were not treated due to very wet road conditions and limited access.
April 22–25, 2019	Invasive treatment work was conducted at (going in the order they were treated): Areas 36, 37, 33, 31, C, 28, 47, 42, E, B, and 2.
May 6, 2019	Invasive treatment work was conducted in the remaining portion of Area 32. This was the last day of treatments for the spring season.
*RECON field crews performed invasive treatment work, with direction and oversight conducted by a RECON Restoration Biologist.	

Invasive Species Control Methods

Invasive species control work began on February 19, 2019, and was completed on May 6, 2019. Due to regular rain events and unsafe road conditions following the rainstorms, there was a delay in the work being completed. Following each rain event, the roads were assessed to determine if road conditions were safe enough for the field crew to use for accessing the treatment areas. Although the treatment period

was over a two-month period, the species were treated adequately and at an appropriate time of the year based on their stage of growth.

RECON field crews, under the direction of a RECON biologist and in close coordination with Orange County Transportation Authority (OCTA), retreated pampas grass (*Cortaderia selloana*) in Areas 47, 42, and E; and retreated artichoke thistle (*Cynara cardunculus*) in Areas 22, 17, 13, 14, 15, 24, 25, 26, 35, D, 36, 37, 32, 33, 31, C, 28, 2, and B. There was no retreatment of tamarisk (*Tamarix* spp.) necessary during this round of treatments. The tamarisk treated in fall 2018 in Areas A, 23, 21, 44, G, and F were either completely submerged in water this spring (Area 23; see Figure 1) or were washed downstream by debris flows (Areas F, G, and 44; see Figure 1). The canyon that had the pampas grass and tamarisk (see Figure 1) has become so eroded following the winter rains, that hiking up to the end of the canyon is no longer possible due to the large amounts of rock, boulders, soil, and vegetation that have sloughed into the channel (see Photograph 12).

The primary invasive species that was retreated this spring was artichoke thistle. The field crew revisited all areas that were mowed/mulched in the fall, and treated the resprouts with a glyphosate-based herbicide. For pampas grass, initial treatments were very effective as there were only a few plants with limited green growth observed this spring. The green plant parts were also sprayed with a glyphosate-based herbicide.

Future Work

RECON's recommended follow-up treatment schedule would follow the methods and treatment timelines included in the Invasive Species Management Plan for OCTA M2 Preserves – Trabuco Rose Preserve (GLA 2017). It is recommended that follow-up treatments be performed during the fall season (Table 2), most likely in the September 2019 time frame; however, this could be subject to change based on the rainy season and other weather conditions that could affect the work. For pampas grass, a foliar application with a glyphosate-based herbicide will be applied to resprouts; this same method will be utilized for treating artichoke thistle resprouts. If tamarisk resprouts are present in the fall, a foliar application with a triclopyr-based herbicide is recommended for resprouts.

Table 2
Recommended Follow-up Treatment Schedule

Invasive Species	Recommended Follow-up Treatment
Cortaderia selloana (pampas grass)	Fall (September) – foliar application with a glyphosate-based herbicide on resprouts
Cynara cardunculus (artichoke thistle)	Fall (September) – foliar application with a glyphosate-based herbicide on resprouts
Tamarix spp. (tamarisk)	Fall (September) – foliar application with a triclopyr-based herbicide on resprouts

If you have any questions regarding this letter, please contact me by e-mail (ratik@reconenvironmental.com) or by phone (619-308-9333 ext. 178).

Sincerely,

Raquel Atik
Associate Restoration Biologist

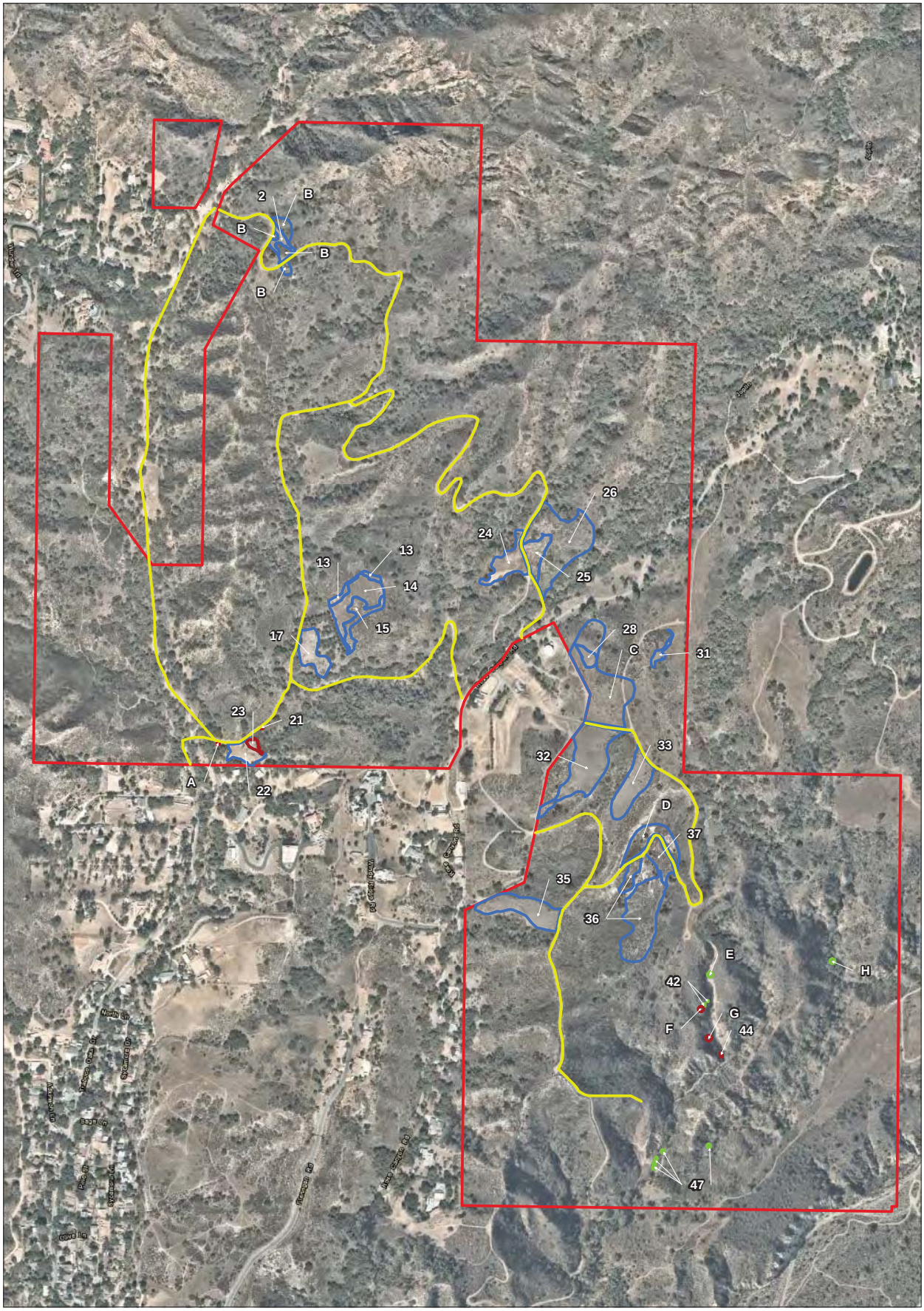
RCA:sh

References Cited

Glen Lukos Associates (GLA)
2017 Invasive Species Management Plan for OCTA M2 Preserves – Trabuco Rose Preserve. November.

RECON
2018 Progress Report for Invasive Species Control at Trabuco Rose (RECON Number 8316). November 19.

Image source: Nearmap (flown September 2018)



Trabuco Rose
Fire Road

Invasive Species Control Areas
Artichoke Thistle
Tamarisk
Pampas Grass

Note: Polygons with numbers were mapped by Glen Lukos Associates; polygons with letters were mapped by RECON

RECON

M:\JOBS5\8316\common_gis\fig1_TrabucoRose.mxd 11/13/2018 fmm

FIGURE 1
Invasive Species Control Areas at Trabuco Rose

ATTACHMENT 1

Photographs

PHOTOGRAPH 1
Area 17, Before Herbicide Application, February 2019

PHOTOGRAPH 2
Area 17, During Herbicide Application, February 2019

PHOTOGRAPH 3
Area 24, During Herbicide Application, February 2019

PHOTOGRAPH 4
Area 25, During Herbicide Application, March 2019

PHOTOGRAPH 5
Area 25, Following Herbicide Application, March 2019

PHOTOGRAPH 6
Area 32, During Herbicide Application, March 2019

PHOTOGRAPH 7
Area 35, Following Herbicide Application, March 2019

PHOTOGRAPH 8
Area 37, Following Herbicide Application, March 2019

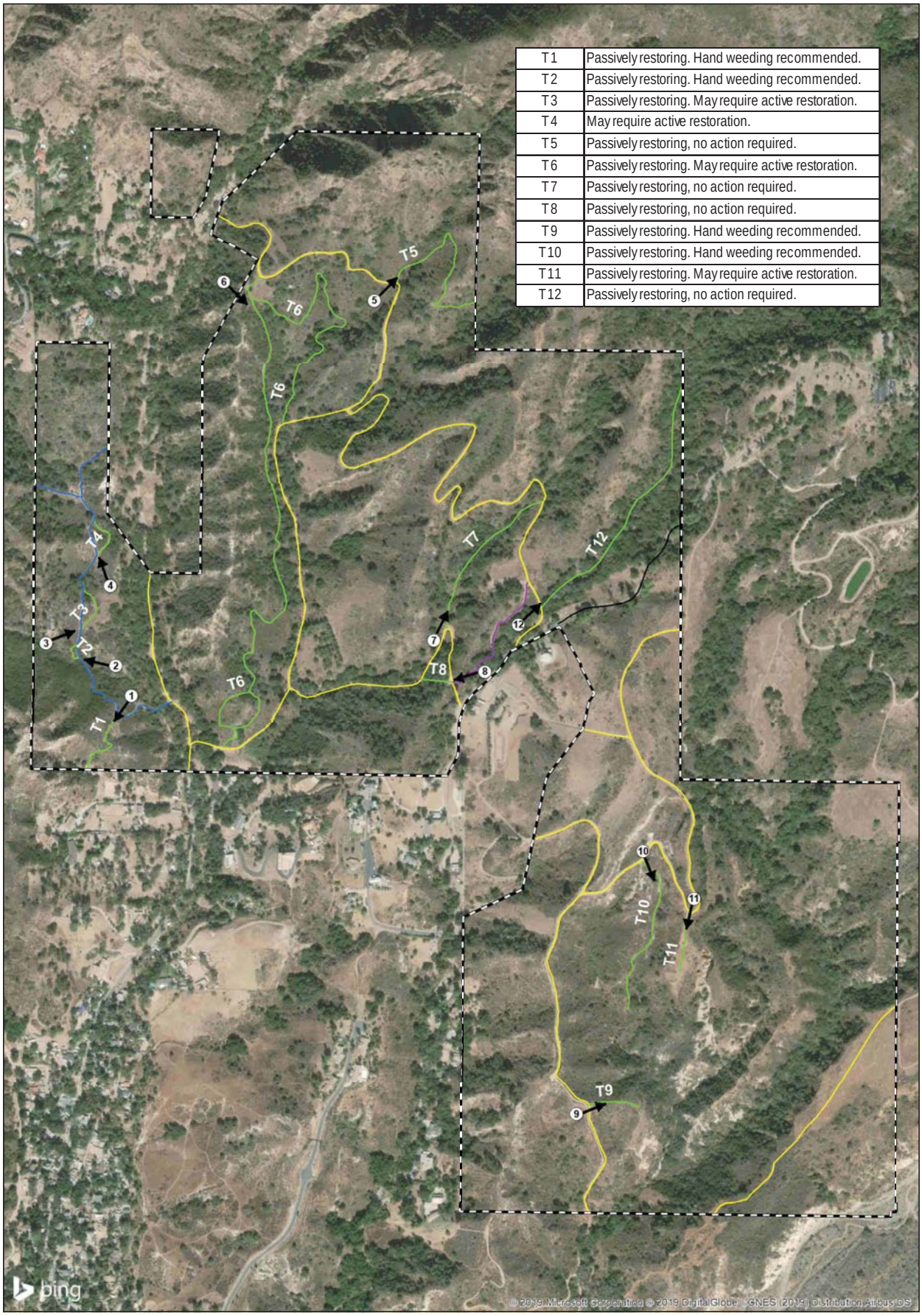
PHOTOGRAPH 9
Area D, Following Herbicide Application, March 2019

PHOTOGRAPH 10
Area B, Following Herbicide Application, April 2019

PHOTOGRAPH 11
Area 47, During Herbicide Application,
April 2019

PHOTOGRAPH 12
Erosion within Canyon, Looking Upstream,
Following Winter Storms, April 2019

APPENDIX D



T1	Passively restoring. Hand weeding recommended.
T2	Passively restoring. Hand weeding recommended.
T3	Passively restoring. May require active restoration.
T4	May require active restoration.
T5	Passively restoring, no action required.
T6	Passively restoring. May require active restoration.
T7	Passively restoring, no action required.
T8	Passively restoring, no action required.
T9	Passively restoring. Hand weeding recommended.
T10	Passively restoring. Hand weeding recommended.
T11	Passively restoring. May require active restoration.
T12	Passively restoring, no action required.

Trabuco Rose Preserve Boundary
Dirt Road
Maintained for Managed Public Access
Maintained for Preserve Management
Passive Restoration
Rose Canyon Road
1 Photo Location*
*Approximate photo locations

N

0 275 550 1,100
Feet

1 inch = 550 feet

TRABUCO ROSE PRESERVE

Trail Monitoring Map - Year 2019

GLENN LUKOS ASSOCIATES

Exhibit 1

X:\1100 AFTER THE REST\1184-1OCTA\1184-1_GIS\FerberRanch_GIS\Trail MonitoringGIS\2019\1184-1_TrailMonitoring2019.mxd

Photograph 1: View of T1 passively restoring with California sagebrush (*Artemisia californica*), black sage (*Salvia mellifera*) and needle grass (*Stipa pulchra*). Hand weeding of tocalote (*Centaurea melitensis*), short podded mustard (*Hirschfeldia incana*), and red brome (*Bromus madritensis* ssp. *rubens*) is recommended.

Photograph 2: View of T2. Trail has further filled in since the 2018 monitoring year with native shrub species. Hand weeding of red brome and veldt grass (*Ehrharta calycina*) is recommended.

Photograph 3: View of T3 vegetated with non-native grasses (*Avena sp.*) mixed with needle grass and native wildflowers. Could benefit from cactus plantings but appears to be only used by wildlife.

Photograph 4: View of T4. Although there are no signs of unauthorized use, the trail is still visibly open and could benefit from seeding of California sagebrush, black sage, and white sage (*Salvia apiana*). Hand weeding of red brome is recommended.

Photograph 6: View of T6. Mix of native and non-native seedlings were noted. Decompaction of soils and seeding with California sagebrush, black sage, and California buckwheat (*Eriogonum fasciculatum*) or cactus planting at the upper portion of the trail is recommended.

Photograph 8: View of T8 passively restoring.

Photograph 5: View of T5 entirely closed in with scrub. No actions are recommended.

Photograph 7: View of T7 of decaying, falling oak, cut branches. Drainage contains non-native grass, but is in a natural condition, therefore no action is recommended at this time.

Photograph 9: View of T9. Trail is naturally recruiting with California sagebrush and native wildflowers. Hand weeding of non-native grasses, short podded mustard, red brome, tocalote, sow thistle (*Sonchus* sp.) and crete weed (*Hedypnois* sp.) is recommended.

Photograph 10: View of T10. Removal of bur clover (*Medicago polymorpha*), tocalote, and artichoke thistle (*Cynara cardunculus*) is recommended.

Photograph 11: View of T11. Natural recruitment of native wildflowers and blue eyed grass (*Sisyrinchium bellum*). Decompaction of soil to allow for further natural recruitment and seeding of California sagebrush, black sage, and needle grass is recommended.

Photograph 12: View of T12, which is a natural drainage course. No action is recommended.

APPENDIX E

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January 14, 2020 11788

Lesley Hill
Project Manager, Environmental Mitigation Program
Orange County Transportation Authority
550 South Main Street
Orange, California 92868

Subject: Invasive Shot Hole Borer Monitoring, Emergent Pest Trapping and Goldspotted Oak Borer Extent Survey – OCTA Preserves, Orange County, California

Dear Ms. Hill,

This letter report includes information from Dudek's invasive shot hole borer (*Euwallacea fornicatus*; ISHB) monitoring surveys in Wren's View and Trabuco Rose Preserves; ISHB emergent pest trapping at Wren's View, Trabuco Rose, Bobcat Ridge, and Live Oak Creek Preserves; and goldspotted oak borer (*Agrilus auroguttatus*; GSOB) extent surveys in Wren's View. All four preserves—Wren's View, Trabuco Rose, Bobcat Ridge, and Live Oak Creek—are owned and managed by the Orange County Transportation Authority (OCTA). Due to the 2017 and 2018 on-site identification of ISHB by Dudek at Wren's View and Trabuco Rose, OCTA and Glenn Lukos Associates expressed concern over the level of infestation and possible spread of ISHB throughout these preserves. As such, OCTA requested that Dudek conduct ISHB monitoring and evaluation surveys to evaluate levels of ISHB infestation within these Preserves.

In addition to ISHB surveys, Dudek conducted GSOB extent surveys within Wren's View Preserve. Potential signs of GSOB were observed by Mathew Karie (Field Supervisor, Audubon Starr Ranch) in May 2019. Due to the potential presence of GSOB on site, OCTA requested that Dudek confirm the presence of GSOB and, if confirmed, conduct surveys to determine the extent of the GSOB infestation within the preserve.

To that end, Dudek arborists certified by the International Society of Arboriculture conducted ISHB monitoring surveys within OCTA-managed Wren's View and Trabuco Rose Preserves; ISHB emergent pest trapping at Wren's View, Trabuco Rose, Bobcat Ridge, and Live Oak Creek Preserves; and GSOB extent surveys within the Wren's View Preserve. The ISHB evaluations were limited to riparian tree species previously mapped within each preserve during the 2018 ISHB surveys. Coast live oak (*Quercus agrifolia*) and other non-riparian species were not locally infested with ISHB and, therefore, were not evaluated for the presence of ISHB. As such, the 2019 ISHB surveys focused on collecting information for accessible riparian tree species (primarily sycamore and willow species) that could be used to estimate the level of ISHB infestation within the two preserves and to provide recommendations for the short- and long-term management of the woodlands and pests.

Assignment

Dudek's assignment included the following:

1. Evaluate previously mapped riparian tree species within Wren's View and Trabuco Rose Preserves maintained by OCTA in Trabuco Canyon, California, for the presence of ISHB infestation.

2. Conduct emergent pest trapping at the following preserves: Bobcat Ridge, Live Oak Creek, Wren's View, and Trabuco Rose.
3. Determine the presence or absence of GSOB within the Wren's View Preserve.
4. Determine the extent of GSOB within the Wren's View Preserve through individual oak tree mapping and visual evaluations.
5. Develop a letter report documenting the survey observations and management recommendations.

Methods

Invasive Shot Hole Borer Monitoring

On May 15 and 16, 2019, Dudek arborists certified by the International Society of Arboriculture conducted ISHB extent surveys limited to the previously mapped riparian tree species within Wren's View and Trabuco Rose Preserves maintained by OCTA. Included in the survey was an assessment of potential infestations of invasive insects and pathogens that can threaten native habitat within 50 feet of preserved waters of the United States as shows in Attachment 1, Figure 17 USACE Preservation/Mitigation Map, prepared by Glenn Lukos Associates. The selection of riparian tree species was based on known ISHB-infested trees documented during the 2017 and 2018 ISHB presence and absence surveys conducted within OCTA Preserves. Dudek arborists evaluated a total 162 riparian trees within the two individual preserves (134 tree in Trabuco Rose Preserve and 28 trees in Wren's View Preserve) and evaluated approximately 1.61 acres of non-wetland preservation/mitigation areas, and 0.14 acres of wetland mitigation area located in Trabuco Rose (light blue drainages and yellow wetland polygon shown in Attachment 1). The locations of the individual mitigation preservation sites and individual trees are illustrated in Attachment 2, Riparian Tree Locations.

The evaluations included visiting previously mapped trees in accessible riparian areas (primarily sycamore and willow species) and noting the presence or absence of ISHB. The surveys were conducted by teams of two (Christopher Kallstrand and Christopher LaCroix) that visited each previously mapped and accessible riparian tree and surveyed for potential signs and symptoms of the presence of ISHB. A tree was counted as infested (or attacked) if it had beetle holes, extrusions of sawdust plugs or frass, or gumming out of sap. The infestation level data collection is consistent with the data collection standards used by Orange County Parks for ISHB surveys. Infestation levels on select trees were categorized as none (no signs or symptoms), low (<50 entry holes), moderate (<50, <150 entry holes, no dieback), moderate II (>150 entry holes, no dieback), and heavy (>150 entry-holes, dieback). Dudek noted any additional pests or observed disease found in the observed trees. Individual evaluated tree locations are presented in Attachment 2, and details regarding each tree are presented in Attachment 3, Riparian Tree Matrices.

Emergent Pest Trapping

To evaluate for the presence of ISHB in areas previously found to not be infested with ISHB, Dudek conducted emergent pest trapping over a 1-month period in July 2019. To conduct emergent pest trapping, Dudek deployed five panel traps, with the chemical lure quercivorol (an ISHB attractant), throughout OCTA managed lands. Specifically, panel traps were deployed at Bobcat Ridge (one trap), Live Oak Creek (one trap), Wren's View (one trap), and Trabuco Rose (two traps). The location of the five panel traps is presented in Attachment 4, Panel Trap Locations. The panel traps were checked twice (May 29 and June 10, 2019) during the monitoring period. Panel traps found to have

potential ISHB samples were submitted to the State of California Department of Food and Agriculture (CDFA) Plant Health and Pest Prevention Services office for lab analysis.

Goldspotted Oak Borer Confirmation and Extent Mapping

Prior to the initiation of the GSOB extent surveys, two Dudek arborists (Mr. Kallstrand and Mr. LaCroix) performed a site visit on June 7, 2019, to the Wren's View Preserve to confirm the presence of GSOB within a tree found to be exhibiting symptoms of GSOB. During the GSOB confirmation evaluation, Dudek collected two samples and photographed each sample for submission to Kevin Turner (Southern California Invasive Pest Coordinator, Retired) at the University of California Division of Agriculture and Natural Resources. Following confirmation of GSOB, Dudek conducted presence/absence surveys throughout Wren's View Preserve. The surveys were conducted in late July and early August 2019 by Dudek arborists, Mr. Kallstrand, Ryan Gilmore, and Jeff Cloud. During the surveys, Dudek evaluated and mapped each coast live oak tree located within the Wren's View Preserve. Each tree was evaluated using the University of California Division of Agriculture and Natural Resources Goldspotted Oak Borer Form. Details included the following attributes:

- Tree Locations (GPS coordinates)
- Tree Species
- Crown Rating (1, 2, 3, 4, or 5)
- Emergence hole rating (1, 2, or 3)
- Bark staining rating (1, 2, 3, or, 4)
- Woodpecker foraging (yes/no)
- Other Damage

In addition to collecting the previously discussed data, Dudek collected individual tree diameter at standard height (4.5 feet above ground level), height, crown spread, tree health, and structure. Sign of GSOB infestation included the presence of D-shaped exit holes approximately 3–4 millimeters (0.15 inches) wide (approximately the diameter of an unsharpened no. 2 pencil lead), bark staining, and crown decline. A tree was noted as potentially having GSOB if a D-shaped exit hole was observed on the tree's trunk. Representative photographs of the site's trees were collected.

Findings

Invasive Shot Hole Borer Monitoring

Dudek arborists re-evaluated 162 riparian trees within the two individual preserves (Wren's View and Trabuco Rose), which included an evaluation of trees located within 50 feet of preserved waters of the United States for the presence of ISHB and other pests. In summary, 134 riparian trees were evaluated in Trabuco Rose Preserve, and 28 riparian trees were evaluated in Wren's View Preserve. Of the two preserve locations surveyed, each were found to contain riparian tree species that exhibit signs and symptoms of ISHB infestation. However, no trees located within 50 feet of preserved waters of the United States, identified in Attachment 1, were found to have invasive insects and pathogens.

Within the two preserves, 21 riparian trees (13 in Wren's View Preserve and 8 in Trabuco Rose Preserve) exhibited signs and symptoms of ISHB. Signs of potential ISHB observed in these trees consisted of bore holes (perfectly round and <0.1 inches in diameter), bark staining (oily dark stain), and frass exudate (sawdust from boring). Symptoms of ISHB included discolored wood, leaf discoloration and wilting, and dieback of entire branches. Infestation rates ranged from high to low. In total, 14 trees had low infestation rates (Trabuco Rose – 7 trees, Wren's View – 7 trees), 6 trees had moderate infestation rates (Trabuco Rose – 1 tree, Wren's View – 5 trees), and 1 tree had a high infestation rate (Trabuco Rose – 0 trees, Wren's View – 1 tree). The individual tree observed to have high levels of ISHB is considered to be a reproductive tree (heavily infested with more than 150 entry holes) ISHB was not observed on any red willow (*Salix laevigata*), and no newly infested trees were observed. As such, no trees located within 50 feet of preserved waters of the United States were found to have invasive insects and/or pathogens. Individual tree health information and infestation rates are presented in Attachment 3, and the location of the individual trees can be found in Attachment 2. No new pests and/or disease were observed on the Trabuco Rose Preserve; GSOB (as discussed in the following section, Goldspotted Oak Borer Confirmation and Extent Surveys) was positively identified in Wren's View Preserve.

Emergent Pest Trapping

Dudek monitored five panel traps located at Bobcat Ridge (one trap), Live Oak Creek (one trap), Wren's View (one trap), and Trabuco Rose (two traps). The location of the five panel traps is presented in Attachment 4. Three panel traps, located at Trabuco Rose (two traps) and Wren's view (one trap), were submitted to the CDFA Plant Health and Pest Prevention Services for identification/confirmation of ISHB. No ISHB samples were collected or identified within Bobcat Ridge or Live Oak Creek. The three panel traps submitted for evaluation were found not to have ISHB. The sample submission positively identified scolytid beetle (*Euwallacea spp*), a common ambrosia beetle that attacks distressed trees. The results of the CDFA evaluation are presented in Attachment 5, California Department of Food and Agriculture Results.

Goldspotted Oak Borer Confirmation and Extent Surveys

Dudek arborists visited Wren's View Preserve on June 7, 2019, to confirm the presence of GSOB within a coast live oak tree found to be exhibiting symptoms (D-shaped holes) of GSOB. During the GSOB confirmation evaluation, Dudek collected two samples and photographed each sample for submission to Kevin Turner (Southern California Invasive Pest Coordinator, Retired) at the University of California Division of Agriculture and Natural Resources. The samples were confirmed to be GSOB on June 8, 2019, by Kevin Turner. Following confirmation of the GSOB infested tree, Dudek conducted GSOB extent and presence/absence surveys of the Wren's View Preserve. In total, Dudek mapped and evaluated 690 coast live oak trees within the preserve. Of the 690 mapped and evaluated trees, nine were found to exhibit signs of GSOB. Levels of potential GSOB within the nine trees ranged from low (five trees) to moderate (four trees). No trees were found to have high occurrences of GSOB exit holes. The nine trees are comprised of two trees in fair health, three trees in poor health, and four dead trees. As shown in Attachment 6, Goldspotted Oak Borer Distribution Overview at Wren's View Preserve, the trees exhibiting signs of GSOB are located along Live Oak Canyon Road and along a site access road within the preserve. Overall, 1.3% of the trees inventoried on site were found to exhibit signs of GSOB. The remaining 681 trees were found to exhibit no sign of GSOB. This does not mean that these trees do not have GSOB, it only means that they did not exhibit sign of GSOB at the time of the inventory. Individual tree details are presented in Attachment 7, Oak Tree Information Matrix.

Discussion and Recommendations

Invasive Shot Hole Borer Surveys, Monitoring, and Trapping

ISHB was discovered in Los Angeles County in 2003 and has continued to spread throughout Los Angeles, Riverside, Orange, and San Diego Counties. ISHB is nearly identical to the tea shot hole borer (*Euwallacea fornicatus*), an exotic Asian ambrosia beetle from Sri Lanka (Center for Invasive Species Research 2014). ISHB, unlike many other ambrosia beetles, has formed a symbiotic relationship with the fungal pathogen Fusarium. According to the Center for Invasive Species Research at the University of California, Riverside (UCR), the "Fusarium species is inoculated into its host by the ISHB, and once inside the host species, the fungus destroys the food and water conducting systems of the tree, eventually causing stress and dieback. The larvae of the beetles within the beetle gallery in infected trees feed on the fungus, forming a symbiotic relationship between the fungus and beetle" (Center for Invasive Species Research 2014). It is through this process that ISHB and associated Fusarium are able to thrive in the host species.

As of 2018, ISHB is known to attack over 200 tree species, including but not limited to California sycamore (*Platanus racemosa*), white alder (*Alnus rhombifolia*), avocado (*Persea americana*), Chinese flame (*Koelreuteria bipinnata*), red willow, coast live oak, Chinese pistache (*Pistacia chinensis*), camphor (*Cinnamomum camphora*), and sweetgum (*Liquidambar styraciflua*). A detailed list of host species and their susceptibility to ISHB and Fusarium dieback is provided in Attachment 8, Invasive Shot Hole Borer Host Tree Species. However, according to the University of California, only 67 tree species have been confirmed as reproductive hosts, including the native riparian species coast live oak, California sycamore, Fremont cottonwood (*Populus fremontii*), red willow, and white alder (University of California 2018).

Due to the wide range of known native tree species susceptible to attack by ISHB and the ISHB's symbiotic relationship with the fungal pathogen Fusarium, the potential for damage to the native landscape is substantial. Several native tree species susceptible to attack, such as California sycamore and coast live oak, commonly occur throughout OCTA lands and are considered a key component of OCTA's managed lands' ecosystems and overall biodiversity. As such, management, to the extent feasible, will be important to maintain a healthy forest ecosystem.

Based on the results of the 2019 surveys and supplemental emergent pest trapping, ISHB is considered active within the Wren's View and Trabuco Rose Preserves. However, based on the findings of the 2019 ISHB survey, ISHB continues to be in the early stages of infestation. Furthermore, with the exception of three interior trees found on the Trabuco Rose Preserve and two interior trees found on the Wren's View Preserve, the majority of ISHB signs and symptoms continue to be found on the periphery of the western boundaries of the two sites. The observation of ISHB along the sites' western boundaries along Trabuco Canyon is believed to be due to high infestation levels observed throughout O'Neill Regional Park and ISHB's active spread throughout the region. Alternatively, the observation of ISHB sign within the interior of the two preserves continues to be considered an outlier from the observed population along the edge of the two properties. However, based on the ISHB's potential for spread, it is within the ISHB's zone of influence/impact for the area.

The observation of ISHB signs and symptoms within the interior of Wren's View and Trabuco Rose Preserves is significant due to the risk presented to the adjacent California sycamore tree population. However, only one tree (Tree No. 17) located on Wren's View was found to exhibit high levels of ISHB, while the remaining 20 trees exhibited low to moderate signs of ISHB. Furthermore, observed levels of ISHB within the two preserves were

consistent with the 2018 surveys, and no new occurrences of ISHB were observed. As such, the following treatment options are recommended:

1) ISHB Treatment – As with many insect infestations, it is at the early stages that the outbreak/infestation can be controlled. In an effort to maintain and limit the spread of ISHB throughout the remaining areas of Wren's View and Trabuco Rose Preserves, it is recommended that the 20 trees observed to have low to moderate signs and symptoms of ISHB be treated by means of a trunk spray with Bifenthrin, Bacillus subtilis, and Pentra-Bark or similar. The above recommended pesticide and fungicide treatments should be conducted by a reputable licensed company that specializes in such and has a Pest Control Advisor and Applicator on staff.
2) Removal – Tree No. 17 on the Wren's View property was found to have high levels of ISHB and has the potential to be an amplifier tree. As such, to protect the adjacent tree, Tree No. 17 is recommended for removal. Additionally, to minimize the spread of ISHB, Dudek recommends that tree material be disposed of so that bark- and wood-boring insects are not attracted to the fresh cuttings and do not emerge and begin seeking out other stressed trees. To address this specific issue, the University of California, Davis, recommends that

   > all material, not removed from the site, should be tightly sealed beneath thick (10 mil [millimeter]), clear plastic sheets in a sunny location for several months to exclude attacking beetles, and kill any beetles already infesting wood. To be effective, solar/plastic treatment requires vigilance and careful execution. It is important to keep wood piles small, use high-quality clear plastic resistant to UV (ultraviolet light) degradation, and thoroughly seal edges and promptly patch holes to prevent beetles from escaping. (Seybold et al. 2008)

   Should solarization prove unfeasible, it is recommended that the material be chipped to less than 1 inch. According to UCR, chipping to less than 1 inch would reduce the spread of beetle by 95%–98%.
3) Monitoring – Dudek recommends that OCTA maintain an active ISHB monitoring, treatment, and removal program that focuses on riparian tree species identified and mapped within this letter report. Specifically, it is recommended that this program focus on high-priority areas located throughout OCTA Preserves. Areas that should be considered for monitoring include but are not limited to high-use recreation areas, native oak woodlands, and riparian areas that do not contain ISHB, and those areas identified within this letter report. The frequency of ISHB monitoring within the selected areas should be conducted on a biweekly (i.e., every other week) basis during peak flight season (November through March). Active and frequent monitoring would allow OCTA land managers to identify ISHB quickly and to remove infested material before ISHB spreads into uninfested areas. This type of monitoring is currently employed in Riverside County by the U.S. Fish and Wildlife Service in conjunction with UCR. As previously stated, with many insect infestations, it is at the early stages that the outbreak/infestation can be controlled. As such, routine monitoring of the site will play an important role in managing ISHB within OCTA preserves.

Goldspotted Oak Borer Confirmation and Extent Mapping

GSOB is an invasive pest found throughout San Diego County—and to a lesser extent in Riverside, Orange, Los Angeles, and San Bernardino Counties—that poses a significant threat to the region's oak trees. GSOB is native to southeastern Arizona and was first identified in San Diego in 2004 (UCR 2019). According to UCR, since 2002 it has been estimated to have contributed to the death of over 80,000 oak trees. The GSOB primarily attacks three species of oaks, including, coast live oak, canyon live oak (*Quercus chrysolepis*), and California Black oak (*Quercus kelloggii*).

The borer's larvae create feeding galleries beneath the surface of the bark and can often be identified by D-shaped exit holes, blistering and oozing, crown thinning, twig and branch dieback, and premature leaf loss. The larvae damage the phloem and xylem, the nutrient and water conducting tissues of plants. The larvae damage both of these tissues as well as the cambium, a unicellular layer between the phloem and xylem that is responsible for the radial growth of the tree, which eventually leads to the death of the tree (UCR 2019). GSOB is considered to be a significant threat to the region's oak resources.

The observation of GSOB within the Wren's View Preserve is the first such recorded observation in Trabuco Canyon, California, and as such is considered a threat to the canyon's oak tree resources. The total extent of GSOB within the canyon is unknown. However, based on the 2019 surveys conducted within Wren's View Preserve, the infestation is suspected to be at the early stages and, as such, may be controllable. To manage the observed GSOB outbreak within Wren's View, it is recommended that OCTA follow the protocol utilized to manage the GSOB outbreak in Weir Canyon, California. Specifically, it is recommended that any trees found to have high levels of GSOB be removed and debarked, and all other trees greater than 10 inches in diameter within 200–300 feet of an infested, including the infested tree, be chemically treated with carbaryl as a trunk spray. As such, based on the 2019 Wren's View Extent Survey, it is recommended that the initial tree (Tree No. 1) found to have GSOB be removed (it was retroactively removed in July 2019), eight trees found to have low to moderate levels be chemically treated, and all trees greater than 10 inches in diameter located within 200–300 feet of the infested trees be chemically treated. Chemical treatments will help to minimize the spread of GSOB and reduce current populations. Prior to performing the chemical treatments, it is recommended that OCTA develop a comprehensive GSOB treatment plan. Details regarding the Weir Canyon treatment method can be found in Attachment 9, Survey and Management of the Goldspotted Oak Borer Outbreak in Weir Canyon, Irvine Ranch Open Space 2014–2016. In addition to treating and managing the outbreak in Wren's View, it is recommended that OCTA work with adjacent landowners, as feasible, to identify and manage GSOB. Similar to ISHB, it will be important to monitor the spread and/or containment of GSOB within Wren's View. As such, it is recommended that OCTA continue annual monitoring of the site for the presence/absence and spread of GSOB on site. It is recommended that the annual surveys occur during peak emergence/flight season for GSOB. This will allow surveyors to assess trees that exhibit newly emerged GSOB and recommend the appropriate treatment if needed.

Conclusion

This letter report provides conclusions and recommendations based on the examination of trees located within Bobcat Ridge, Live Oak Creek, Wren's View, and Trabuco Rose Preserves; a visual examination of the trees and surrounding site by Dudek's International Society of Arboriculture-certified arborists; and the reasonable reliance on the completeness and accuracy of the information provided to the arborists. The examination did not include subterranean or internal examination of the trees.

Arborists are tree specialists who use their education, knowledge, training, and experience to examine trees; recommend measures to enhance the beauty and health of trees; and attempt to reduce the risk of living near them. Although trees provide many benefits to those who live near them, they also include inherent risks from breakage or failure that can be minimized but not eliminated.

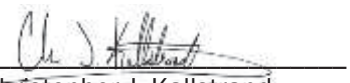
Arborists cannot detect every condition that could possibly lead to the failure of a tree. Trees are living organisms subject to attack by disease, insects, fungi, weather, and other forces of nature, and conditions that lead to failure are often hidden within trees and below ground. There are some inherent risks associated with trees that cannot be predicted with any

degree of certainty, even by a skilled and experienced arborist. Arborists cannot predict acts of nature, including storms of sufficient strength, which can cause even an apparently healthy tree to fail. Additionally, arborists cannot guarantee that a tree will be healthy or safe under all circumstances or for any specific period of time. A tree's condition could change over a short or long period of time due to climatic, environmental, and other conditions. Further, there is no guarantee or certainty that recommendations or efforts to correct unsafe conditions will prevent future breakage or failure of a tree.

To live or work near trees is to accept some degree of risk. Neither the author of this letter report nor Dudek assumes responsibility or liability for any claims, losses, or damages to any tree, death or injury to any person, or loss of or damage to any personal or real property.

I would be pleased to answer any questions or respond to any comments regarding this letter report. I can be contacted at 949.373.8310 or ckallstrand@dudek.com.

Sincerely,



Christopher J. Kallstrand
Certified Arborist No. WE-8208A

Att.: 1, Figure 17 USACOE Preservation/Mitigation Map
2, Riparian Tree Locations
3, Riparian Tree Matrices
4, Panel Trap Locations
5, California Department of Food and Agriculture Results
6, Goldspotted Oak Borer Distribution Overview at Wren's View Preserve
7, Oak Tree Information Matrix
8, Invasive Shot Hole Borer Host Tree Species
9, Survey and Management of the Goldspotted Oak Borer Outbreak in Weir Canyon, Irvine Ranch Open Space 2014–2016

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Attachment 1

Figure 17 USACOE Preservation/Mitigation Map

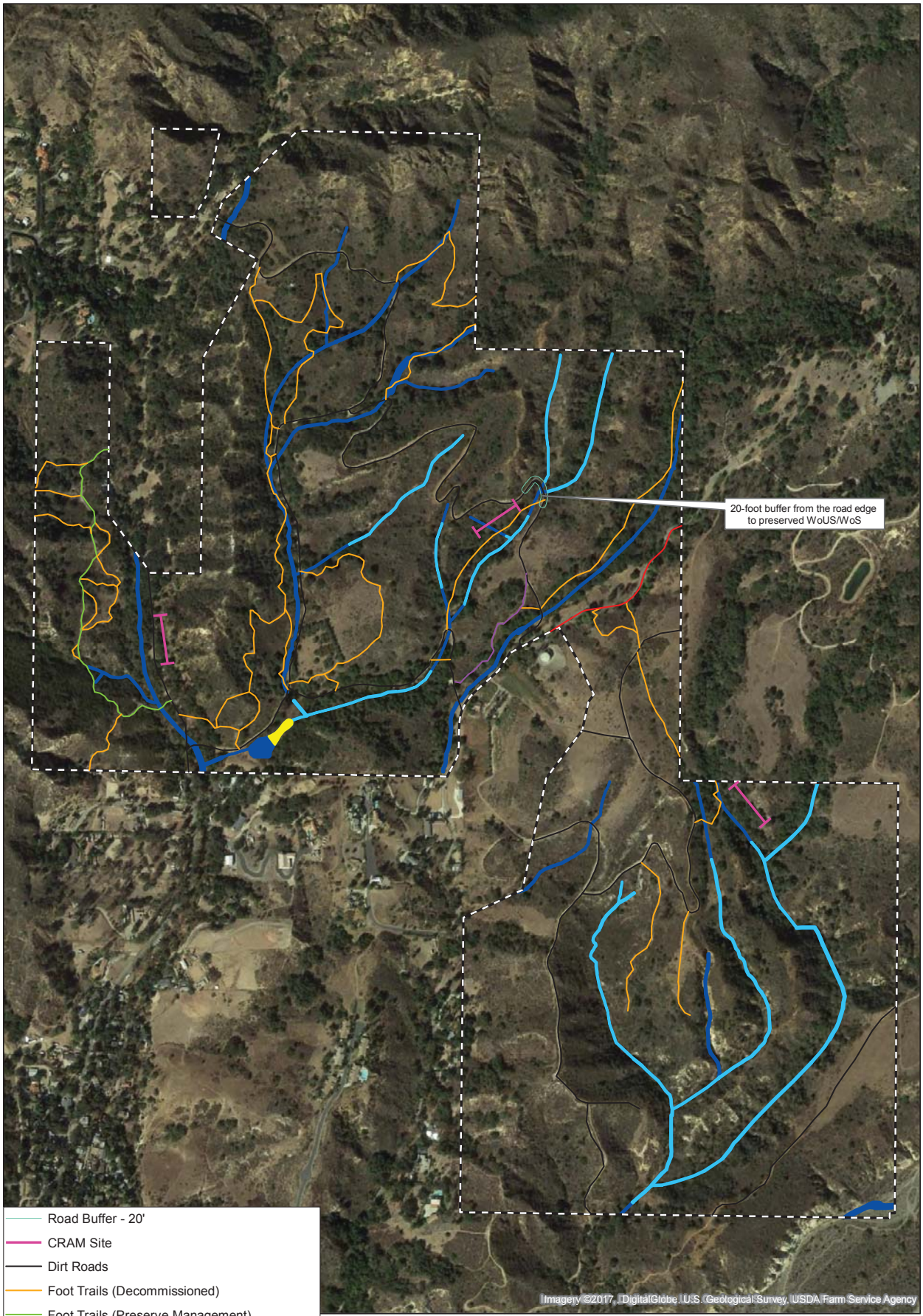


FIGURE 17

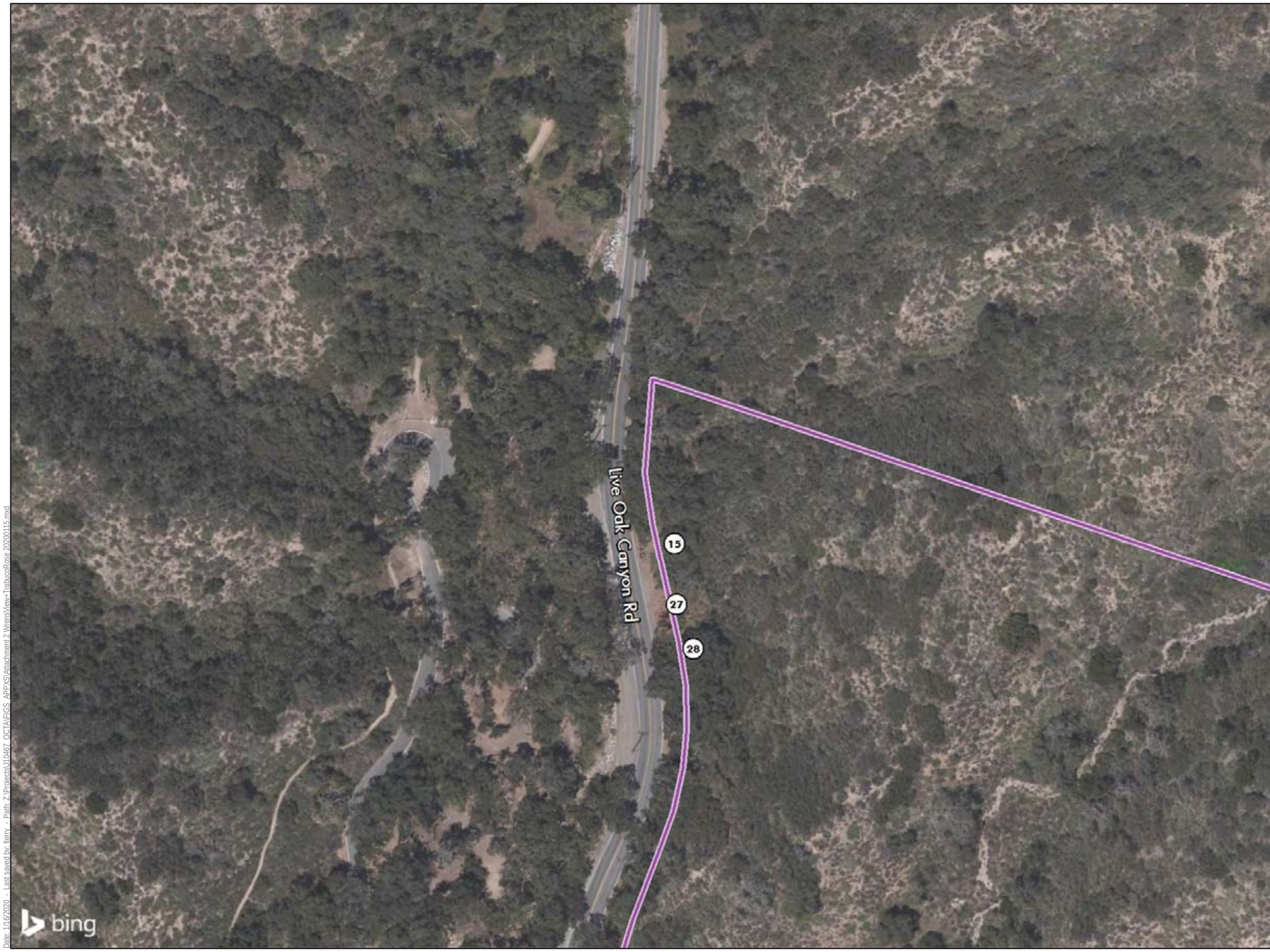
USACOE Preservation/Mitigation Map

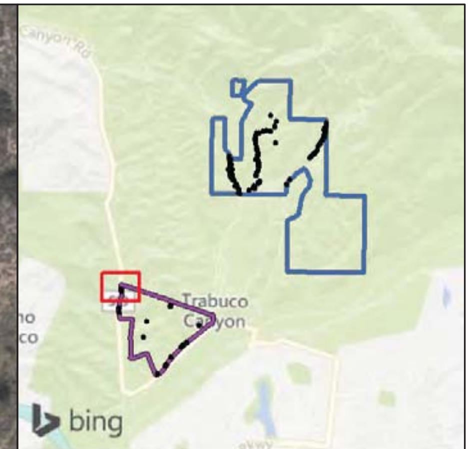
GLENN LUKOS ASSOCIATES

X:\1100 AFTER THE REST\1184-1OCTA\1184-1_GIS\FerberRanch_GIS\MitigationGIS\1184-1_CorpsMitigation.mxd

Attachment 2

Riparian Tree Locations





ISHB Infestation Levels

- No ISHB Observed (3)
- Wren's View

SOURCE: AERIAL- BING MAPPING SERVICE 2018

DUDEK

0 45 90 Feet

ATTACHMENT 2 - Wren's View Sheet 1

Riparian Tree Locations

Invasive Shot Hole Borer Extent Evaluations - Wren's View and Trabuco Rose Preserves

SOURCE: AERIAL - BING MAPPING SERVICE 2018

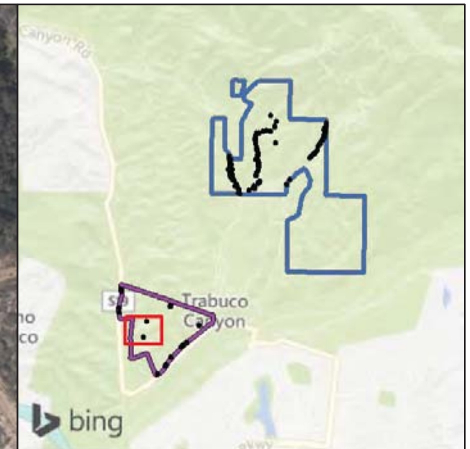
DUDEK

0 45 90 Feet

ATTACHMENT 2 - Wren's View Sheet 2

Riparian Tree Locations

Invasive Shot Hole Borer Extent Evaluations - Wren's View and Trabuco Rose Preserves



ISHB Infestation Levels

○ No ISHB Observed (2)

▭ Wren's View

SOURCE: AERIAL- BING MAPPING SERVICE 2018

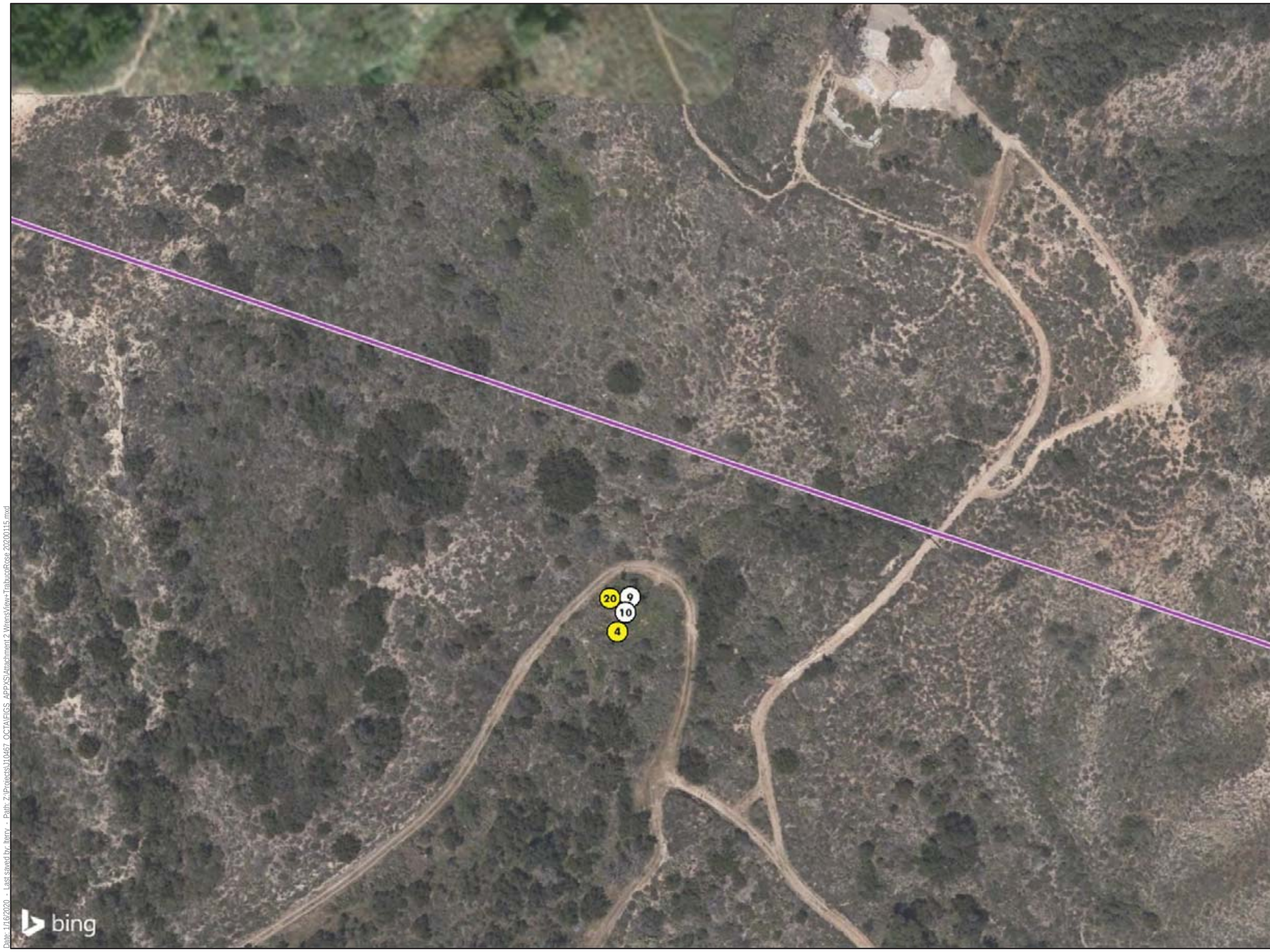
DUDEK

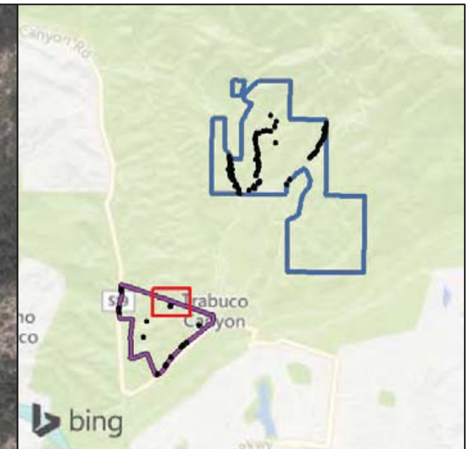
0 45 90 Feet

ATTACHMENT 2 - Wren's View Sheet 3

Riparian Tree Locations

Invasive Shot Hole Borer Extent Evaluations - Wren's View and Trabuco Rose Preserves





ISHB Infestation Levels

- Moderate (2)
- No ISHB Observed (2)
- Wren's View

SOURCE: AERIAL - BING MAPPING SERVICE 2018

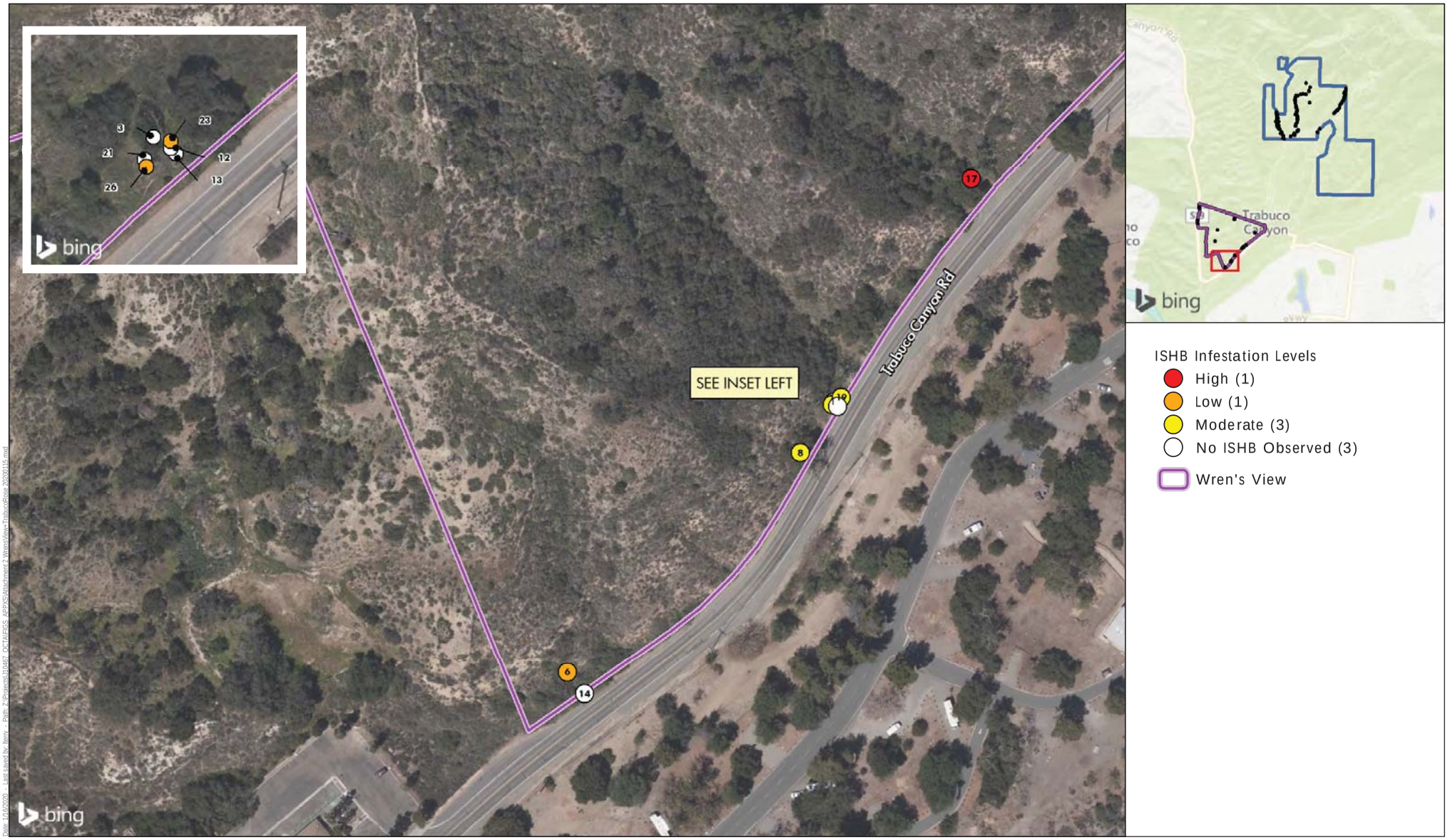
DUDEK

0 45 90 Feet

ATTACHMENT 2 - Wren's View Sheet 4

Riparian Tree Locations

Invasive Shot Hole Borer Extent Evaluations - Wren's View and Trabuco Rose Preserves



SOURCE: AERIAL- BING MAPPING SERVICE 2018

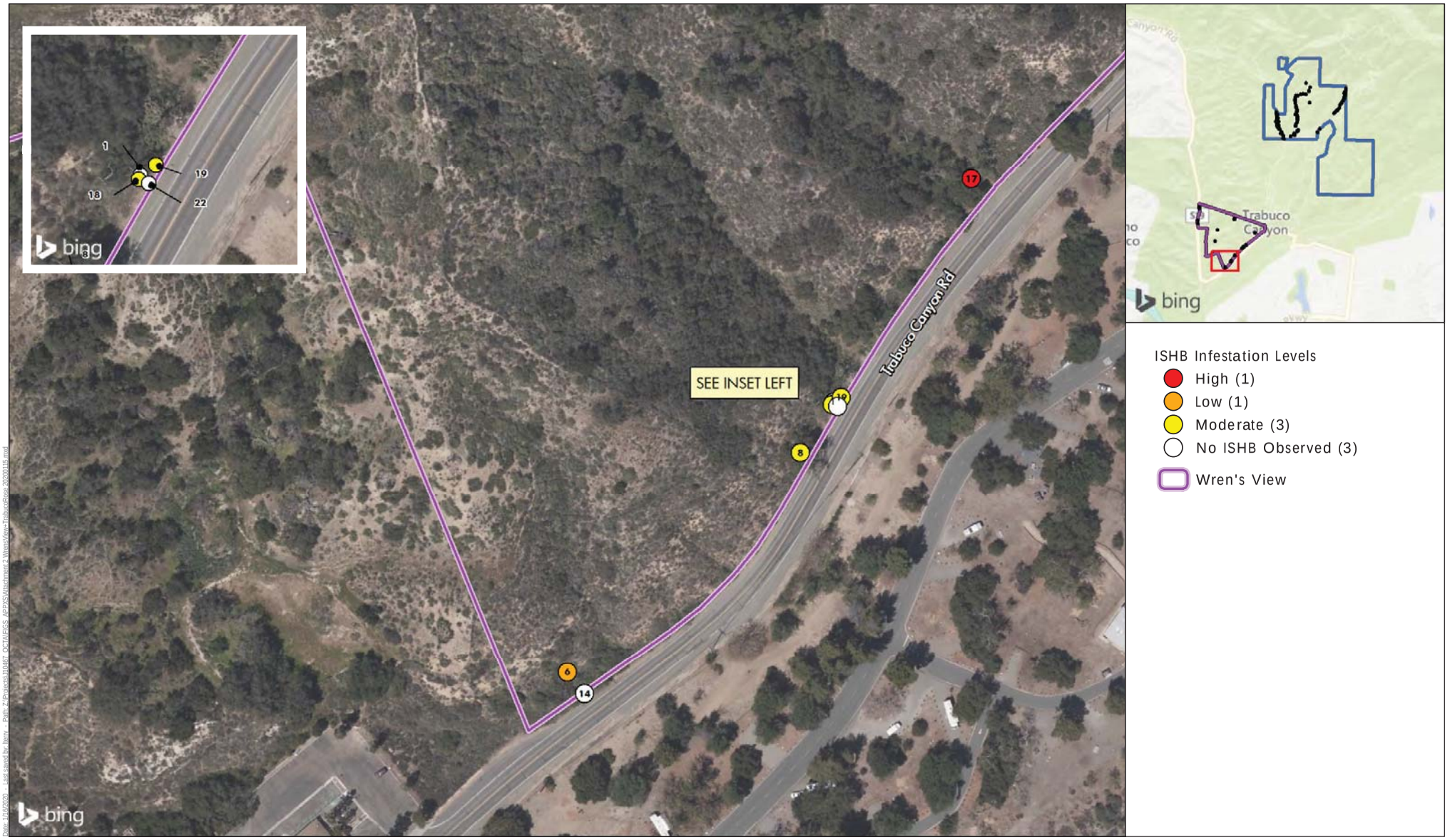
DUDEK

0 45 90 Feet

ATTACHMENT 2 - Wren's View Sheet 6

Riparian Tree Locations

Invasive Shot Hole Borer Extent Evaluations - Wren's View and Trabuco Rose Preserves



SOURCE: AERIAL- BING MAPPING SERVICE 2018

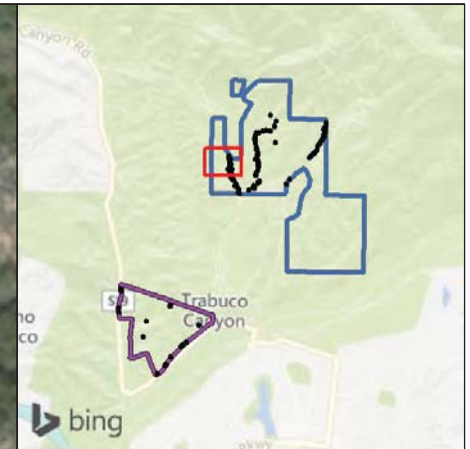
DUDEK

0 45 90 Feet

ATTACHMENT 2 - Wren's View Sheet 6

Riparian Tree Locations

Invasive Shot Hole Borer Extent Evaluations - Wren's View and Trabuco Rose Preserves



ISHB Infestation Levels

No ISHB Observed (17)

Trabuco Rose

Date: 1/16/2020 - Last saved by: fterry - Path: Z:\Projects\j10467_OCTA\FIGS_APPXS\Attachment 2 WrensView+TrabucoRose 20200115.mxd

SOURCE: AERIAL- BING MAPPING SERVICE 2018

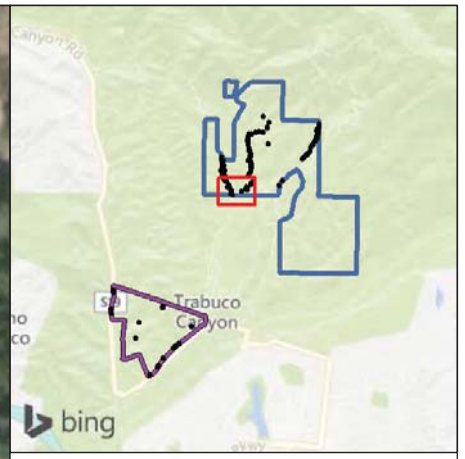
DUDEK

0 45 90 Feet

ATTACHMENT 2 - Trabuco Rose Sheet 7

Riparian Tree Locations

Invasive Shot Hole Borer Extent Evaluations - Wren's View and Trabuco Rose Preserves



ISHB Infestation Levels

- Low (4)
- Moderate (1)
- No ISHB Observed (27)
- Trabuco Rose

SOURCE: AERIAL- BING MAPPING SERVICE 2018

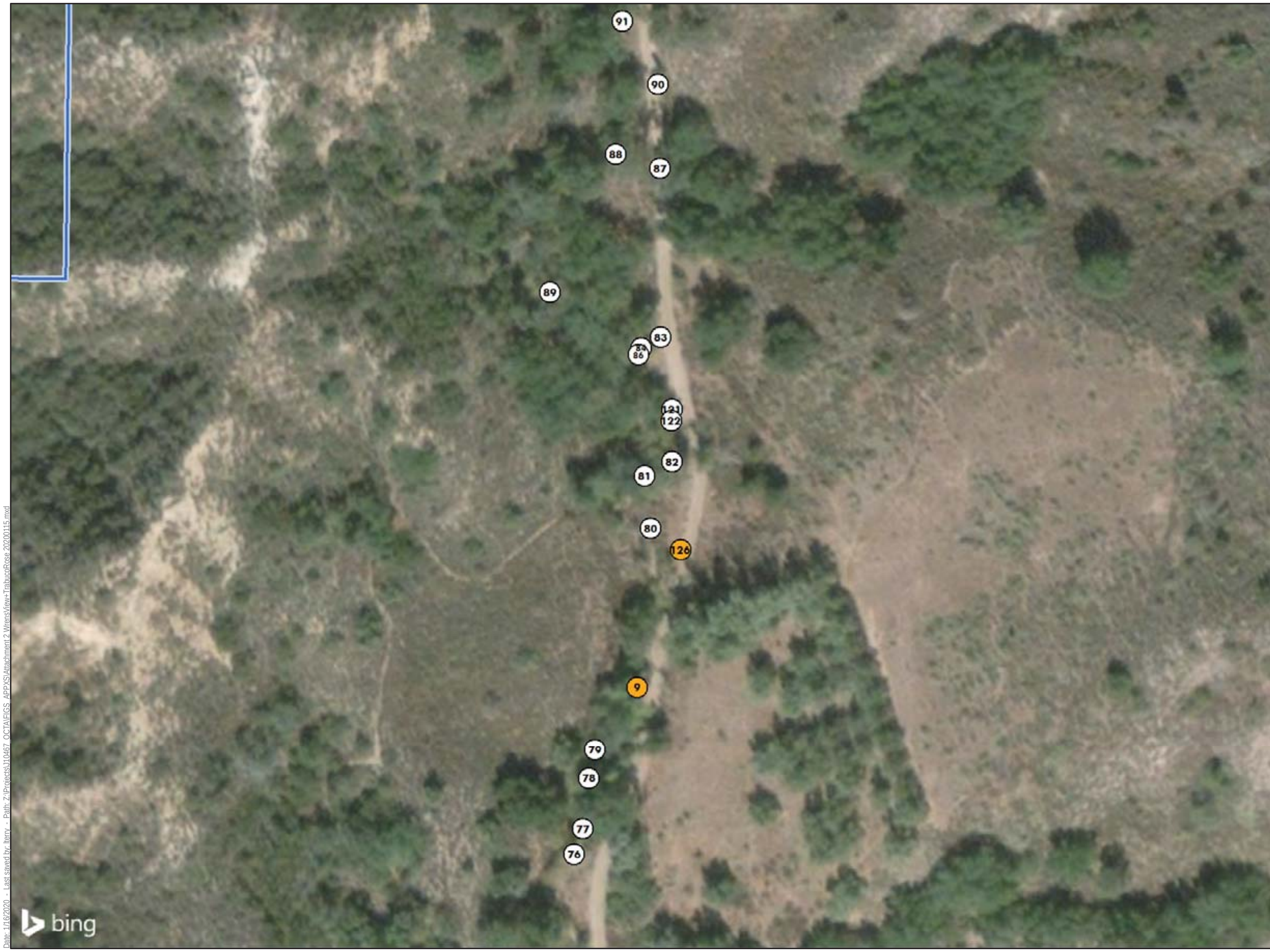
DUDEK

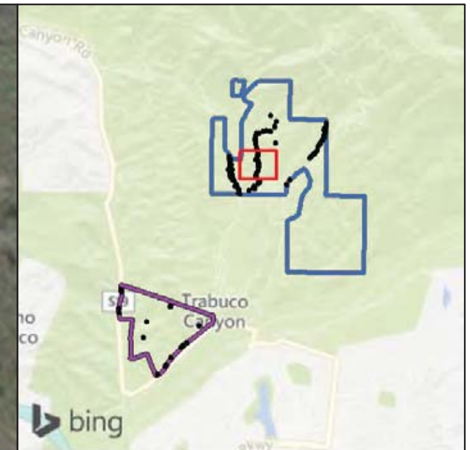
0 45 90 Feet

ATTACHMENT 2 - Trabuco Rose Sheet 8

Riparian Tree Locations

Invasive Shot Hole Borer Extent Evaluations - Wren's View and Trabuco Rose Preserves





ISHB Infestation Levels

- Low (2)
- No ISHB Observed (18)
- Trabuco Rose

SOURCE: AERIAL- BING MAPPING SERVICE 2018

DUDEK

0 45 90 Feet

ATTACHMENT 2 - Trabuco Rose Sheet 9

Riparian Tree Locations

Invasive Shot Hole Borer Extent Evaluations - Wren's View and Trabuco Rose Preserves

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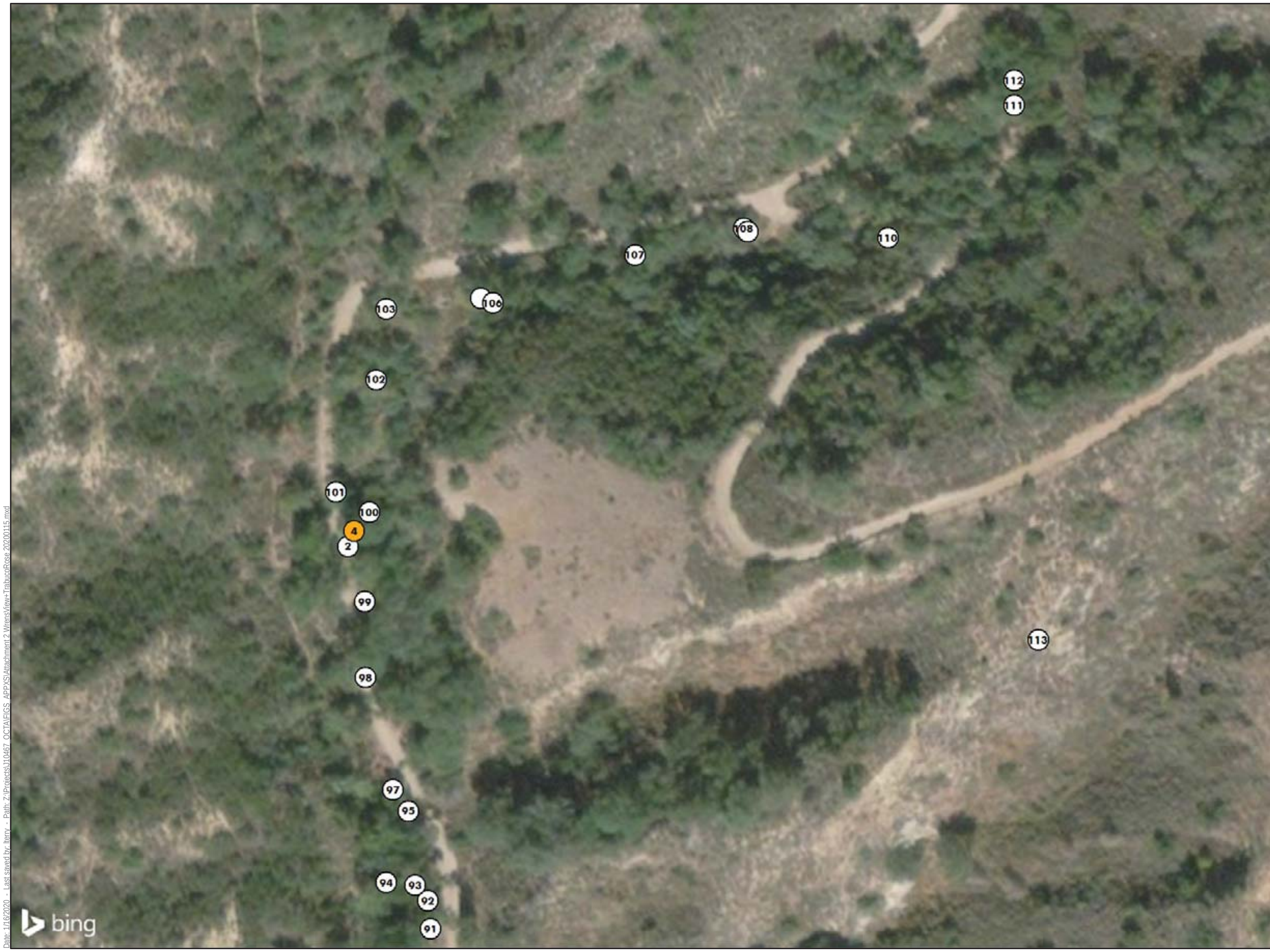
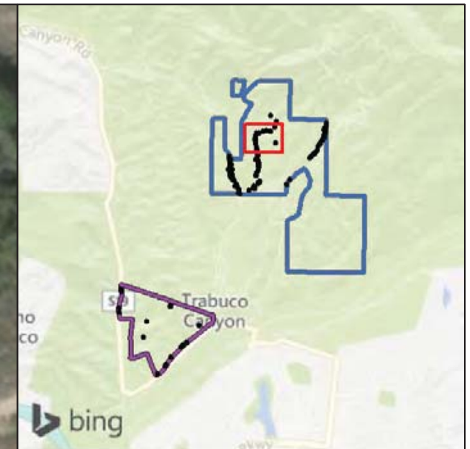




ISHB Infestation Levels

- Low (1)
- No ISHB Observed (22)
- Trabuco Rose

SOURCE: AERIAL- BING MAPPING SERVICE 2018

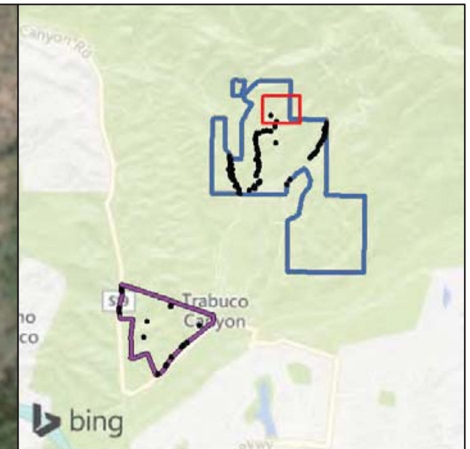
DUDEK

0 45 90 Feet

ATTACHMENT 2 - Trabuco Rose Sheet 10

Riparian Tree Locations

Invasive Shot Hole Borer Extent Evaluations - Wren's View and Trabuco Rose Preserves



ISHB Infestation Levels

◯ No ISHB Observed (3)

Trabuco Rose

SOURCE: AERIAL- BING MAPPING SERVICE 2018

DUDEK

0 45 90 Feet

ATTACHMENT 2 - Trabuco Rose Sheet 11

Riparian Tree Locations

Invasive Shot Hole Borer Extent Evaluations - Wren's View and Trabuco Rose Preserves

ISHB Infestation Levels

◯ No ISHB Observed (29)

Trabuco Rose

SOURCE: AERIAL- BING MAPPING SERVICE 2018

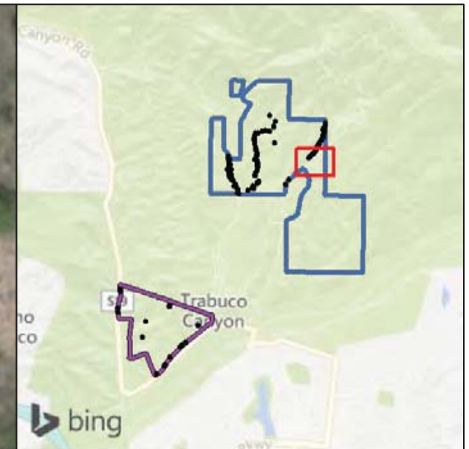
DUDEK

0 45 90 Feet

ATTACHMENT 2 - Trabuco Rose Sheet 12

Riparian Tree Locations

Invasive Shot Hole Borer Extent Evaluations - Wren's View and Trabuco Rose Preserves



ISHB Infestation Levels

- No ISHB Observed (10)
- Trabuco Rose

SOURCE: AERIAL- BING MAPPING SERVICE 2018

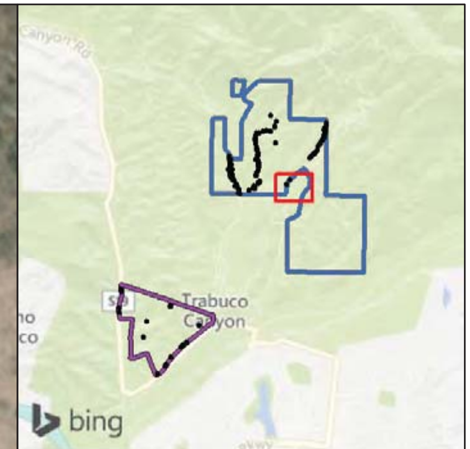
DUDEK

0 45 90 Feet

ATTACHMENT 2 - Trabuco Rose Sheet 13

Riparian Tree Locations

Invasive Shot Hole Borer Extent Evaluations - Wren's View and Trabuco Rose Preserves



ISHB Infestation Levels

No ISHB Observed (2)

Trabuco Rose

SOURCE: AERIAL- BING MAPPING SERVICE 2018

DUDEK

0 45 90 Feet

ATTACHMENT 2 - Trabuco Rose Sheet 14

Riparian Tree Locations

Invasive Shot Hole Borer Extent Evaluations - Wren's View and Trabuco Rose Preserves

Attachment 3

Riparian Tree Matrices

Survey Location	Tree No.	Botanical Name	Common Name	Health	Structure	ISHB Status	Recommendation	Latitude	Longitude
Wren's View	1	*Platanus racemosa*	Western Sycamore	Dead	Dead	None		33.65579	-117.596
Wren's View	2	*Platanus racemosa*	Western Sycamore	Good	Good	None		33.65833	-117.598
Wren's View	3	*Platanus racemosa*	Western Sycamore	Good	Good	None		33.65766	-117.594
Wren's View	4	*Platanus racemosa*	Western Sycamore	Poor	Poor	Moderate	Treatment	33.6612	-117.595
Wren's View	5	*Platanus racemosa*	Western Sycamore	Poor	Poor	Low	Treatment	33.65948	-117.592
Wren's View	6	*Platanus racemosa*	Western Sycamore	Poor	Poor	Low	Treatment	33.65494	-117.597
Wren's View	7	*Platanus racemosa*	Western Sycamore	Poor	Poor	Low	Treatment	33.66058	-117.601
Wren's View	8	*Platanus racemosa*	Western Sycamore	Poor	Poor	Moderate	Treatment	33.65563	-117.596
Wren's View	9	*Platanus racemosa*	Western Sycamore	Poor	Poor	None		33.66129	-117.595
Wren's View	10	*Platanus racemosa*	Western Sycamore	Poor	Poor	None		33.66125	-117.595
Wren's View	11	*Platanus racemosa*	Western Sycamore	Poor	Poor	None		33.65977	-117.598
Wren's View	12	*Platanus racemosa*	Western Sycamore	Poor	Poor	None		33.65764	-117.594
Wren's View	13	*Platanus racemosa*	Western Sycamore	Poor	Poor	None		33.65765	-117.594
Wren's View	14	*Platanus racemosa*	Western Sycamore	Poor	Poor	None		33.65487	-117.596
Wren's View	15	*Platanus racemosa*	Western Sycamore	Poor	Poor	None		33.66282	-117.601
Wren's View	16	*Platanus racemosa*	Western Sycamore	Poor	Poor	None		33.66097	-117.601
Wren's View	17	*Platanus racemosa*	Western Sycamore	Poor	Poor	High	Remove	33.65648	-117.595
Wren's View	18	*Platanus racemosa*	Western Sycamore	Poor	Poor	Moderate	Treatment	33.65578	-117.596
Wren's View	19	*Platanus racemosa*	Western Sycamore	Moderate	Moderate	Moderate	Treatment	33.6558	-117.596
Wren's View	20	*Platanus racemosa*	Western Sycamore	Poor	Poor	Moderate	Treatment	33.66129	-117.595
Wren's View	21	*Platanus racemosa*	Western Sycamore	Good	Good	None		33.65763	-117.594
Wren's View	22	*Platanus racemosa*	Western Sycamore	Poor	Poor	None		33.65577	-117.596
Wren's View	23	*Platanus racemosa*	Western Sycamore	Poor	Poor	Low	Treatment	33.65765	-117.594
Wren's View	24	*Platanus racemosa*	Western Sycamore	Poor	Poor	Low	Treatment	33.65746	-117.594
Wren's View	25	*Platanus racemosa*	Western Sycamore	Poor	Poor	Low	Treatment	33.65789	-117.593
Wren's View	26	*Platanus racemosa*	Western Sycamore	Poor	Poor	Low	Treatment	33.65762	-117.594
Wren's View	27	*Platanus racemosa*	Western Sycamore	Fair	Poor	None		33.66265	-117.601
Wren's View	28	*Platanus racemosa*	Western Sycamore	Very Poor	Very Poor	None		33.66253	-117.601
Trabuco Rose	1	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67183	-117.588
Trabuco Rose	2	*Platanus racemosa*	Western Sycamore	Dead	Dead	None		33.67685	-117.586
Trabuco Rose	3	*Platanus racemosa*	Western Sycamore	Dead	Dead	None		33.67281	-117.586
Trabuco Rose	4	*Platanus racemosa*	Western Sycamore	Fair	Fair	Low	Treatment	33.67689	-117.586
Trabuco Rose	5	*Platanus racemosa*	Western Sycamore	Fair	Fair	Low	Treatment	33.67227	-117.588
Trabuco Rose	6	*Platanus racemosa*	Western Sycamore	Poor	Poor	Low	Treatment	33.67252	-117.588
Trabuco Rose	7	*Platanus racemosa*	Western Sycamore	Fair	Fair	Low	Treatment	33.6719	-117.588
Trabuco Rose	8	*Platanus racemosa*	Western Sycamore	Poor	Fair	Low	Treatment	33.67189	-117.588
Trabuco Rose	9	*Platanus racemosa*	Western Sycamore	Fair	Fair	Low	Treatment	33.67398	-117.586
Trabuco Rose	10	*Platanus racemosa*	Western Sycamore	Fair	Fair	Moderate	Treatment	33.67265	-117.588
Trabuco Rose	11	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67563	-117.579
Trabuco Rose	12	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67537	-117.58
Trabuco Rose	13	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67559	-117.579
Trabuco Rose	14	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67521	-117.58
Trabuco Rose	15	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67591	-117.579
Trabuco Rose	16	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.6732	-117.588
Trabuco Rose	17	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67318	-117.589
Trabuco Rose	18	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67337	-117.588

Survey Location	Tree No.	Botanical Name	Common Name	Health	Structure	ISHB Status	Recommendation	Latitude	Longitude
Trabuco Rose	19	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67336	-117.588
Trabuco Rose	20	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.6734	-117.589
Trabuco Rose	21	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67343	-117.589
Trabuco Rose	22	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67358	-117.588
Trabuco Rose	23	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67356	-117.589
Trabuco Rose	24	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67365	-117.589
Trabuco Rose	25	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67381	-117.589
Trabuco Rose	26	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67637	-117.579
Trabuco Rose	27	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67404	-117.588
Trabuco Rose	28	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67405	-117.589
Trabuco Rose	29	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67428	-117.589
Trabuco Rose	30	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67433	-117.589
Trabuco Rose	31	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67455	-117.589
Trabuco Rose	32	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67461	-117.589
Trabuco Rose	33	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67473	-117.589
Trabuco Rose	34	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67478	-117.589
Trabuco Rose	35	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67482	-117.589
Trabuco Rose	36	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67502	-117.589
Trabuco Rose	37	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67654	-117.579
Trabuco Rose	38	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67509	-117.589
Trabuco Rose	39	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67507	-117.589
Trabuco Rose	40	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67531	-117.589
Trabuco Rose	41	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67303	-117.588
Trabuco Rose	42	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67278	-117.588
Trabuco Rose	43	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67303	-117.588
Trabuco Rose	44	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67248	-117.588
Trabuco Rose	45	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67232	-117.588
Trabuco Rose	46	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67661	-117.579
Trabuco Rose	47	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.6722	-117.588
Trabuco Rose	48	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67685	-117.578
Trabuco Rose	49	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67693	-117.578
Trabuco Rose	50	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67699	-117.578
Trabuco Rose	51	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67706	-117.578
Trabuco Rose	52	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67711	-117.578
Trabuco Rose	53	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67521	-117.58
Trabuco Rose	54	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67715	-117.578
Trabuco Rose	55	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67718	-117.578
Trabuco Rose	56	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67738	-117.578
Trabuco Rose	57	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67742	-117.578
Trabuco Rose	58	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67759	-117.578
Trabuco Rose	59	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67765	-117.578
Trabuco Rose	60	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67772	-117.578
Trabuco Rose	61	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.6777	-117.578
Trabuco Rose	62	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67789	-117.578
Trabuco Rose	63	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67791	-117.578
Trabuco Rose	64	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67791	-117.578

Survey Location	Tree No.	Botanical Name	Common Name	Health	Structure	ISHB Status	Recommendation	Latitude	Longitude
Trabuco Rose	65	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67785	-117.578
Trabuco Rose	66	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67807	-117.578
Trabuco Rose	67	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67811	-117.578
Trabuco Rose	68	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67825	-117.578
Trabuco Rose	69	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67849	-117.578
Trabuco Rose	70	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67322	-117.582
Trabuco Rose	71	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67264	-117.582
Trabuco Rose	72	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67293	-117.585
Trabuco Rose	73	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67301	-117.585
Trabuco Rose	74	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67292	-117.585
Trabuco Rose	75	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67288	-117.586
Trabuco Rose	76	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67352	-117.586
Trabuco Rose	77	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67359	-117.586
Trabuco Rose	78	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67373	-117.586
Trabuco Rose	79	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67381	-117.586
Trabuco Rose	80	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67442	-117.586
Trabuco Rose	81	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67456	-117.586
Trabuco Rose	82	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.6746	-117.585
Trabuco Rose	83	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67494	-117.586
Trabuco Rose	84	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67491	-117.586
Trabuco Rose	85	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67573	-117.579
Trabuco Rose	86	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67489	-117.586
Trabuco Rose	87	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.6754	-117.586
Trabuco Rose	88	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67544	-117.586
Trabuco Rose	89	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67506	-117.586
Trabuco Rose	90	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67563	-117.586
Trabuco Rose	91	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.6758	-117.586
Trabuco Rose	92	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67588	-117.586
Trabuco Rose	93	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67592	-117.586
Trabuco Rose	94	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67593	-117.586
Trabuco Rose	95	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67612	-117.586
Trabuco Rose	96	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67576	-117.579
Trabuco Rose	97	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67618	-117.586
Trabuco Rose	98	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67649	-117.586
Trabuco Rose	99	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67669	-117.586
Trabuco Rose	100	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67694	-117.586
Trabuco Rose	101	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67699	-117.586
Trabuco Rose	102	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.6773	-117.586
Trabuco Rose	103	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.6775	-117.586
Trabuco Rose	104	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67753	-117.586
Trabuco Rose	105	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67578	-117.579
Trabuco Rose	106	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67752	-117.585
Trabuco Rose	107	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67765	-117.585
Trabuco Rose	108	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67773	-117.585
Trabuco Rose	109	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67772	-117.585
Trabuco Rose	110	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67771	-117.584

Survey Location	Tree No.	Botanical Name	Common Name	Health	Structure	ISHB Status	Recommendation	Latitude	Longitude
Trabuco Rose	111	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67807	-117.584
Trabuco Rose	112	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67814	-117.584
Trabuco Rose	113	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67661	-117.584
Trabuco Rose	114	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67913	-117.584
Trabuco Rose	115	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.67584	-117.579
Trabuco Rose	116	*Platanus racemosa*	Western Sycamore	Fair	Fair	None		33.6732	-117.588
Trabuco Rose	117	*Platanus racemosa*	Western Sycamore	Poor	Poor	None		33.67723	-117.578
Trabuco Rose	118	*Platanus racemosa*	Western Sycamore	Poor	Poor	None		33.67727	-117.578
Trabuco Rose	119	*Platanus racemosa*	Western Sycamore	Poor	Poor	None		33.6773	-117.578
Trabuco Rose	120	*Platanus racemosa*	Western Sycamore	Poor	Poor	None		33.6773	-117.578
Trabuco Rose	121	*Platanus racemosa*	Western Sycamore	Poor	Poor	None		33.67474	-117.585
Trabuco Rose	122	*Platanus racemosa*	Western Sycamore	Poor	Poor	None		33.67471	-117.585
Trabuco Rose	123	*Platanus racemosa*	Western Sycamore	Poor	Poor	None		33.67858	-117.584
Trabuco Rose	124	*Platanus racemosa*	Western Sycamore	Poor	Poor	None		33.67864	-117.584
Trabuco Rose	125	*Platanus racemosa*	Western Sycamore	Poor	Poor	None		33.67677	-117.579
Trabuco Rose	126	*Platanus racemosa*	Western Sycamore	Poor	Poor	Low	Treatment	33.67436	-117.585
Trabuco Rose	127	*Salix laevigata*	Red Willow	Poor	Poor	None		33.67236	-117.586
Trabuco Rose	128	*Salix laevigata*	Red Willow	Poor	Poor	None		33.67237	-117.586
Trabuco Rose	129	*Salix laevigata*	Red Willow	Poor	Poor	None		33.67239	-117.586
Trabuco Rose	130	*Salix laevigata*	Red Willow	Poor	Poor	None		33.67256	-117.586
Trabuco Rose	131	*Salix laevigata*	Red Willow	Poor	Poor	None		33.67233	-117.586
Trabuco Rose	132	*Salix laevigata*	Red Willow	Poor	Poor	None		33.67237	-117.586
Trabuco Rose	133	*Salix laevigata*	Red Willow	Poor	Poor	None		33.67215	-117.587
Trabuco Rose	134	*Salix laevigata*	Red Willow	Poor	Poor	None		33.67233	-117.586

Attachment 4

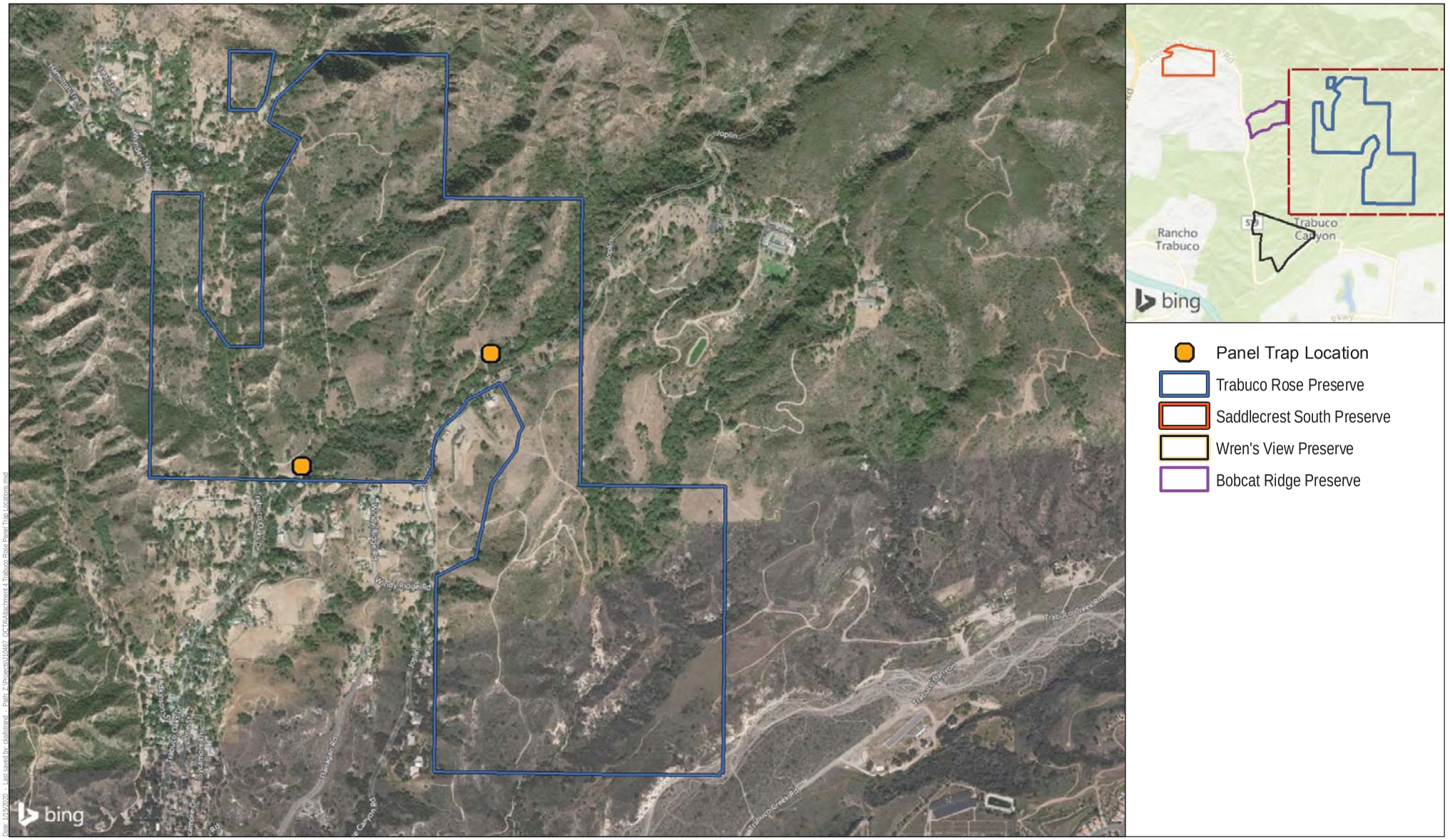
Panel Trap Locations

SOURCE: AERIAL- BING MAPPING SERVICE 2017

DUDEK

Attachment 4

Panel Trap Locations - Bobcat Ridge Preserve



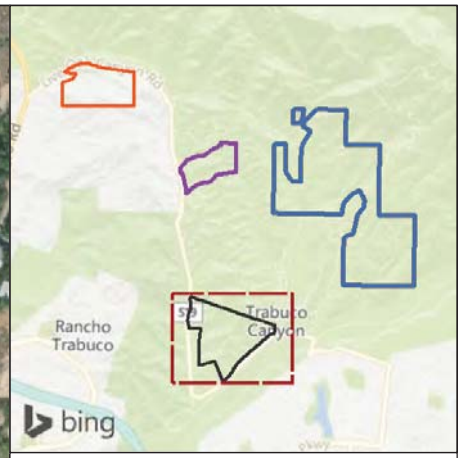
SOURCE: AERIAL- BING MAPPING SERVICE 2017

DUDEK

0 400 800 Feet

Attachment 4

Panel Trap Locations - Trabuco Rose Preserve



Panel Trap Location
Wren's View Preserve
Bobcat Ridge Preserve
Live Oak Creek Preserve
Trabuco Rose Preserve

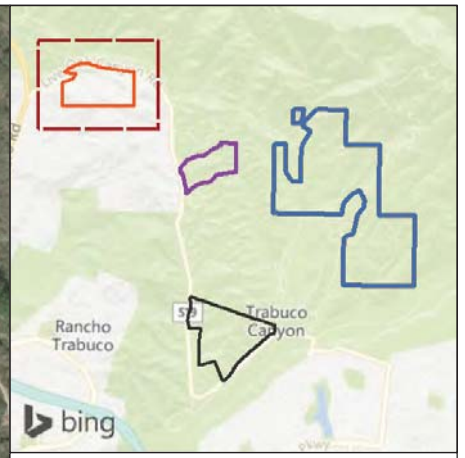
SOURCE: AERIAL- BING MAPPING SERVICE 2017

DUDEK

0 160 320 Feet

Attachment 4

Panel Trap Locations - Wren's View Preserve



- Panel Trap Location
- Live Oak Creek Preserve
- Wren's View Preserve
- Bobcat Ridge Preserve
- Trabuco Rose Preserve

SOURCE: AERIAL- BING MAPPING SERVICE 2017

DUDEK

0 175 350 Feet

Attachment 4

Panel Trap Locations - Live Oak Creek Preserve

Attachment 5

California Department of Food and Agriculture Results

STATE OF CALIFORNIA
DEPARTMENT OF FOOD AND AGRICULTURE
PLANT HEALTH AND
PEST PREVENTION SERVICES

PEST AND DAMAGE RECORD

PDR NUMBER **300P50002370**

Date collected **7/31/2019**

Lab: [x] ENTO [ ] PLANT PATH [ ] NEMA [ ] SEED [ ] BOTANY [ ] VERT

Time Collected **12:00**

NOR Number:

Number of samples:

Location: **30**

Activity: **10**

Situation: **66**

Section:

Township:

Range:

Base and meridian:

Owner/receiver

Owner: **Chris Kallstrand**

Address/physical description: **Sticky trap placed in field**

City: **Trabuco Canyon** | State: **CA** | Zip code:

County: **Orange**

Phone: **(949) 482-5115** | Fax: | Latitude:

E-mail: **ckallstrand@dudek.com** | Longitude:

Cross street:

Quarantine destination:

Collector **Chris Kallstrand**

Affil. F S C E U O Describe Other: [x] O **Walk-in**

Quarantine shipper/broker

Name:

Address:

City: | Zip code:

State/Country:

Phone: | Fax: | Latitude:

E-mail: | Longitude:

Quarantine origin (where host grown)

City	County	State/Country	Zip

Carrier (ground/air/maritime)

Business name	Flight number

Shipment size / units	Program	License plate	License state	Tail/ship number
/	**GEN - General**			

Submitter remarks
Submitter would like to know ISHB identification. Bugs trapped using sticky traps with quercivoral lure.

Suspect

Send report to:

Name: **Orange County Ag Comm**

Phone:

Fax:

Email:

Entomology

Trap number	Grid number	Last service date	Latitude
Trap 1		**7/31/2019**	

Trap type	Trap density	Longitude
Sticky trap	**per**	

Survey method: **Trap**

General or Plant Pathology

Number of involved:

of plants affected:

Plant distribution:

Plant parts affected

[ ] Bark [ ] Bulbs or Corms [ ] Leaves, upper surface
[ ] Blossoms [ ] Fruit or nuts [ ] Petiole [ ] Stem
[ ] Branches, large [ ] Growing tips [ ] Rootlets [ ] Trunk
[ ] Branches, terminal [ ] Roots, large [ ] Seeds [ ] Tubers
[ ] Buds [ ] Leaves, lower surface

Plant symptoms

[ ] Canker [ ] Gumming [ ] Malformation [ ] Slow Decline
[ ] Die back [ ] Internal discoloration [ ] Marginal burn [ ] Stunting
[ ] Fruit rot [ ] Leaf fall [ ] Root rot [ ] Sudden collapse
[ ] Fruit spot [ ] Leaf mottling [ ] Rough bark [ ] Wilting
[ ] Galls [ ] Leaf spot [ ] Shot hole [ ] Yellowing

Host

Host Tag	Common Name	Scientific Name	Type	Nema Field Block Type
	Variety	Container Size	Quantity and Units	Nema Field Block
	Remarks trapped in the field, host unknown			

Sample

Sample Tag Trap 1	Location Description		Latitude	Remarks
	Quantity and unit	Lot Number	Longitude	
Total pest count or number per (sweep, leaf, acre, trap, root, stem etc) Count: 12			*Entomology:* Conditions ☐ Dead ☐ Alive ☑ Unknown Stages ☐ Egg ☐ Larva ☐ Nymph ☐ Pupa ☑ Adult	
Nematology			*Botany/Vertebrate:* Acreage net: Acreage gross:	

Identifications

Lab Entomology	Scientist Alexey Tishechkin	Rating B	Common Name scolytid beetle
Date 8/5/2019	Order Coleoptera	Family Curculionidae	
Genus Euwallacea		Species sp.	
Sub-Species		Higher Category (phylum) Arthropoda, (class) Insecta	
General Identification Notes near E. fornicates.			
Entomology			
Mature:	Dead:	Egg:	Adult:
Immature:	Alive:	Larva:	Male:
Mated:	Unknown:	Nymph:	Female:
		Pupa:	
Egg Viability:			
Egg Viability Notes:			
Instar Notes:			

Sample

Sample Tag Trap 2	Location Description		Latitude	Remarks
	Quantity and unit	Lot Number	Longitude	
Total pest count or number per (sweep, leaf, acre, trap, root, stem etc) Count: 1			*Entomology:* Conditions ☐ Dead ☐ Alive ☑ Unknown Stages ☐ Egg ☐ Larva ☐ Nymph ☐ Pupa ☑ Adult	
Nematology			*Botany/Vertebrate:* Acreage net: Acreage gross:	

Identifications

Lab Entomology	Scientist Alexey Tishechkin	Rating B	Common Name scolytid beetle
Date 8/5/2019	Order	Family Curculionidae	
Genus Euwallacea		Species sp.	
Sub-Species		Higher Category (phylum) Arthropoda, (class) Insecta	
General Identification Notes near E. fornicates.			
Entomology			
Mature:	Dead:	Egg:	Adult:
Immature:	Alive:	Larva:	Male:

Mated:	Unknown:	Nymph:	Female:
		Pupa:	
Egg Viability:			
Egg Viability Notes:			
Instar Notes:			

Sample

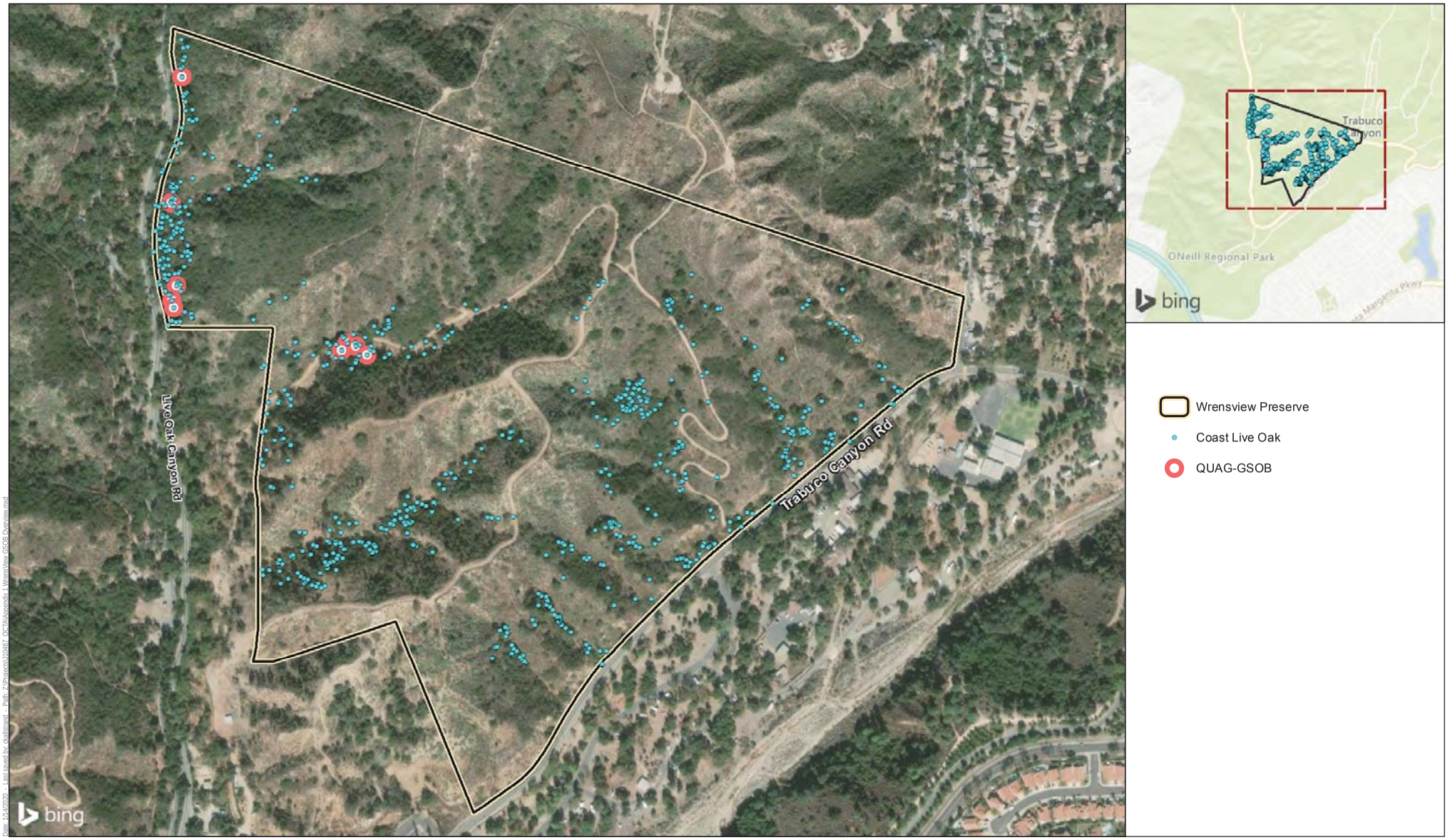
Sample Tag Trap 3	Location Description		Latitude	Remarks
	Quantity and unit	Lot Number	Longitude	
Total pest count or number per (sweep, leaf, acre, trap, root, stem etc) Count: 1			*Entomology:* Conditions ☐ Dead ☐ Alive ☑ Unknown Stages ☐ Egg ☐ Larva ☐ Nymph ☐ Pupa ☑ Adult	
Nematology			*Botany/Vertebrate:* Acreage net: Acreage gross:	

Identifications

Lab Entomology	Scientist Alexey Tishechkin	Rating B	Common Name scolytid beetle
Date 8/5/2019	Order	Family Curculionidae	
Genus Euwallacea		Species sp.	
Sub-Species		Higher Category (phylum) Arthropoda, (class) Insecta	
General Identification Notes near E. fornicates.			
Entomology			
Mature:	Dead:	Egg:	Adult:
Immature:	Alive:	Larva:	Male:
Mated:	Unknown:	Nymph:	Female:
		Pupa:	
Egg Viability:			
Egg Viability Notes:			
Instar Notes:			

Attachment 6

Goldspotted Oak Borer Distribution Overview at Wren's View Preserve



SOURCE: AERIAL- BING MAPPING SERVICE 2017

Attachment 6

DUDEK

0 162.5 325 Feet

Gold Spotted Oak Borer Distribution Overview at Wrensview Preserve

Gold Spotted Oak Borer (GSOB) Distribution - Wrensview Preserve

Attachment 7

Oak Tree Information Matrix

Tree No.	Botanical Name	Common Name	Stems	Individual Stem Diameters (in.)					Health	Structure	Crown Rating	Emergence Hole Rating	Bark Staining Rating	Woodpecker Damage	Notes
				Stem 1	*Stem 2*	*Stem 3*	*Stem 4*	*Stem 5*							
1	*Quercus agrifolia*	Coast live oak	1	24	0	0	0	0	Poor	Fair	4	2	3	N	GSOB - Tree is gone
2	*Quercus agrifolia*	Coast live oak	1	18	0	0	0	0	Good	Good	1	0	0	N	
3	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Good	Good	1	0	0	N	
4	*Quercus agrifolia*	Coast live oak	1	25	0	0	0	0	Fair	Fair	2	1	1	N	GSOB
5	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Good	Good	2	0	1	N	
6	*Quercus agrifolia*	Coast live oak	1	7	0	0	0	0	Good	Good	1	0	0	N	
7	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Good	Good	2	0	1	N	
8	*Quercus agrifolia*	Coast live oak	1	14	0	0	0	0	Poor	Good	4	0	0	N	
9	*Quercus agrifolia*	Coast live oak	1	6	4	0	0	0	Poor	Poor	3	1	0	N	
10	*Quercus agrifolia*	Coast live oak	1	24	0	0	0	0	Poor	Fair	4	1	0	N	GSOB
11	*Quercus agrifolia*	Coast live oak	1	13	0	0	0	0	Good	Good	2	0	0	N	
12	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Good	Good	1	0	1	N	
13	*Quercus agrifolia*	Coast live oak	1	18	0	0	0	0	Good	Good	1	0	0	N	
14	*Quercus agrifolia*	Coast live oak	1	13	0	0	0	0	Good	Good	1	0	0	N	
15	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Good	Good	1	0	0	N	
16	*Quercus agrifolia*	Coast live oak	1	13	0	0	0	0	Good	Good	1	0	1	N	
17	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Good	Good	1	0	0	N	
18	*Quercus agrifolia*	Coast live oak	2	30	20	0	0	0	Dead	Dead	Dead	0	0	N	
19	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Good	Good	1	0	0	N	
20	*Quercus agrifolia*	Coast live oak	2	22	22	0	0	0	Good	Good	3	1	2	N	
21	*Quercus agrifolia*	Coast live oak	1	18	18	0	0	0	Good	Good	1	0	1	N	
22	*Quercus agrifolia*	Coast live oak	1	9	5	0	0	0	Good	Good	1	0	0	N	
23	*Quercus agrifolia*	Coast live oak	1	13	19	0	0	0	Good	Good	1	0	0	N	
24	*Quercus agrifolia*	Coast live oak	3	16	16	16	0	0	Poor	Poor	5	0	2	N	
25	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Dead	Dead	Dead	0	0	N	
26	*Quercus agrifolia*	Coast live oak	1	22	16	0	0	0	Good	Good	1	0	0	N	
27	*Quercus agrifolia*	Coast live oak	1	22	0	0	0	0	Poor	Good	4	0	0	N	
28	*Quercus agrifolia*	Coast live oak	1	9	13	6	0	0	Good	Good	3	0	0	N	
29	*Quercus agrifolia*	Coast live oak	1	13	12	15	0	0	Good	Good	1	0	0	N	
30	*Quercus agrifolia*	Coast live oak	1	9	8	7	7	0	Good	Good	1	0	0	N	
31	*Quercus agrifolia*	Coast live oak	1	6	5	4	0	0	Good	Good	1	0	0	N	
32	*Quercus agrifolia*	Coast live oak	1	16	5	0	0	0	Good	Good	3	0	2	N	
33	*Quercus agrifolia*	Coast live oak	1	7	7	7	7	0	Good	Good	1	0	0	N	
34	*Quercus agrifolia*	Coast live oak	1	9	8	8	8	8	Good	Good	1	0	0	N	
35	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Good	Good	1	0	0	N	
36	*Quercus agrifolia*	Coast live oak	1	9	8	8	0	0	Good	Good	1	0	0	N	
37	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Good	Good	1	0	0	N	
38	*Quercus agrifolia*	Coast live oak	1	8	6	6	4	0	Good	Good	1	0	0	N	
39	*Quercus agrifolia*	Coast live oak	1	10	9	8	8	0	Good	Good	1	0	0	N	
40	*Quercus agrifolia*	Coast live oak	1	14	14	14	11	0	Good	Good	1	0	0	N	
41	*Quercus agrifolia*	Coast live oak	1	10	9	9	9	0	Good	Good	1	0	0	N	
42	*Quercus agrifolia*	Coast live oak	1	15	20	14	14	6	Good	Good	2	0	0	N	
43	*Quercus agrifolia*	Coast live oak	1	30	22	22	0	0	Good	Good	2	0	0	N	
44	*Quercus agrifolia*	Coast live oak	1	24	0	0	0	0	Fair	Fair	2	1	1	N	GSOB

Tree No.	Botanical Name	Common Name	Stems	Individual Stem Diameters (in.)					Health	Structure	Crown Rating	Emergence Hole Rating	Bark Staining Rating	Woodpecker Damage	Notes
				Stem 1	*Stem 2*	*Stem 3*	*Stem 4*	*Stem 5*							
45	*Quercus agrifolia*	Coast live oak	1	40	0	0	0	0	Dead	Dead	Dead	2	0	N	
46	*Quercus agrifolia*	Coast live oak	1	22	0	0	0	0	Dead	Dead	Dead	2	0	N	
47	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Good	Good	2	0	0	N	
48	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Good	Good	2	0	0	N	
49	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Good	Good	2	0	0	N	
50	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Good	Good	1	0	0	N	
51	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Good	Good	1	0	1	N	
52	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Good	Good	1	0	1	N	
53	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Good	Good	1	0	0	N	
54	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Good	Good	2	0	0	N	
55	*Quercus agrifolia*	Coast live oak	1	7	0	0	0	0	Good	Good	2	0	0	N	
56	*Quercus agrifolia*	Coast live oak	1	22	22	0	0	0	Poor	Good	4	1	3	N	
57	*Quercus agrifolia*	Coast live oak	1	7	0	0	0	0	Good	Good	1	0	1	N	
58	*Quercus agrifolia*	Coast live oak	1	13	8	0	0	0	Good	Good	2	0	0	N	
59	*Quercus agrifolia*	Coast live oak	1	6	0	0	0	0	Good	Good	2	0	0	N	
60	*Quercus agrifolia*	Coast live oak	1	8	8	7	0	0	Good	Good	2	0	0	N	
61	*Quercus agrifolia*	Coast live oak	1	18	0	0	0	0	Good	Good	2	0	0	N	
62	*Quercus agrifolia*	Coast live oak	1	6	0	0	0	0	Good	Good	2	0	0	N	
63	*Quercus agrifolia*	Coast live oak	1	14	16	16	0	0	Dead	Dead	Dead	1	0	Y	
64	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Dead	Dead	Dead	2	0	y	
65	*Quercus agrifolia*	Coast live oak	1	26	0	0	0	0	Good	Good	2	0	0	N	
66	*Quercus agrifolia*	Coast live oak	1	28	0	0	0	0	Dead	Dead	Dead	0	0	No	
67	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Good	Good	2	0	0	No	
68	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Good	Good	2	0	0	No	
69	*Quercus agrifolia*	Coast live oak	1	14	16	0	0	0	Good	Good	2	0	0	No	
70	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Good	Good	2	0	0	No	
71	*Quercus agrifolia*	Coast live oak	1	19	11	0	0	0	Dead	Dead	Dead	0	0	No	
72	*Quercus agrifolia*	Coast live oak	1	14	0	0	0	0	Good	Good	3	0	0	No	
73	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Good	Good	3	0	0	No	
74	*Quercus agrifolia*	Coast live oak	1	14	0	0	0	0	Good	Good	2	0	0	No	
75	*Quercus agrifolia*	Coast live oak	1	28	0	0	0	0	Good	Good	3	0	3	No	
76	*Quercus agrifolia*	Coast live oak	1	14	0	0	0	0	Good	Good	2	0	0	No	
77	*Quercus agrifolia*	Coast live oak	1	16	7	0	0	0	Good	Good	1	0	0	No	
78	*Quercus agrifolia*	Coast live oak	1	18	20	28	0	0	Good	Good	2	0	0	No	
79	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Good	Good	1	0	0	No	
80	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Good	Good	2	0	0	No	
81	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Dead	Dead	Dead	0	0	No	
82	*Quercus agrifolia*	Coast live oak	1	18	24	18	0	0	Dead	Dead	Dead	0	0	No	
83	*Quercus agrifolia*	Coast live oak	1	6	6	0	0	0	Good	Good	1	0	0	No	
84	*Quercus agrifolia*	Coast live oak	1	6	4	0	0	0	Good	Good	2	0	0	No	
85	*Quercus agrifolia*	Coast live oak	1	13	13	13	0	0	Good	Good	2	0	0	No	
86	*Quercus agrifolia*	Coast live oak	1	22	0	0	0	0	Dead	Dead	Dead	0	0	Yes	
87	*Quercus agrifolia*	Coast live oak	1	30	30	0	0	0	Good	Good	2	0	0	No	
88	*Quercus agrifolia*	Coast live oak	1	20	0	0	0	0	Good	Good	1	0	0	No	

Tree No.	Botanical Name	Common Name	Stems	Individual Stem Diameters (in.)					Health	Structure	Crown Rating	Emergence Hole Rating	Bark Staining Rating	Woodpecker Damage	Notes
				Stem 1	*Stem 2*	*Stem 3*	*Stem 4*	*Stem 5*							
89	*Quercus agrifolia*	Coast live oak	1	24	0	0	0	0	Good	Good	1	0	0	No	
90	*Quercus agrifolia*	Coast live oak	1	18	16	0	0	0	Dead	Dead	Dead	0	0	No	
91	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Dead	Dead	Dead	0	0	No	
92	*Quercus agrifolia*	Coast live oak	1	16	9	0	0	0	Good	Good	3	0	0	No	
93	*Quercus agrifolia*	Coast live oak	1	14	14	7	0	0	Good	Good	2	0	0	No	
94	*Quercus agrifolia*	Coast live oak	1	24	20	0	0	0	Good	Good	1	0	0	No	
95	*Quercus agrifolia*	Coast live oak	1	7	6	5	0	0	Good	Good	1	0	0	No	
96	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Good	Good	1	0	0	No	
97	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Good	Good	2	0	0	No	
98	*Quercus agrifolia*	Coast live oak	1	7	0	0	0	0	Good	Good	2	0	0	No	
99	*Quercus agrifolia*	Coast live oak	1	20	0	0	0	0	Good	Good	2	0	0	No	
100	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Good	Good	1	0	0	No	
101	*Quercus agrifolia*	Coast live oak	0	28	0	0	0	0	Good	Fair	1	0	0	No	
102	*Quercus agrifolia*	Coast live oak	0	9	0	0	0	0	Good	Fair	1	0	0	No	
103	*Quercus agrifolia*	Coast live oak	0	4	0	0	0	0	Good	Fair	1	0	0	No	
104	*Quercus agrifolia*	Coast live oak	0	4	0	0	0	0	Good	Fair	1	0	0	No	
105	*Quercus agrifolia*	Coast live oak	0	6	0	0	0	0	Good	Fair	1	0	0	No	
106	*Quercus agrifolia*	Coast live oak	0	24	0	0	0	0	Good	Fair	1	0	1	No	
107	*Quercus agrifolia*	Coast live oak	0	9	7	0	0	0	Good	Fair	1	0	0	No	
108	*Quercus agrifolia*	Coast live oak	0	32	0	0	0	0	Dead	Dead	Dead	0	0	Yes	
109	*Quercus agrifolia*	Coast live oak	0	10	0	0	0	0	Good	Fair	1	0	0	No	
110	*Quercus agrifolia*	Coast live oak	0	12	0	0	0	0	Good	Fair	1	0	0	No	
111	*Quercus agrifolia*	Coast live oak	0	14	13	0	0	0	Good	Fair	1	0	1	No	
112	*Quercus agrifolia*	Coast live oak	0	14	0	0	0	0	Good	Fair	1	0	0	No	
113	*Quercus agrifolia*	Coast live oak	0	12	0	0	0	0	Fair	Fair	1	0	1	No	
114	*Quercus agrifolia*	Coast live oak	0	14	0	0	0	0	Good	Fair	1	0	0	No	
115	*Quercus agrifolia*	Coast live oak	0	12	0	0	0	0	Good	Fair	1	0	0	No	
116	*Quercus agrifolia*	Coast live oak	0	14	0	0	0	0	Good	Fair	1	0	0	No	
117	*Quercus agrifolia*	Coast live oak	0	12	22	18	0	0	Good	Fair	3	0	2	No	
118	*Quercus agrifolia*	Coast live oak	0	11	0	0	0	0	Good	Fair	1	0	0	No	
119	*Quercus agrifolia*	Coast live oak	0	25	13	15	18	0	Good	Fair	1	0	0	No	Conks
120	*Quercus agrifolia*	Coast live oak	0	12	0	0	0	0	Good	Fair	1	0	0	No	
121	*Quercus agrifolia*	Coast live oak	0	16	0	0	0	0	Good	Fair	1	0	0	No	
122	*Quercus agrifolia*	Coast live oak	0	16	0	0	0	0	Dead	Dead	Dead	2	0	No	
123	*Quercus agrifolia*	Coast live oak	0	15	0	0	0	0	Fair	Fair	1	0	1	No	
124	*Quercus agrifolia*	Coast live oak	0	6	0	0	0	0	Fair	Fair	2	0	0	No	
125	*Quercus agrifolia*	Coast live oak	0	6	0	0	0	0	Fair	Fair	2	0	0	No	
126	*Quercus agrifolia*	Coast live oak	0	6	0	0	0	0	Fair	Fair	2	0	0	No	
127	*Quercus agrifolia*	Coast live oak	0	12	0	0	0	0	Fair	Fair	1	0	0	No	
128	*Quercus agrifolia*	Coast live oak	0	4	0	0	0	0	Fair	Fair	2	0	0	No	
129	*Quercus agrifolia*	Coast live oak	0	4	3	0	0	0	Fair	Fair	1	0	0	No	
130	*Quercus agrifolia*	Coast live oak	0	10	0	0	0	0	Good	Fair	1	0	0	No	
131	*Quercus agrifolia*	Coast live oak	0	13	0	0	0	0	Fair	Fair	1	0	0	No	
132	*Quercus agrifolia*	Coast live oak	0	18	0	0	0	0	Dead	Dead	Dead	0	0	No	

Tree No.	Botanical Name	Common Name	Stems	Individual Stem Diameters (in.)					Health	Structure	Crown Rating	Emergence Hole Rating	Bark Staining Rating	Woodpecker Damage	Notes
				Stem 1	*Stem 2*	*Stem 3*	*Stem 4*	*Stem 5*							
133	*Quercus agrifolia*	Coast live oak	0	32	0	0	0	0	Fair	Fair	3	0	0	No	
134	*Quercus agrifolia*	Coast live oak	0	22	18	0	0	0	Fair	Fair	1	0	0	No	
135	*Quercus agrifolia*	Coast live oak	0	18	17	0	0	0	Fair	Fair	2	0	0	No	
136	*Quercus agrifolia*	Coast live oak	0	15	0	0	0	0	Fair	Fair	1	0	0	No	
137	*Quercus agrifolia*	Coast live oak	0	6	0	0	0	0	Fair	Fair	1	0	0	No	
138	*Quercus agrifolia*	Coast live oak	0	9	0	0	0	0	Fair	Fair	1	0	0	No	
139	*Quercus agrifolia*	Coast live oak	0	18	18	18	9	0	Fair	Fair	2	0	2	No	
140	*Quercus agrifolia*	Coast live oak	0	8	0	0	0	0	Fair	Fair	1	0	0	No	
141	*Quercus agrifolia*	Coast live oak	0	10	0	0	0	0	Fair	Fair	1	0	0	No	
142	*Quercus agrifolia*	Coast live oak	0	9	4	0	0	0	Fair	Fair	1	0	0	No	
143	*Quercus agrifolia*	Coast live oak	0	32	0	0	0	0	Good	Fair	1	0	0	No	
144	*Quercus agrifolia*	Coast live oak	0	13	10	0	0	0	Good	Fair	1	0	2	No	
145	*Quercus agrifolia*	Coast live oak	0	13	10	0	0	0	Good	Fair	1	0	0	No	
146	*Quercus agrifolia*	Coast live oak	0	9	10	10	0	0	Good	Fair	1	0	0	No	
147	*Quercus agrifolia*	Coast live oak	0	10	0	0	0	0	Good	Fair	3	0	0	No	
148	*Quercus agrifolia*	Coast live oak	0	7	0	0	0	0	Good	Fair	1	0	0	No	
149	*Quercus agrifolia*	Coast live oak	0	13	0	0	0	0	Dead	Dead	Dead	0	0	No	
150	*Quercus agrifolia*	Coast live oak	0	18	18	15	8	4	Poor	Fair	2	0	0	No	
151	*Quercus agrifolia*	Coast live oak	0	18	4	0	0	0	Poor	Fair	3	0	0	No	
152	*Quercus agrifolia*	Coast live oak	0	20	0	0	0	0	Fair	Fair	1	0	0	No	
153	*Quercus agrifolia*	Coast live oak	0	7	6	0	0	0	Fair	Fair	1	0	0	No	
154	*Quercus agrifolia*	Coast live oak	0	7	0	0	0	0	Fair	Fair	1	0	0	No	
155	*Quercus agrifolia*	Coast live oak	0	4	0	0	0	0	Fair	Fair	1	0	0	No	
156	*Quercus agrifolia*	Coast live oak	0	26	0	0	0	0	Fair	Fair	1	1	1	No	
157	*Quercus agrifolia*	Coast live oak	0	28	17	0	0	0	Fair	Fair	3	0	1	No	
158	*Quercus agrifolia*	Coast live oak	0	9	6	0	0	0	Fair	Fair	1	0	0	No	
159	*Quercus agrifolia*	Coast live oak	0	15	0	0	0	0	Fair	Fair	1	0	0	No	
160	*Quercus agrifolia*	Coast live oak	0	28	0	0	0	0	Fair	Fair	2	0	1	No	
161	*Quercus agrifolia*	Coast live oak	0	16	0	0	0	0	Fair	Fair	1	0	0	No	
162	*Quercus agrifolia*	Coast live oak	0	13	0	0	0	0	Fair	Fair	1	0	0	No	
163	*Quercus agrifolia*	Coast live oak	0	10	0	0	0	0	Fair	Fair	1	0	0	No	
164	*Quercus agrifolia*	Coast live oak	0	4	0	0	0	0	Fair	Fair	1	0	0	No	
165	*Quercus agrifolia*	Coast live oak	0	13	0	0	0	0	Fair	Fair	2	0	1	No	
166	*Quercus agrifolia*	Coast live oak	0	9	3	0	0	0	Fair	Fair	1	0	0	No	
167	*Quercus agrifolia*	Coast live oak	0	4	0	0	0	0	Fair	Fair	1	0	0	No	
168	*Quercus agrifolia*	Coast live oak	0	9	0	0	0	0	Fair	Fair	1	0	0	No	
169	*Quercus agrifolia*	Coast live oak	0	11	0	0	0	0	Fair	Fair	1	0	0	No	
170	*Quercus agrifolia*	Coast live oak	0	4	0	0	0	0	Fair	Fair	1	0	0	No	
171	*Quercus agrifolia*	Coast live oak	0	3	0	0	0	0	Fair	Fair	1	0	0	No	
172	*Quercus agrifolia*	Coast live oak	0	36	0	0	0	0	Fair	Fair	1	0	0	No	
173	*Quercus agrifolia*	Coast live oak	0	12	0	0	0	0	Fair	Fair	1	0	0	No	
174	*Quercus agrifolia*	Coast live oak	0	5	0	0	0	0	Fair	Fair	1	0	0	No	
175	*Quercus agrifolia*	Coast live oak	0	5	0	0	0	0	Fair	Fair	1	0	0	No	
176	*Quercus agrifolia*	Coast live oak	0	12	10	0	0	0	Fair	Fair	1	0	0	No	

Tree No.	Botanical Name	Common Name	Stems	Individual Stem Diameters (in.)					Health	Structure	Crown Rating	Emergence Hole Rating	Bark Staining Rating	Woodpecker Damage	Notes
				Stem 1	*Stem 2*	*Stem 3*	*Stem 4*	*Stem 5*							
177	*Quercus agrifolia*	Coast live oak	0	4	0	0	0	0	Fair	Fair	1	0	0	No	
178	*Quercus agrifolia*	Coast live oak	0	9	0	0	0	0	Fair	Fair	1	0	0	No	
179	*Quercus agrifolia*	Coast live oak	0	28	0	0	0	0	Fair	Fair	1	0	0	No	
180	*Quercus agrifolia*	Coast live oak	0	6	0	0	0	0	Fair	Fair	1	0	0	No	
181	*Quercus agrifolia*	Coast live oak	0	16	0	0	0	0	Fair	Fair	1	0	0	No	
182	*Quercus agrifolia*	Coast live oak	0	8	0	0	0	0	Fair	Fair	1	0	0	No	
183	*Quercus agrifolia*	Coast live oak	0	10	8	0	0	0	Fair	Fair	1	0	0	No	
184	*Quercus agrifolia*	Coast live oak	0	36	0	0	0	0	Poor	Poor	5	0	0	Decay	
185	*Quercus agrifolia*	Coast live oak	0	36	0	0	0	0	Poor	Fair	4	0	0	Decay/Other beetles	
186	*Quercus agrifolia*	Coast live oak	0	11	0	0	0	0	Fair	Fair	1	0	0	No	
187	*Quercus agrifolia*	Coast live oak	0	13	8	6	0	0	Fair	Fair	1	0	0	No	
188	*Quercus agrifolia*	Coast live oak	0	10	8	0	0	0	Dead	Dead	Dead	0	0	No	
189	*Quercus agrifolia*	Coast live oak	0	12	0	0	0	0	Fair	Fair	2	0	0	No	
190	*Quercus agrifolia*	Coast live oak	0	28	0	0	0	0	Fair	Fair	1	0	0	No	
191	*Quercus agrifolia*	Coast live oak	0	10	10	0	0	0	Fair	Fair	1	0	0	No	
192	*Quercus agrifolia*	Coast live oak	0	11	0	0	0	0	Fair	Fair	2	0	0	No	
193	*Quercus agrifolia*	Coast live oak	0	11	4	10	10	0	Fair	Fair	1	0	0	No	
194	*Quercus agrifolia*	Coast live oak	0	11	0	10	0	0	Fair	Fair	1	0	0	No	
195	*Quercus agrifolia*	Coast live oak	0	12	9	0	0	0	Fair	Fair	2	0	0	No	
196	*Quercus agrifolia*	Coast live oak	0	16	0	0	0	0	Poor	Poor	4	0	0	No	Crown failure
197	*Quercus agrifolia*	Coast live oak	0	12	0	0	0	0	Fair	Fair	1	0	0	No	
198	*Quercus agrifolia*	Coast live oak	0	15	0	0	0	0	Poor	Poor	4	0	0	No	Crown failure
199	*Quercus agrifolia*	Coast live oak	0	32	0	0	0	0	Dead	Dead	Dead	0	0	No	
200	*Quercus agrifolia*	Coast live oak	0	11	0	0	0	0	Dead	Dead	Dead	0	0	No	
201	*Quercus agrifolia*	Coast live oak	0	11	0	0	0	0	Good	Fair	1	0	0	No	
202	*Quercus agrifolia*	Coast live oak	0	8	0	0	0	0	Good	Fair	1	0	0	No	
203	*Quercus agrifolia*	Coast live oak	0	36	0	0	0	0	Dead	Dead	Dead	1	0	No	Standing dead
204	*Quercus agrifolia*	Coast live oak	0	13	0	0	0	0	Dead	Dead	Dead	0	0	No	
205	*Quercus agrifolia*	Coast live oak	0	13	0	0	0	0	Poor	Poor	3	0	0	No	
206	*Quercus agrifolia*	Coast live oak	0	22	0	0	0	0	Fair	Fair	1	0	0	No	
207	*Quercus agrifolia*	Coast live oak	0	15	0	0	0	0	Dead	Dead	Dead	0	0	No	
208	*Quercus agrifolia*	Coast live oak	0	9	8	0	0	0	Dead	Dead	Dead	0	0	No	Collapsed crown
209	*Quercus agrifolia*	Coast live oak	0	16	12	9	0	0	Poor	Fair	3	0	0	No	
210	*Quercus agrifolia*	Coast live oak	0	32	0	0	0	0	Poor	Fair	3	0	0	No	
211	*Quercus agrifolia*	Coast live oak	0	16	0	0	0	0	Fair	Fair	2	1	0	No	
212	*Quercus agrifolia*	Coast live oak	0	4	0	0	0	0	Fair	Fair	2	0	2	No	
213	*Quercus agrifolia*	Coast live oak	0	12	10	8	0	0	Fair	Fair	1	0	0	No	
214	*Quercus agrifolia*	Coast live oak	0	11	0	0	0	0	Fair	Fair	1	0	0	No	
215	*Quercus agrifolia*	Coast live oak	0	11	0	0	0	0	Fair	Fair	1	0	0	No	
216	*Quercus agrifolia*	Coast live oak	0	9	0	0	0	0	Dead	Dead	Dead	0	0	No	
217	*Quercus agrifolia*	Coast live oak	0	11	0	0	0	0	Dead	Dead	Dead	0	0	No	
218	*Quercus agrifolia*	Coast live oak	0	7	0	0	0	0	Poor	Poor	3	0	0	No	
219	*Quercus agrifolia*	Coast live oak	0	16	0	0	0	0	Fair	Fair	1	0	0	No	
220	*Quercus agrifolia*	Coast live oak	0	17	18	0	0	0	Poor	Poor	5	0	0	No	

Tree No.	Botanical Name	Common Name	Stems	Individual Stem Diameters (in.)					Health	Structure	Crown Rating	Emergence Hole Rating	Bark Staining Rating	Woodpecker Damage	Notes
				Stem 1	*Stem 2*	*Stem 3*	*Stem 4*	*Stem 5*							
221	*Quercus agrifolia*	Coast live oak	0	13	0	0	0	0	Fair	Fair	1	0	0	No	
222	*Quercus agrifolia*	Coast live oak	0	10	5	0	0	0	Fair	Fair	1	0	0	No	
223	*Quercus agrifolia*	Coast live oak	0	9	0	0	0	0	Fair	Fair	1	0	0	No	
224	*Quercus agrifolia*	Coast live oak	0	12	0	0	0	0	Poor	Fair	3	0	0	No	
225	*Quercus agrifolia*	Coast live oak	0	13	0	0	0	0	Poor	Fair	3	0	0	No	
226	*Quercus agrifolia*	Coast live oak	0	15	15	0	0	0	Fair	Fair	1	0	0	No	
227	*Quercus agrifolia*	Coast live oak	0	10	10	9	8	0	Fair	Fair	3	0	0	No	
228	*Quercus agrifolia*	Coast live oak	0	18	15	0	0	0	Poor	Fair	2	0	0	No	
229	*Quercus agrifolia*	Coast live oak	0	16	0	0	0	0	Dead	Dead	Dead	0	0	No	Collapsed crown
230	*Quercus agrifolia*	Coast live oak	0	4	4	0	0	0	Poor	Fair	4	0	0	No	
231	*Quercus agrifolia*	Coast live oak	0	19	11	9	0	0	Dead	Dead	Dead	0	0	No	
232	*Quercus agrifolia*	Coast live oak	0	11	0	0	0	0	Poor	Poor	3	0	0	No	
233	*Quercus agrifolia*	Coast live oak	0	10	0	0	0	0	Poor	Poor	3	0	0	No	
234	*Quercus agrifolia*	Coast live oak	0	10	4	0	0	0	Poor	Poor	3	0	0	No	
235	*Quercus agrifolia*	Coast live oak	0	14	14	9	0	0	Fair	Fair	1	0	0	No	
236	*Quercus agrifolia*	Coast live oak	0	14	4	0	0	0	Fair	Fair	2	0	0	No	
237	*Quercus agrifolia*	Coast live oak	0	14	16	9	12	0	Fair	Fair	1	0	0	No	
238	*Quercus agrifolia*	Coast live oak	0	12	10	0	0	0	Fair	Fair	1	0	0	No	
239	*Quercus agrifolia*	Coast live oak	0	17	15	0	0	0	Fair	Fair	1	0	0	No	
240	*Quercus agrifolia*	Coast live oak	0	24	0	0	0	0	Fair	Fair	1	0	0	No	
241	*Quercus agrifolia*	Coast live oak	0	4	4	0	0	0	Fair	Fair	1	0	0	No	
242	*Quercus agrifolia*	Coast live oak	0	20	18	0	0	0	Fair	Fair	1	0	0	No	
243	*Quercus agrifolia*	Coast live oak	0	0	12	0	0	0	Fair	Fair	1	0	0	No	
244	*Quercus agrifolia*	Coast live oak	1	6	0	0	0	0	Good	Good	1	0	0	No	
245	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
246	*Quercus agrifolia*	Coast live oak	0	22	24	0	0	0	Fair	Fair	1	0	0	No	
247	*Quercus agrifolia*	Coast live oak	0	3	0	0	0	0	Fair	Fair	1	0	0	No	
248	*Quercus agrifolia*	Coast live oak	0	28	24	0	0	0	Good	Fair	1	0	0	No	
249	*Quercus agrifolia*	Coast live oak	0	13	15	0	0	0	Poor	Fair	3	0	0	No	
250	*Quercus agrifolia*	Coast live oak	0	16	14	0	0	0	Poor	Fair	3	0	0	No	Crown failure
251	*Quercus agrifolia*	Coast live oak	0	11	10	0	0	0	Poor	Fair	3	0	0	No	
252	*Quercus agrifolia*	Coast live oak	0	20	23	0	0	0	Fair	Fair	1	0	0	No	
253	*Quercus agrifolia*	Coast live oak	0	12	0	0	0	0	Fair	Fair	1	0	0	No	
254	*Quercus agrifolia*	Coast live oak	0	14	7	0	0	0	Fair	Fair	1	0	0	No	
255	*Quercus agrifolia*	Coast live oak	0	9	0	0	0	0	Fair	Fair	1	0	0	No	
256	*Quercus agrifolia*	Coast live oak	0	12	0	0	0	0	Fair	Fair	1	0	0	No	
257	*Quercus agrifolia*	Coast live oak	0	15	0	0	0	0	Fair	Fair	1	0	0	No	
258	*Quercus agrifolia*	Coast live oak	0	15	0	0	0	0	Fair	Fair	1	0	0	No	
259	*Quercus agrifolia*	Coast live oak	0	9	0	0	0	0	Fair	Fair	1	0	0	No	
260	*Quercus agrifolia*	Coast live oak	0	10	10	11	4	0	Fair	Fair	2	0	0	No	
261	*Quercus agrifolia*	Coast live oak	0	16	0	0	0	0	Fair	Fair	1	0	0	No	
262	*Quercus agrifolia*	Coast live oak	0	4	4	0	0	0	Fair	Fair	1	0	0	No	
263	*Quercus agrifolia*	Coast live oak	0	10	10	10	0	0	Fair	Fair	3	0	0	No	
264	*Quercus agrifolia*	Coast live oak	0	16	16	0	0	0	Fair	Fair	1	0	0	No	

Tree No.	Botanical Name	Common Name	Stems	Individual Stem Diameters (in.)					Health	Structure	Crown Rating	Emergence Hole Rating	Bark Staining Rating	Woodpecker Damage	Notes
				Stem 1	*Stem 2*	*Stem 3*	*Stem 4*	*Stem 5*							
265	*Quercus agrifolia*	Coast live oak	0	22	16	9	0	0	Fair	Fair	1	0	0	No	
266	*Quercus agrifolia*	Coast live oak	0	19	0	0	0	0	Dead	Dead	Dead	0	0	No	
267	*Quercus agrifolia*	Coast live oak	0	16	9	0	0	0	Fair	Fair	1	0	0	No	
268	*Quercus agrifolia*	Coast live oak	0	11	0	0	0	0	Fair	Fair	1	0	0	No	
269	*Quercus agrifolia*	Coast live oak	0	9	5	0	0	0	Fair	Fair	1	0	0	No	
270	*Quercus agrifolia*	Coast live oak	0	32	0	0	0	0	Poor	Fair	3	0	1	No	
271	*Quercus agrifolia*	Coast live oak	0	16	15	17	0	0	Poor	Fair	3	0	0	No	
272	*Quercus agrifolia*	Coast live oak	0	16	9	0	0	0	Poor	Fair	3	0	0	No	
273	*Quercus agrifolia*	Coast live oak	0	22	18	18	19	0	Poor	Fair	3	0	0	No	
274	*Quercus agrifolia*	Coast live oak	0	14	0	0	0	0	Poor	Fair	3	0	0	No	
275	*Quercus agrifolia*	Coast live oak	0	10	0	0	0	0	Poor	Fair	3	0	0	No	
276	*Quercus agrifolia*	Coast live oak	0	10	4	0	0	0	Poor	Fair	3	0	0	No	
277	*Quercus agrifolia*	Coast live oak	0	4	0	0	0	0	Poor	Fair	3	0	0	No	
278	*Quercus agrifolia*	Coast live oak	0	12	0	0	0	0	Poor	Fair	3	0	0	No	
279	*Quercus agrifolia*	Coast live oak	0	12	9	0	0	0	Poor	Fair	3	0	0	No	
280	*Quercus agrifolia*	Coast live oak	0	6	0	0	0	0	Poor	Fair	3	0	0	No	
281	*Quercus agrifolia*	Coast live oak	0	15	0	0	0	0	Poor	Fair	3	0	0	No	
282	*Quercus agrifolia*	Coast live oak	0	11	0	0	0	0	Fair	Fair	1	0	0	No	
283	*Quercus agrifolia*	Coast live oak	0	21	0	0	0	0	Poor	Fair	3	0	0	No	
284	*Quercus agrifolia*	Coast live oak	0	9	0	0	0	0	Poor	Fair	3	0	0	No	
285	*Quercus agrifolia*	Coast live oak	0	15	0	0	0	0	Poor	Fair	3	0	0	No	
286	*Quercus agrifolia*	Coast live oak	0	18	0	0	0	0	Fair	Fair	3	0	0	No	
287	*Quercus agrifolia*	Coast live oak	0	12	0	0	0	0	Fair	Fair	3	0	0	No	
288	*Quercus agrifolia*	Coast live oak	0	12	0	0	0	0	Dead	Dead	Dead	0	0	no	
289	*Quercus agrifolia*	Coast live oak	0	17	17	0	0	0	Fair	Fair	2	0	0	No	
290	*Quercus agrifolia*	Coast live oak	0	12	11	0	0	0	Fair	Fair	1	0	0	No	
291	*Quercus agrifolia*	Coast live oak	1	7	0	0	0	0	Good	Fair	1	0	0	No	
292	*Quercus agrifolia*	Coast live oak	2	19	19	0	0	0	Fair	Fair	2	0	0	No	
293	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Dead	Dead	Dead	0	0	No	
294	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Fair	Fair	2	0	0	No	
295	*Quercus agrifolia*	Coast live oak	1	17	0	0	0	0	Fair	Fair	3	0	0	No	
296	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Fair	Fair	2	0	0	No	
297	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Fair	Fair	2	0	0	No	
298	*Quercus agrifolia*	Coast live oak	1	6	0	0	0	0	Fair	Fair	2	0	0	No	
299	*Quercus agrifolia*	Coast live oak	1	11	14	0	0	0	Fair	Fair	1	0	0	No	
300	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Poor	Fair	4	0	0	No	
301	*Quercus agrifolia*	Coast live oak	1	27	0	0	0	0	Poor	Fair	4	0	2	No	
302	*Quercus agrifolia*	Coast live oak	1	6	0	0	0	0	Fair	Fair	1	0	0	No	
303	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
304	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
305	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	2	0	0	No	
306	*Quercus agrifolia*	Coast live oak	3	13	18	19	0	0	Fair	Fair	1	0	0	No	
307	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
308	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Fair	Fair	1	0	0	No	

Tree No.	Botanical Name	Common Name	Stems	Individual Stem Diameters (in.)					Health	Structure	Crown Rating	Emergence Hole Rating	Bark Staining Rating	Woodpecker Damage	Notes
				Stem 1	*Stem 2*	*Stem 3*	*Stem 4*	*Stem 5*							
309	*Quercus agrifolia*	Coast live oak	1	14	0	0	0	0	Fair	Fair	1	0	0	No	
310	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Dead	Dead	Dead	0	0	No	
311	*Quercus agrifolia*	Coast live oak	1	12	11	0	0	0	Dead	Dead	Dead	0	0	No	
312	*Quercus agrifolia*	Coast live oak	1	13	0	0	0	0	Fair	Fair	2	0	0	No	
313	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Dead	Dead	Dead	0	0	No	Tag no. 208
314	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Dead	Dead	Dead	0	0	No	
315	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Fair	Fair	2	0	0	No	
316	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Poor	Fair	3	0	0	No	
317	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Fair	Fair	1	0	0	No	
318	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
319	*Quercus agrifolia*	Coast live oak	1	7	0	0	0	0	Fair	Fair	1	0	0	No	Tag no. 658
320	*Quercus agrifolia*	Coast live oak	2	15	16	0	0	0	Dead	Dead	Dead	0	0	No	
321	*Quercus agrifolia*	Coast live oak	2	12	0	0	0	0	Dead	Dead	Dead	0	0	No	
322	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Fair	Fair	1	0	0	No	
323	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Fair	Fair	1	0	0	No	
324	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Dead	Dead	Dead	0	0	No	
325	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Dead	Dead	Dead	0	0	No	
326	*Quercus agrifolia*	Coast live oak	2	15	11	0	0	0	Fair	Fair	2	0	0	No	
327	*Quercus agrifolia*	Coast live oak	1	13	0	0	0	0	Poor	Poor	4	0	0	No	
328	*Quercus agrifolia*	Coast live oak	2	18	9	0	0	0	Poor	Poor	3	2	3	No	Tag no. 225
329	*Quercus agrifolia*	Coast live oak	2	13	11	0	0	0	Fair	Fair	2	0	0	No	Tag no. 226
330	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Fair	Fair	2	0	0	No	Tag no. 229
331	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Dead	Dead	Dead	0	0	No	Stump
332	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Poor	Fair	3	0	0	No	
333	*Quercus agrifolia*	Coast live oak	1	13	0	0	0	0	Fair	Fair	1	0	0	No	
334	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
335	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Dead	Dead	Dead	0	0	No	
336	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
337	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
338	*Quercus agrifolia*	Coast live oak	2	15	9	0	0	0	Fair	Fair	1	0	0	No	
339	*Quercus agrifolia*	Coast live oak	1	18	0	0	0	0	Poor	Poor	3	0	0	No	
340	*Quercus agrifolia*	Coast live oak	1	17	0	0	0	0	Dead	Dead	Dead	0	0	No	
341	*Quercus agrifolia*	Coast live oak	4	9	14	15	12	0	Poor	Poor	3	0	0	No	
342	*Quercus agrifolia*	Coast live oak	1	18	0	0	0	0	Dead	Dead	Dead	0	0	No	
343	*Quercus agrifolia*	Coast live oak	1	17	0	0	0	0	Poor	Fair	4	0	1	No	
344	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Fair	Fair	1	0	0	No	
345	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Fair	Fair	1	0	0	No	
346	*Quercus agrifolia*	Coast live oak	1	13	0	0	0	0	Fair	Fair	2	0	0	No	
347	*Quercus agrifolia*	Coast live oak	2	16	18	0	0	0	Dead	Dead	Dead	0	0	No	
348	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Dead	Dead	Dead	0	0	No	
349	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Dead	Dead	Dead	0	0	No	
350	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Good	Fair	1	0	0	No	
351	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Fair	Fair	1	0	0	No	
352	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Fair	Fair	1	0	0	No	

Tree No.	Botanical Name	Common Name	Stems	Individual Stem Diameters (in.)					Health	Structure	Crown Rating	Emergence Hole Rating	Bark Staining Rating	Woodpecker Damage	Notes
				Stem 1	*Stem 2*	*Stem 3*	*Stem 4*	*Stem 5*							
353	*Quercus agrifolia*	Coast live oak	1	6	0	0	0	0	Fair	Fair	1	0	0	No	
354	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Fair	Fair	2	0	0	No	
355	*Quercus agrifolia*	Coast live oak	1	17	0	0	0	0	Fair	Fair	1	0	0	No	
356	*Quercus agrifolia*	Coast live oak	3	11	10	8	0	0	Fair	Fair	2	0	1	No	
357	*Quercus agrifolia*	Coast live oak	2	12	15	0	0	0	Fair	Fair	1	0	0	No	
358	*Quercus agrifolia*	Coast live oak	1	13	0	0	0	0	Fair	Fair	1	0	1	No	
359	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
360	*Quercus agrifolia*	Coast live oak	2	22	18	0	0	0	Poor	Fair	4	1	1	No	Crown failure
361	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Fair	Fair	1	0	1	No	
362	*Quercus agrifolia*	Coast live oak	2	10	9	0	0	0	Fair	Fair	2	0	1	No	Tag no. 604
363	*Quercus agrifolia*	Coast live oak	2	18	9	0	0	0	Fair	Fair	2	1	1	No	Failed stem
364	*Quercus agrifolia*	Coast live oak	5	18	22	24	25	18	Poor	Poor	3	0	0	No	
365	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Good	Fair	1	0	0	No	
366	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Good	Fair	1	0	0	No	Tag no. 578
367	*Quercus agrifolia*	Coast live oak	1	18	0	0	0	0	Good	Fair	1	0	0	No	
368	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Good	Fair	1	0	1	No	
369	*Quercus agrifolia*	Coast live oak	2	15	16	0	0	0	Good	Fair	1	0	0	No	
370	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Good	Fair	1	0	0	No	
371	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Dead	Dead	Dead	0	0	No	
372	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Fair	Fair	2	0	0	No	
373	*Quercus agrifolia*	Coast live oak	1	22	0	0	0	0	Dead	Dead	Dead	0	0	No	
374	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	2	No	
375	*Quercus agrifolia*	Coast live oak	2	15	16	0	0	0	Fair	Fair	1	0	0	No	Tag no. 574
376	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Fair	Fair	1	0	0	No	
377	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Fair	Fair	1	0	0	No	
378	*Quercus agrifolia*	Coast live oak	1	5	0	0	0	0	Fair	Fair	1	0	0	No	
379	*Quercus agrifolia*	Coast live oak	1	36	0	0	0	0	Fair	Fair	1	0	0	No	
380	*Quercus agrifolia*	Coast live oak	2	6	6	0	0	0	Fair	Fair	1	0	0	No	
381	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Fair	Fair	1	0	0	No	
382	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
383	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Fair	Fair	1	0	0	No	
384	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Fair	Fair	1	0	0	No	
385	*Quercus agrifolia*	Coast live oak	1	13	0	0	0	0	Fair	Fair	1	0	0	No	
386	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Poor	Fair	3	0	0	No	
387	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
388	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Fair	Fair	1	0	0	No	
389	*Quercus agrifolia*	Coast live oak	2	18	19	0	0	0	Dead	Dead	Dead	2	1	No	
390	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
391	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
392	*Quercus agrifolia*	Coast live oak	2	6	5	0	0	0	Fair	Fair	1	0	0	No	
393	*Quercus agrifolia*	Coast live oak	1	14	0	0	0	0	Fair	Fair	2	0	0	No	
394	*Quercus agrifolia*	Coast live oak	2	9	8	0	0	0	Fair	Fair	1	0	0	No	
395	*Quercus agrifolia*	Coast live oak	2	14	12	0	0	0	Fair	Fair	1	0	0	No	
396	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	

Tree No.	Botanical Name	Common Name	Stems	Individual Stem Diameters (in.)					Health	Structure	Crown Rating	Emergence Hole Rating	Bark Staining Rating	Woodpecker Damage	Notes
				Stem 1	*Stem 2*	*Stem 3*	*Stem 4*	*Stem 5*							
397	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Fair	Fair	1	0	0	No	
398	*Quercus agrifolia*	Coast live oak	1	7	0	0	0	0	Fair	Fair	1	0	0	No	
399	*Quercus agrifolia*	Coast live oak	1	7	0	0	0	0	Fair	Fair	1	0	0	No	
400	*Quercus agrifolia*	Coast live oak	1	7	0	0	0	0	Fair	Fair	1	0	0	No	
401	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Fair	Fair	1	0	0	No	
402	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Fair	Fair	1	0	1	No	
403	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Fair	Fair	1	0	1	No	
404	*Quercus agrifolia*	Coast live oak	1	13	0	0	0	0	Fair	Fair	1	0	0	No	
405	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Fair	Fair	1	0	0	No	
406	*Quercus agrifolia*	Coast live oak	2	9	9	0	0	0	Fair	Fair	1	0	0	No	
407	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
408	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Fair	Fair	1	0	0	No	
409	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Fair	Fair	1	0	0	No	
410	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Fair	Fair	2	0	0	No	
411	*Quercus agrifolia*	Coast live oak	1	6	0	0	0	0	Fair	Fair	1	0	0	No	
412	*Quercus agrifolia*	Coast live oak	2	13	19	0	0	0	Fair	Fair	1	0	0	No	
413	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Fair	Fair	1	0	0	No	
414	*Quercus agrifolia*	Coast live oak	1	13	0	0	0	0	Poor	Fair	3	0	0	No	
415	*Quercus agrifolia*	Coast live oak	1	17	0	0	0	0	Fair	Fair	1	0	0	No	
416	*Quercus agrifolia*	Coast live oak	1	17	0	0	0	0	Fair	Fair	1	0	1	No	
417	*Quercus agrifolia*	Coast live oak	1	17	0	0	0	0	Fair	Fair	1	1	1	No	
418	*Quercus agrifolia*	Coast live oak	1	17	0	0	0	0	Fair	Fair	1	0	0	No	
419	*Quercus agrifolia*	Coast live oak	2	16	10	0	0	0	Fair	Fair	1	0	0	No	
420	*Quercus agrifolia*	Coast live oak	2	8	12	0	0	0	Dead	Dead	Dead	0	0	No	
421	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Dead	Dead	Dead	0	0	No	
422	*Quercus agrifolia*	Coast live oak	1	12	15	0	0	0	Poor	Poor	4	0	0	No	Crown failure
423	*Quercus agrifolia*	Coast live oak	1	36	0	0	0	0	Poor	Poor	3	0	1	No	
424	*Quercus agrifolia*	Coast live oak	2	12	11	0	0	0	Fair	Fair	1	0	0	No	
425	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Fair	Fair	1	0	0	No	
426	*Quercus agrifolia*	Coast live oak	3	10	10	9	0	0	Fair	Fair	1	0	0	No	
427	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Fair	Fair	1	0	0	No	
428	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Fair	Fair	1	0	0	No	
429	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Fair	Fair	1	0	0	No	
430	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Fair	Fair	1	0	0	No	
431	*Quercus agrifolia*	Coast live oak	1	6	0	0	0	0	Fair	Fair	2	0	0	No	
432	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	2	0	0	No	
433	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Fair	Fair	3	0	0	No	Trunk decay
434	*Quercus agrifolia*	Coast live oak	1	18	0	0	0	0	Dead	Dead	Dead	0	0	No	
435	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Dead	Dead	Dead	0	0	No	
436	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Fair	Fair	1	0	0	No	
437	*Quercus agrifolia*	Coast live oak	2	13	9	0	0	0	Fair	Fair	1	0	0	No	
438	*Quercus agrifolia*	Coast live oak	1	14	0	0	0	0	Fair	Fair	1	0	0	No	
439	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Fair	Fair	1	0	0	No	
440	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Fair	Fair	2	0	0	No	

Tree No.	Botanical Name	Common Name	Stems	Individual Stem Diameters (in.)					Health	Structure	Crown Rating	Emergence Hole Rating	Bark Staining Rating	Woodpecker Damage	Notes
				Stem 1	*Stem 2*	*Stem 3*	*Stem 4*	*Stem 5*							
441	*Quercus agrifolia*	Coast live oak	2	12	8	0	0	0	Poor	Fair	4	0	0	No	
442	*Quercus agrifolia*	Coast live oak	2	12	8	0	0	0	Fair	Fair	1	0	0	No	
443	*Quercus agrifolia*	Coast live oak	1	28	0	0	0	0	Fair	Fair	1	0	0	No	
444	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Fair	Fair	1	0	0	No	
445	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Fair	Fair	1	0	0	No	
446	*Quercus agrifolia*	Coast live oak	1	13	0	0	0	0	Dead	Dead	Dead	0	0	No	
447	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Dead	Dead	Dead	0	0	No	
448	*Quercus agrifolia*	Coast live oak	2	12	11	0	0	0	Fair	Fair	2	0	0	No	
449	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
450	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Fair	Fair	2	0	0	No	Trunk decay
451	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Fair	Fair	1	0	0	No	
452	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Fair	Fair	1	0	0	No	
453	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Poor	Fair	3	0	0	No	
454	*Quercus agrifolia*	Coast live oak	1	6	0	0	0	0	Poor	Fair	3	0	0	No	
455	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Poor	Fair	3	0	0	No	
456	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Fair	Fair	1	0	0	No	
457	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Fair	Fair	2	0	0	No	
458	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Fair	Fair	3	0	0	No	Trunk decay
459	*Quercus agrifolia*	Coast live oak	1	17	0	0	0	0	Poor	Fair	3	0	0	No	
460	*Quercus agrifolia*	Coast live oak	3	12	10	15	0	0	Poor	Poor	5	0	0	No	Crown failure
461	*Quercus agrifolia*	Coast live oak	4	12	10	15	12	10	Poor	Fair	3	0	0	No	
462	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Dead	Dead	Dead	0	0	No	
463	*Quercus agrifolia*	Coast live oak	2	9	9	0	0	0	Poor	Poor	3	0	0	No	Trunk decay
464	*Quercus agrifolia*	Coast live oak	3	16	9	12	0	0	Poor	Poor	2	0	0	No	
465	*Quercus agrifolia*	Coast live oak	1	14	0	0	0	0	Fair	Fair	1	0	1	No	
466	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Fair	Fair	2	0	0	No	
467	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Poor	Fair	3	0	0	No	Crown dieback
468	*Quercus agrifolia*	Coast live oak	2	14	13	0	0	0	Poor	Fair	3	0	0	No	
469	*Quercus agrifolia*	Coast live oak	1	12	13	0	0	0	Fair	Fair	1	0	0	No	
470	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Fair	Fair	2	0	0	No	
471	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Fair	Fair	1	0	0	No	
472	*Quercus agrifolia*	Coast live oak	2	8	8	0	0	0	Fair	Fair	1	0	0	No	
473	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
474	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Fair	Fair	1	0	0	No	
475	*Quercus agrifolia*	Coast live oak	1	7	0	0	0	0	Fair	Fair	1	0	0	No	
476	*Quercus agrifolia*	Coast live oak	1	7	0	0	0	0	Fair	Fair	1	0	0	No	
477	*Quercus agrifolia*	Coast live oak	1	29	0	0	0	0	Fair	Fair	3	0	0	No	Crown dieback
478	*Quercus agrifolia*	Coast live oak	3	9	9	6	0	0	Fair	Fair	3	0	0	No	
479	*Quercus agrifolia*	Coast live oak	2	15	12	0	0	0	Fair	Fair	3	0	0	No	
480	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Poor	Poor	5	0	2	No	
481	*Quercus agrifolia*	Coast live oak	1	28	0	0	0	0	Fair	Fair	3	0	0	No	
482	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Fair	Fair	1	0	0	No	
483	*Quercus agrifolia*	Coast live oak	1	8	7	0	0	0	Fair	Fair	1	0	0	No	
484	*Quercus agrifolia*	Coast live oak	5	13	15	17	18	0	Fair	Fair	3	1	1	No	

Tree No.	Botanical Name	Common Name	Stems	Individual Stem Diameters (in.)					Health	Structure	Crown Rating	Emergence Hole Rating	Bark Staining Rating	Woodpecker Damage	Notes
				Stem 1	*Stem 2*	*Stem 3*	*Stem 4*	*Stem 5*							
485	*Quercus agrifolia*	Coast live oak	1	14	0	0	0	0	Fair	Fair	1	0	0	No	
486	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Fair	Fair	1	0	0	No	
487	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Fair	Fair	1	0	0	No	
488	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Fair	Fair	1	0	0	No	
489	*Quercus agrifolia*	Coast live oak	1	32	0	0	0	0	Fair	Fair	1	0	0	No	
490	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Fair	Fair	1	0	0	No	
491	*Quercus agrifolia*	Coast live oak	2	19	11	0	0	0	Fair	Fair	1	0	0	No	
492	*Quercus agrifolia*	Coast live oak	2	19	19	0	0	0	Fair	Fair	1	0	0	No	
493	*Quercus agrifolia*	Coast live oak	1	25	0	0	0	0	Fair	Fair	2	0	0	No	
494	*Quercus agrifolia*	Coast live oak	1	25	0	0	0	0	Fair	Fair	1	0	0	No	
495	*Quercus agrifolia*	Coast live oak	3	19	18	16	0	0	Fair	Fair	3	0	0	No	
496	*Quercus agrifolia*	Coast live oak	1	25	0	0	0	0	Fair	Fair	1	0	0	No	
497	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Dead	Dead	Dead	0	0	No	
498	*Quercus agrifolia*	Coast live oak	3	19	15	12	0	0	Fair	Fair	3	0	0	No	Tag no. 88
499	*Quercus agrifolia*	Coast live oak	16	0	0	0	0	0	Poor	Poor	3	0	0	No	
500	*Quercus agrifolia*	Coast live oak	2	11	9	0	0	0	Poor	Poor	4	0	0	No	
501	*Quercus agrifolia*	Coast live oak	1	16	9	0	0	0	Fair	Poor	3	0	0	No	
502	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Fair	Poor	2	0	0	No	
503	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Dead	Dead	Dead	0	0	No	
504	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	2	0	0	No	
505	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Fair	Fair	1	0	0	No	
506	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	2	0	0	No	
507	*Quercus agrifolia*	Coast live oak	4	12	10	8	16	0	Fair	Fair	2	0	0	No	
508	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Fair	Fair	1	0	0	No	
509	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Good	Fair	1	0	0	No	
510	*Quercus agrifolia*	Coast live oak	5	8	6	6	7	8	Fair	Fair	1	0	0	No	
511	*Quercus agrifolia*	Coast live oak	5	10	11	12	12	0	Fair	Fair	2	0	0	No	
512	*Quercus agrifolia*	Coast live oak	5	14	13	14	5	0	Good	Fair	1	0	0	No	
513	*Quercus agrifolia*	Coast live oak	1	25	0	0	0	0	Poor	Fair	3	0	0	No	
514	*Quercus agrifolia*	Coast live oak	2	11	9	0	0	0	Fair	Fair	2	0	0	No	
515	*Quercus agrifolia*	Coast live oak	7	11	9	11	11	8	Fair	Fair	2	0	0	No	
516	*Quercus agrifolia*	Coast live oak	4	9	9	8	6	0	Fair	Fair	2	0	0	No	Tag no. 799
517	*Quercus agrifolia*	Coast live oak	6	9	9	8	6	5	Fair	Fair	2	0	0	No	
518	*Quercus agrifolia*	Coast live oak	3	9	9	8	0	0	Fair	Fair	1	0	0	No	
519	*Quercus agrifolia*	Coast live oak	4	6	6	8	8	0	Poor	Fair	3	0	0	No	
520	*Quercus agrifolia*	Coast live oak	1	16	14	18	0	0	Poor	Poor	4	0	0	No	
521	*Quercus agrifolia*	Coast live oak	4	11	8	6	6	0	Poor	Poor	3	0	0	No	
522	*Quercus agrifolia*	Coast live oak	2	9	13	0	0	0	Poor	Poor	4	0	0	No	
523	*Quercus agrifolia*	Coast live oak	3	17	11	9	0	0	Poor	Poor	5	0	0	No	
524	*Quercus agrifolia*	Coast live oak	3	14	9	11	0	0	Poor	Poor	1	0	0	No	
525	*Quercus agrifolia*	Coast live oak	4	11	8	8	6	0	Fair	Fair	2	0	0	No	
526	*Quercus agrifolia*	Coast live oak	2	15	14	0	0	0	Poor	Fair	3	0	0	No	
527	*Quercus agrifolia*	Coast live oak	2	17	17	19	0	0	Dead	Dead	Dead	0	0	No	Collapsed crown
528	*Quercus agrifolia*	Coast live oak	1	17	0	0	0	0	Poor	Poor	3	0	1	No	Tag no. 763

Tree No.	Botanical Name	Common Name	Stems	Individual Stem Diameters (in.)					Health	Structure	Crown Rating	Emergence Hole Rating	Bark Staining Rating	Woodpecker Damage	Notes
				Stem 1	*Stem 2*	*Stem 3*	*Stem 4*	*Stem 5*							
529	*Quercus agrifolia*	Coast live oak	1	32	0	0	0	0	Dead	Dead	Dead	0	0	No	
530	*Quercus agrifolia*	Coast live oak	2	25	22	0	0	0	Fair	Fair	2	0	1	No	
531	*Quercus agrifolia*	Coast live oak	4	12	11	13	15	0	Fair	Fair	1	0	0	No	
532	*Quercus agrifolia*	Coast live oak	2	18	15	0	0	0	Fair	Fair	2	0	0	No	
533	*Quercus agrifolia*	Coast live oak	2	12	10	0	0	0	Fair	Fair	1	0	0	No	
534	*Quercus agrifolia*	Coast live oak	2	11	6	0	0	0	Fair	Fair	2	0	0	No	
535	*Quercus agrifolia*	Coast live oak	4	6	6	5	6	0	Fair	Fair	2	0	0	No	
536	*Quercus agrifolia*	Coast live oak	1	6	0	0	0	0	Fair	Fair	1	0	0	No	
537	*Quercus agrifolia*	Coast live oak	2	6	5	0	0	0	Fair	Fair	1	0	0	No	
538	*Quercus agrifolia*	Coast live oak	2	6	5	0	0	0	Fair	Fair	1	0	0	No	
539	*Quercus agrifolia*	Coast live oak	2	6	5	0	0	0	Fair	Fair	2	0	0	No	
540	*Quercus agrifolia*	Coast live oak	28	0	0	0	0	0	Poor	Fair	4	0	1	No	
541	*Quercus agrifolia*	Coast live oak	12	0	0	0	0	0	Fair	Fair	1	0	0	No	
542	*Quercus agrifolia*	Coast live oak	4	9	15	16	16	0	Fair	Fair	2	0	0	No	
543	*Quercus agrifolia*	Coast live oak	2	18	12	0	0	0	Dead	Dead	Dead	3	2	No	Tag no. 776
544	*Quercus agrifolia*	Coast live oak	2	19	12	0	0	0	Dead	Dead	Dead	2	2	No	
545	*Quercus agrifolia*	Coast live oak	3	15	11	13	0	0	Poor	Poor	5	0	0	No	
546	*Quercus agrifolia*	Coast live oak	2	15	11	0	0	0	Fair	Fair	2	0	0	No	
547	*Quercus agrifolia*	Coast live oak	2	13	11	0	0	0	Fair	Fair	1	0	0	No	
548	*Quercus agrifolia*	Coast live oak	3	15	18	18	0	0	Fair	Fair	1	0	0	No	
549	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Fair	Fair	2	0	0	No	
550	*Quercus agrifolia*	Coast live oak	2	16	16	0	0	0	Fair	Fair	2	0	0	No	
551	*Quercus agrifolia*	Coast live oak	1	13	0	0	0	0	Fair	Fair	1	0	0	No	
552	*Quercus agrifolia*	Coast live oak	4	15	14	13	12	0	Fair	Fair	2	0	0	No	
553	*Quercus agrifolia*	Coast live oak	1	13	0	0	0	0	Fair	Fair	2	0	1	No	
554	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Fair	Fair	2	0	0	No	
555	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Fair	Fair	2	0	1	No	
556	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Dead	Dead	Dead	2	0	No	GSOB
557	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Fair	Fair	1	0	0	No	
558	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Fair	Fair	2	0	0	No	
559	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Fair	Fair	1	0	0	No	
560	*Quercus agrifolia*	Coast live oak	2	18	18	0	0	0	Fair	Fair	2	0	0	No	Bees
561	*Quercus agrifolia*	Coast live oak	2	16	18	0	0	0	Fair	Fair	2	0	0	No	Tag no. 1290
562	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Fair	Fair	2	0	0	No	
563	*Quercus agrifolia*	Coast live oak	1	4	0	0	0	0	Fair	Fair	2	0	0	No	
564	*Quercus agrifolia*	Coast live oak	1	14	0	0	0	0	Fair	Fair	1	0	0	No	
565	*Quercus agrifolia*	Coast live oak	2	14	12	0	0	0	Fair	Fair	2	0	0	No	
566	*Quercus agrifolia*	Coast live oak	2	11	10	0	0	0	Poor	Fair	4	0	0	No	
567	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Fair	Fair	1	0	0	No	
568	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Fair	Fair	2	0	0	No	
569	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
570	*Quercus agrifolia*	Coast live oak	3	11	9	6	0	0	Fair	Fair	1	0	0	No	
571	*Quercus agrifolia*	Coast live oak	1	13	0	0	0	0	Poor	Poor	3	0	0	No	
572	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Poor	Poor	3	0	0	No	

Tree No.	Botanical Name	Common Name	Stems	Individual Stem Diameters (in.)					Health	Structure	Crown Rating	Emergence Hole Rating	Bark Staining Rating	Woodpecker Damage	Notes
				Stem 1	*Stem 2*	*Stem 3*	*Stem 4*	*Stem 5*							
573	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Poor	Poor	3	0	0	No	
574	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Dead	Dead	Dead	0	0	No	
575	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Poor	Fair	3	0	0	No	
576	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Poor	Fair	3	0	0	No	
577	*Quercus agrifolia*	Coast live oak	6	14	16	12	12	10	Poor	Fair	3	0	0	No	
578	*Quercus agrifolia*	Coast live oak	2	9	9	0	0	0	Poor	Fair	3	0	0	No	
579	*Quercus agrifolia*	Coast live oak	3	12	9	10	0	0	Poor	Fair	3	0	0	No	
580	*Quercus agrifolia*	Coast live oak	24	9	0	0	0	0	Poor	Fair	3	0	0	No	
581	*Quercus agrifolia*	Coast live oak	9	0	0	0	0	0	Dead	Dead	Dead	0	0	No	
582	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Dead	Dead	Dead	0	0	No	
583	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Dead	Dead	Dead	0	0	No	
584	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Dead	Dead	Dead	0	0	No	
585	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Dead	Dead	Dead	0	0	No	
586	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Fair	Fair	2	0	0	No	
587	*Quercus agrifolia*	Coast live oak	1	18	0	0	0	0	Poor	Poor	3	0	0	No	
588	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	2	0	0	No	
589	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Fair	Fair	2	0	0	No	
590	*Quercus agrifolia*	Coast live oak	3	11	10	9	0	0	Fair	Fair	2	0	0	No	
591	*Quercus agrifolia*	Coast live oak	2	13	10	0	0	0	Fair	Fair	1	0	0	No	
592	*Quercus agrifolia*	Coast live oak	4	23	12	6	22	0	Fair	Fair	2	0	0	No	
593	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
594	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Fair	Fair	2	0	0	No	
595	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Fair	Fair	1	0	0	No	
596	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Fair	Fair	2	0	0	No	
597	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Fair	Fair	2	0	0	No	
598	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Fair	Fair	2	0	0	No	
599	*Quercus agrifolia*	Coast live oak	1	8	0	0	0	0	Fair	Fair	2	0	0	No	
600	*Quercus agrifolia*	Coast live oak	1	35	0	0	0	0	Poor	Fair	3	0	0	No	
601	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Poor	Fair	3	0	0	No	
602	*Quercus agrifolia*	Coast live oak	2	18	16	0	0	0	Poor	Fair	3	0	0	No	
603	*Quercus agrifolia*	Coast live oak	2	18	15	0	0	0	Poor	Fair	4	0	0	No	
604	*Quercus agrifolia*	Coast live oak	2	13	0	0	0	0	Fair	Fair	1	0	0	No	
605	*Quercus agrifolia*	Coast live oak	1	13	0	0	0	0	Dead	Dead	Dead	0	0	No	
606	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Poor	Fair	3	0	0	No	
607	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Poor	Fair	3	0	0	No	
608	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Poor	Fair	2	0	0	No	
609	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Dead	Dead	Dead	0	0	No	
610	*Quercus agrifolia*	Coast live oak	2	12	16	0	0	0	Dead	Dead	Dead	0	0	No	
611	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Dead	Dead	Dead	0	0	No	
612	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Poor	Poor	4	0	1	No	
613	*Quercus agrifolia*	Coast live oak	18	0	0	0	0	0	Poor	Poor	3	0	0	No	
614	*Quercus agrifolia*	Coast live oak	10	0	0	0	0	0	Poor	Poor	3	0	0	No	
615	*Quercus agrifolia*	Coast live oak	28	0	0	0	0	0	Fair	Fair	1	0	0	No	
616	*Quercus agrifolia*	Coast live oak	28	0	0	0	0	0	Fair	Fair	1	0	0	No	

Tree No.	Botanical Name	Common Name	Stems	Individual Stem Diameters (in.)					Health	Structure	Crown Rating	Emergence Hole Rating	Bark Staining Rating	Woodpecker Damage	Notes
				Stem 1	*Stem 2*	*Stem 3*	*Stem 4*	*Stem 5*							
617	*Quercus agrifolia*	Coast live oak	19	0	0	0	0	0	Fair	Fair	1	0	0	No	
618	*Quercus agrifolia*	Coast live oak	15	0	0	0	0	0	Fair	Fair	2	0	0	No	
619	*Quercus agrifolia*	Coast live oak	19	0	0	0	0	0	Fair	Fair	1	0	0	No	
620	*Quercus agrifolia*	Coast live oak	19	0	0	0	0	0	Fair	Fair	2	0	0	No	
621	*Quercus agrifolia*	Coast live oak	17	0	0	0	0	0	Dead	Dead	Dead	2	0	No	GSOB
622	*Quercus agrifolia*	Coast live oak	19	0	0	0	0	0	Fair	Fair	2	0	0	No	
623	*Quercus agrifolia*	Coast live oak	19	0	0	0	0	0	Fair	Fair	1	0	0	No	
624	*Quercus agrifolia*	Coast live oak	16	0	0	0	0	0	Fair	Fair	2	0	0	No	
625	*Quercus agrifolia*	Coast live oak	2	13	4	0	0	0	Fair	Fair	1	0	0	No	
626	*Quercus agrifolia*	Coast live oak	1	18	0	0	0	0	Poor	Fair	3	0	0	No	
627	*Quercus agrifolia*	Coast live oak	1	36	0	0	0	0	Poor	Fair	3	0	0	No	
628	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Dead	Dead	Dead	0	0	No	
629	*Quercus agrifolia*	Coast live oak	4	16	16	15	15	0	Poor	Poor	3	0	0	No	
630	*Quercus agrifolia*	Coast live oak	2	16	16	15	15	0	Poor	Poor	5	0	0	No	
631	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Dead	Dead	Dead	0	0	No	
632	*Quercus agrifolia*	Coast live oak	3	15	19	19	0	0	Poor	Poor	3	0	0	No	
633	*Quercus agrifolia*	Coast live oak	3	22	19	24	0	0	Poor	Poor	3	0	0	No	Tag no. 1290
634	*Quercus agrifolia*	Coast live oak	1	18	0	0	0	0	Dead	Dead	Dead	1	0	No	GSOB
635	*Quercus agrifolia*	Coast live oak	1	24	0	0	0	0	Dead	Dead	Dead	1	0	No	GSOB
636	*Quercus agrifolia*	Coast live oak	13	10	0	0	0	0	Fair	Fair	2	0	0	No	
637	*Quercus agrifolia*	Coast live oak	3	13	15	8	0	0	Fair	Fair	1	0	0	No	
638	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Fair	Fair	1	0	0	No	
639	*Quercus agrifolia*	Coast live oak	1	14	0	0	0	0	Poor	Poor	3	0	0	No	
640	*Quercus agrifolia*	Coast live oak	3	6	6	4	0	0	Poor	Poor	3	0	0	No	
641	*Quercus agrifolia*	Coast live oak	1	11	0	0	0	0	Poor	Poor	3	0	0	No	
642	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Dead	Dead	Dead	0	0	No	
643	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Dead	Dead	Dead	0	0	No	
644	*Quercus agrifolia*	Coast live oak	3	12	8	9	0	0	Poor	Poor	3	0	0	No	
645	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
646	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Fair	Fair	1	0	0	No	
647	*Quercus agrifolia*	Coast live oak	3	10	9	6	0	0	Fair	Fair	1	0	0	No	
648	*Quercus agrifolia*	Coast live oak	2	10	9	0	0	0	Fair	Fair	1	0	0	No	
649	*Quercus agrifolia*	Coast live oak	2	8	8	0	0	0	Fair	Fair	1	0	0	No	
650	*Quercus agrifolia*	Coast live oak	1	14	0	0	0	0	Fair	Fair	2	0	0	No	
651	*Quercus agrifolia*	Coast live oak	1	16	0	0	0	0	Fair	Fair	2	0	0	No	
652	*Quercus agrifolia*	Coast live oak	3	19	17	18	0	0	Fair	Fair	1	0	0	No	
653	*Quercus agrifolia*	Coast live oak	2	13	13	0	0	0	Fair	Fair	1	0	0	No	
654	*Quercus agrifolia*	Coast live oak	4	13	13	12	10	0	Fair	Fair	1	0	0	No	
655	*Quercus agrifolia*	Coast live oak	2	17	15	0	0	0	Fair	Fair	3	0	0	No	
656	*Quercus agrifolia*	Coast live oak	1	24	0	0	0	0	Poor	Fair	3	0	0	No	
657	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Poor	Fair	3	0	0	No	
658	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Poor	Poor	3	0	0	No	
659	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Poor	Poor	3	0	0	No	
660	*Quercus agrifolia*	Coast live oak	1	20	0	0	0	0	Poor	Poor	4	2	1	No	GSOB

Tree No.	Botanical Name	Common Name	Stems	Individual Stem Diameters (in.)					Health	Structure	Crown Rating	Emergence Hole Rating	Bark Staining Rating	Woodpecker Damage	Notes
				Stem 1	*Stem 2*	*Stem 3*	*Stem 4*	*Stem 5*							
661	*Quercus agrifolia*	Coast live oak	1	25	0	0	0	0	Poor	Poor	3	0	0	No	
662	*Quercus agrifolia*	Coast live oak	1	22	0	0	0	0	Poor	Poor	3	0	0	No	
663	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Fair	Poor	3	0	0	No	
664	*Quercus agrifolia*	Coast live oak	1	25	0	0	0	0	Fair	Poor	1	0	0	No	
665	*Quercus agrifolia*	Coast live oak	1	15	0	0	0	0	Fair	Poor	1	0	0	No	
666	*Quercus agrifolia*	Coast live oak	2	15	17	0	0	0	Poor	Poor	4	0	0	No	
667	*Quercus agrifolia*	Coast live oak	2	16	22	0	0	0	Fair	Poor	2	0	0	No	
668	*Quercus agrifolia*	Coast live oak	2	16	4	0	0	0	Fair	Poor	1	0	0	No	
669	*Quercus agrifolia*	Coast live oak	1	16	4	0	0	0	Fair	Poor	1	0	0	No	
670	*Quercus agrifolia*	Coast live oak	3	8	6	8	0	0	Fair	Poor	1	0	0	No	
671	*Quercus agrifolia*	Coast live oak	1	28	0	0	0	0	Fair	Good	1	0	0	No	
672	*Quercus agrifolia*	Coast live oak	3	25	13	18	0	0	Dead	Dead	Dead	1	0	No	
673	*Quercus agrifolia*	Coast live oak	1	9	0	0	0	0	Fair	Fair	1	0	0	No	
674	*Quercus agrifolia*	Coast live oak	1	18	0	0	0	0	Fair	Fair	2	0	0	No	
675	*Quercus agrifolia*	Coast live oak	1	22	0	0	0	0	Fair	Fair	2	0	0	No	
676	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Fair	Fair	2	0	0	No	
677	*Quercus agrifolia*	Coast live oak	2	13	9	0	0	0	Fair	Fair	2	0	0	No	
678	*Quercus agrifolia*	Coast live oak	1	13	0	0	0	0	Fair	Fair	2	0	0	No	
679	*Quercus agrifolia*	Coast live oak	1	28	0	0	0	0	Fair	Fair	2	0	0	No	
680	*Quercus agrifolia*	Coast live oak	1	32	0	0	0	0	Fair	Fair	1	0	0	No	
681	*Quercus agrifolia*	Coast live oak	1	12	0	0	0	0	Fair	Fair	1	0	0	No	
682	*Quercus agrifolia*	Coast live oak	2	12	13	0	0	0	Fair	Fair	1	0	0	No	
683	*Quercus agrifolia*	Coast live oak	1	19	0	0	0	0	Fair	Fair	1	0	0	No	
684	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Fair	Fair	2	0	0	No	
685	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Poor	Fair	2	0	0	No	
686	*Quercus agrifolia*	Coast live oak	1	20	0	0	0	0	Poor	Fair	3	0	0	No	
687	*Quercus agrifolia*	Coast live oak	1	10	0	0	0	0	Poor	Fair	3	1	0	No	
688	*Quercus agrifolia*	Coast live oak	2	18	12	0	0	0	Dead	Dead	Dead	1	0	No	
689	*Quercus agrifolia*	Coast live oak	2	22	25	0	0	0	Dead	Dead	Dead	0	0	No	
690	*Quercus agrifolia*	Coast live oak	1	18	0	0	0	0	Fair	Fair	1	0	1	No	

Attachment 8

Invasive Shot Hole Borer Host Tree Species

Attachment 5 - ISHB Host Tree Species (August 2018)			
Number	**Botanical Name**	**Common Name**	**Native**
1	*Acacia melanoxylon*	Australian blackwood	
2	Acacia spp.	Acacia	
3	*Acer buergerianum*	Trident maple	
4	*Acer macrophyllum*	Big leaf maple	X
5	*Acer negundo*	Box elder	X
6	*Acer palmatum*	Japanese maple	
7	*Acer paxii*	Evergreen maple	
8	*Aesculus californica*	California buckeye	X
9	*Ailanthus altissima*	Tree of heaven	
10	*Albizia julibrissin*	Mimosa/Silk tree	
11	*Alectryon excelsus*	Titoki	
12	*Alnus rhombifolia*	White alder	X
13	*Archontophoenix cunninghamiana*	King palm	
14	*Baccharis salicifolia*	Mulefat	X
15	*Bauhinia variegata*	Purple orchid tree	
16	*Brachychiton populneus*	Kurrajong	
17	*Camellia semiserrata*	Camellia	
18	*Castanospermum australe*	Moreton Bay chestnut	
19	*Cercidium floridum*	Blue palo verde	X
20	*Cercidium sonorae*	Brea	
21	*Cocculus laurifolius*	Laurel-leaf snailseed tree	
22	*Cupaniopsis anacardioides*	Carrotwood	
23	*Dombeye cacuminum*	Strawberry snowball tree	
24	*Erythrina caffra*	Coast coral tree	
25	*Erythrina coralloides*	Coral tree	
26	*Erythrina falcata*	Brazilian coral tree	
27	*Erythrina humeana*	Draft coral tree	
28	*Eucalyptus ficifolia*	Red flowering gum	
29	*Fagus crenata*	Japanese beech	
30	*Ficus altissima*	Council tree	
31	*Ficus carica*	Black mission fig	
32	*Gleditsia triacanthos*	Honey locust	
33	*Harpulia pendula*	Tulip wood	
34	*Howea forsteriana*	Kentia Palm	
35	*Ilex cornuta*	Chinese holly	
36	*Jacaranda mimosifolia*	Jacaranda	
37	*Koelreuteria bipinnata*	Chinese flame tree	
38	*Liquidambar styraciflua*	Liquidambar/American sweetgum	
39	*Magnolia grandiflora*	Southern magnolia	
40	*Magnolia virginiana*	Sweet bay	
41	*Parkinsonia aculeata*	Palo verde	X
42	*Persea americana*	Avocado	
43	*Platanus mexicana*	Mexican sycamore	
44	*Platanus racemosa*	California sycamore	X
45	*Platanus x acerifolia*	London plane	

Attachment 5 - ISHB Host Tree Species (August 2018)			
Number	**Botanical Name**	**Common Name**	**Native**
46	*Populus fremontii*	Fremont cottonwood	X
47	*Populus nigra*	Black poplar	X
48	*Populus trichocarpa*	Black cottonwood	X
49	*Prosopis articulata*	Mesquite	X
50	*Pterocarya stenoptera*	Chinese wingnut	
51	*Quercus agrifolia*	Coast live oak	X
52	*Quercus chrysolepis*	Canyon live oak	X
53	*Quercus engelmannii*	Engelmann oak	X
54	*Quercus lobata*	Valley oak	X
55	*Quercus robur*	English oak	
56	*Quercus suber*	Cork oak	
57	*Ricinus communis*	Castor bean	
58	*Robinia pseudoacacia*	Black locust	
59	*Salix babylonica*	Weeping willow	
60	*Salix gooddingii*	Goodding's black willow	X
61	*Salix laevigata*	Red willow	X
62	*Salix lasiolepis*	Arroyo willow	X
63	*Salix nigra*	Black Willow	X
64	*Spathodea campanulata*	African tulip tree	
65	*Tamarix ramosissima*	Tamarix	
66	*Wisteria floribunda*	Japanese wisteria	
67	*Xylosma congestum*	Dense logwood/Shiny xylosma	

Attachment 9

Survey and Management of the Goldspotted Oak Borer Outbreak in Weir Canyon, Irvine Ranch Open Space 2014–2016

Survey and Management of the Goldspotted Oak Borer Outbreak in Weir Canyon, Irvine Ranch Open Space 2014-2016

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4 April 2017

**Maps, photos, and data provided by IRC*

Contents

Background

The Goldspotted oak borer (GSOB) *Agrilus auroguttatus* Schaeffer (Coleoptera: Buprestidae) is a flat-headed bark beetle pest from southeastern Arizona that was discovered in San Diego, California in 2004, and in 2008, was determined to be the cause of serious tree injury and mortality. GSOB is not a pest in its native range, and perhaps because of this, very little was known about its life history and ecology prior to its outbreak in San Diego (Coleman et al. 2015). Since GSOB's discovery in California, it has been found to prefer and have its greatest impact on coast live oak (*Quercus agrifolia)* and California black oak (*Quercus kelloggii),* both red oaks, with 45% tree mortality across stands and up to 90% infestation rates among larger oaks (>18 in DBH) (Coleman et al. 2015). The number of infested trees within stands where it had been introduced in San Diego grew rapidly and new infestations spread to satellite areas, likely via firewood movement. Satellite infestations occurred in other regions of San Diego, in Idyllwild in 2012, Weir Canyon in Orange County in 2014, and Green Valley in Los Angeles County in 2015. Since 2002, it has been estimated to have contributed to the mortality of over 80,000 oak trees across approximately 4,900 km^2 (http://cisr.ucr.edu/goldspotted_oak_borer.html). Estimates from aerial surveys of mortality believed to be from GSOB in eastern San Diego county in 2015 were at over 53,000 trees (USDA FHM 2015 *cf.* Coleman et al. 2016). By the time the threat from this pest was realized in San Diego County, the infestation was not feasible to eradicate or control aggressively. Management practices instead focused on protecting high-value trees or removing trees deemed a threat to human safety in parks. Heavily impacted parks were closed, and by 2014 over $1,000,000 have been spent in San Diego County Parks for tree removal costs alone (Vanetta et al., 2015). Using an estimated value of at least $30,000 per tree (http://cisr.ucr.edu/goldspotted_oak_borer.html), the cost of tree loss alone from this beetle has been staggering, at $810,000,000. Wildland habitat quality, microclimate and park aesthetics are also being heavily impacted and cannot as easily be monetized. Oak trees have been described as a keystone species; they provide shelter for numerous mammals, birds and insects, nesting habitat for several species of birds, and a critical food source for deer, woodpeckers, and small mammals. The high rates of tree mortality seen in areas where this pest has occurred for several years represents substantial loss in habitat value for numerous species at different trophic levels.

GSOB was identified and confirmed in Weir Canyon, Orange County in December 2014 (Figure 1), with die-off in the area initially observed that summer. At the time of its discovery in Weir Canyon, estimates of GSOB-caused tree mortality were at approximately 27,000 trees in the southern California area (Venette et al., 2015). An immediate cursory survey of oaks infested within a few hundred feet of the original cluster of dying

oaks recorded approximately 50 infested individuals. Based on the relatively early stage of the outbreak and the potential repercussions of its continued spread, the land owner and land manager took swift action to provide supplemental funding and develop an annual Management Treatment Plan (Irvine Ranch Conservancy 2015, 2016). Weir Canyon is located within the Irvine Ranch Open Space, owned by OC Parks and part of the Natural Community Conservation Plan reserve system for Central and Coastal Orange County (Figure 2). The Irvine Ranch Conservancy (IRC), the contracted land manager, in coordination with OC Parks, consulted with UC Cooperative Extension specialists, US Forest Service entomologists, and the California Department of Fire and Forestry (Cal Fire) that had been studying, advising, and contracting with other landowners impacted by GSOB infestations in San Diego and Riverside Counties. The Orange County Fire Authority (OCFA) shortly thereafter organized and currently hosts monthly meetings for the Orange County Invasive Tree Pest Council.

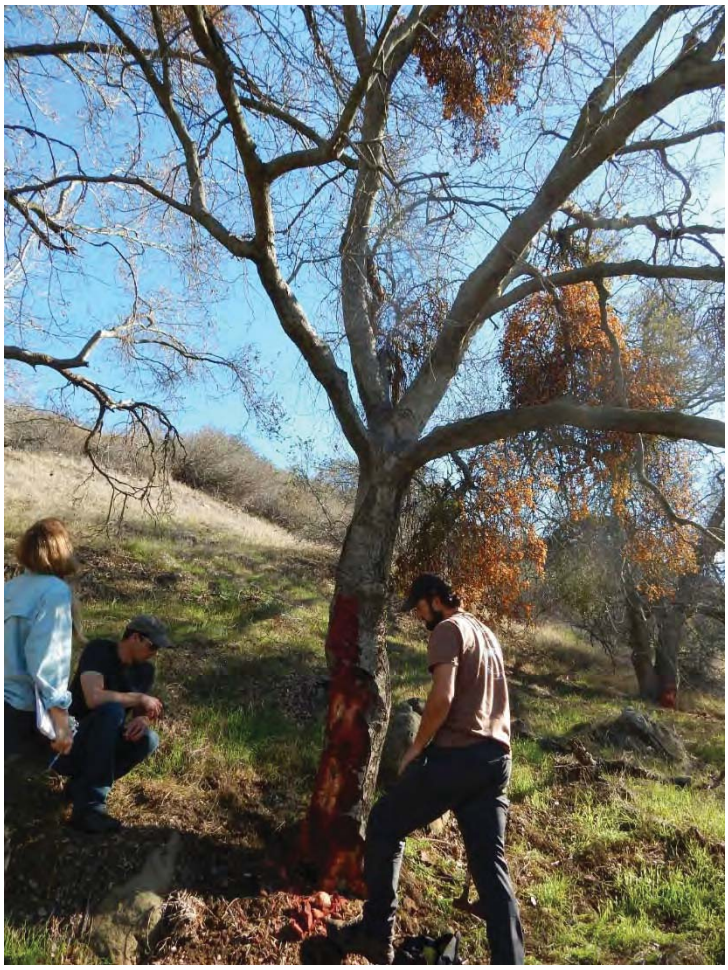

Figure 1. Discovery of GSOB in Weir Canyon December 2014, the first known occurrence in Orange County. Ecologist Zach Principe (left) noticed the cluster of dead oak trees on a routine drive through Nature Conservancy conservation easement lands the previous summer. Tom Coleman (USDA Forest Service entomologist (right), Megan Lulow, Irvine Ranch Conservancy ecologist (far left).

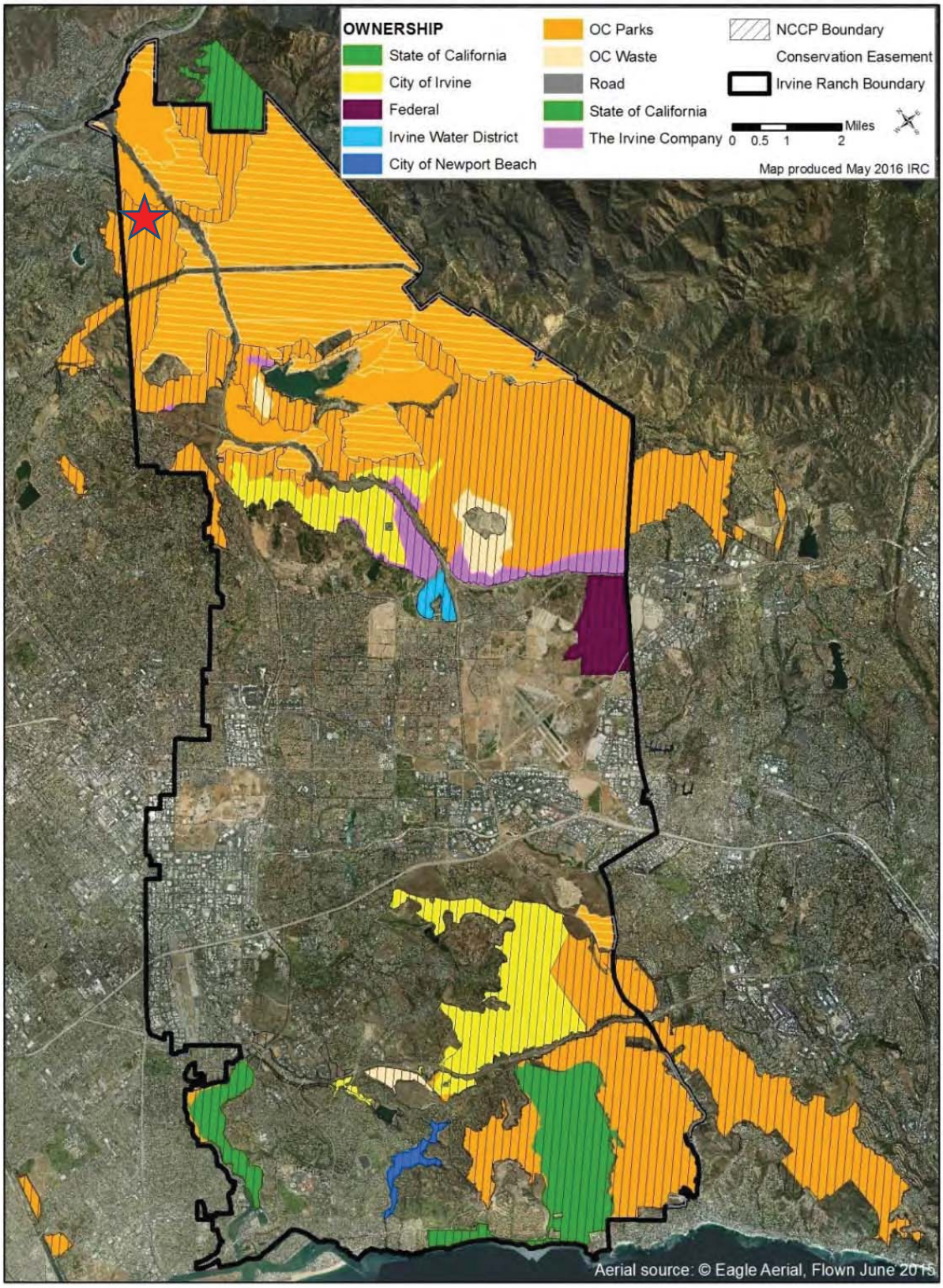

Figure 2. Location of Weir Canyon GSOB outbreak within the Irvine Ranch National Natural Landmark and within OC Parks Irvine Ranch Open Space.

The source of the infestation is believed to have come from un-burned firewood next to an illegal campfire from individuals trespassing from a nearby residential community. A trailhead at the edge of the residential community leads to trails within Santiago Oaks Regional Park, which adjoin gated roads leading down to Weir Canyon. This trail system is approximately 1 mile from what is thought to be the point of introduction in Weir Canyon. To date, no other populations were discovered in Orange County. Once the infestation was discovered, in addition to an intensive survey in the vicinity of the infested oaks (described below under Monitoring and Survey Results), additional surveys were conducted in 2015 along canyons containing oaks throughout the rest of Weir Canyon, and areas of Santiago Oaks Regional Park, Irvine Regional Park, Shoestring Canyon, Limestone Canyon, and Fremont Canyon, but no other infested trees were found. These surveys were conducted by Irvine Ranch Conservancy staff, volunteers and interns and are not included in this report. The only tested and applied management treatments at the time GSOB was discovered in Weir Canyon were removal and chipping of highly infested trees to slow the pace of spread. This report describes treatment and survey methodologies and results of the Weir Canyon GSOB infestation in 2015 and 2016.

Monitoring Protocols

Immediately after the discovery of GSOB in Weir Canyon, Irvine Ranch Conservancy staff developed a monitoring plan to inform management actions. While resource intensive, ground surveys were conducted because they are the most effective technique and because the infestation was deemed small enough to attempt eradication. Lures utilizing purple prism traps and a pheromone are used in some areas for GSOB monitoring, but only provide a general guide for of the level of infestation, not data that could guide management prescriptions, and therefore were not considered effective at detecting beetles (Francis et al. 2008, Coleman et al. 2014). Survey hours recorded in 2016 totaled approximately 600 hours, including staff and trained volunteer time (Table 1). This included time counting exit holes per tree, recording location with a GPS unit, tagging and flagging, and other tree measurements (see below).

Table 1. 2016 expenses for management treatments and survey hours. Hours and expenses do not include financial overhead, GIS map production, or partner support on contracts and advice. In addition, OCFA is a service provider to the County of Orange with an interest in preventing fire risk, and therefore, their expenses reflect coverage of their costs only. Private company expenses would likely be greater. Funding was supported by OC Parks, the landowner. In 2016, application of Carbaryl contact insecticide was ~$16/tree, and tree removal or de-barking ~$800/tree. In 2015 Emamectin benzoate with ArborJet injection was ~$90/tree and trunk spray with Dinotefuron and Pentabark ~$70/tree.

Activity	Cost/hours	Description
Carbaryl treatment of approximately 1000 Trees	$19,379	Contractor charges for Carbaryl provisions and application services
Equipment	$1,927	Equipment necessary to execute the project (backpack sprayer, chainsaw, de-barker tools, axe and hatchet)
Supplies and materials	$1,580	Expenses associated with GSOB monitoring and treatment, including flagging and other survey materials, fuel, Dinotefuron and other incidentals.
Tree felling, hauling for chipping (West Coast Arborists)	$9,620	11 trees
Tree felling, de-barking and slabbing (OCFA)	$17,011	22 trees
Pre-disturbance bird surveys	$2958	33 trees
Dinotefuron (Irvine Ranch Conservancy)	14 hrs	54 trees
Surveying (staff and volunteers)	600 hrs	October 2015-May 2016, counting exit holes, flagging, and recording location with GPS
Planning/Coordination	150 hrs	October 2015-May 2016, scope of work for contractors, monitoring protocols and evaluation of incoming results, coordinating contractors and volunteers, consultation with experts
Oversight of contractors for treatment	100 hrs	April 2016, observe work per specifications, take notes, coordinate timing, evaluate environmental impacts, ensure safety of crews and others

Among wood boring insects, GSOB is distinct in having D-shaped exit holes (Figure 3). This greatly facilitates identification of this pest among holes left by other secondary colonizing borers. Staff were advised that the number of exit holes roughly corresponds to the severity of infestation (Coleman et al. 2015). Heavily infested trees have been estimated to contribute to the large majority of the GSOB population in a given area (Coleman 2015), and therefore, categorization of trees based on the density of exist holes as a way to prioritize trees was incorporated into the survey protocol. The annual life cycle of GSOB also guided survey protocols and management treatments (Figure 4). Counts of exit holes were conducted after the flight period and in enough time to allow for management treatments to be applied. This timing varied with the type of chemical or cultural treatment (see below), but generally occurred between October-March. In both 2015 and 2016, surveys were initiated around the core area of infestation to allow sufficient time to determine management actions and total numbers of trees, with surveys around the periphery continuing into February and March to determine the full extent of the outbreak. In 2016, this included skipping ahead 100 feet and then continuing to

survey several trees in a cluster, and then working back towards to the core as time allowed to ensure the entire population would be treated.

A.  B. 

Figure 3. Goldspotted oak borer emergence hole at 4 mm (A) and pupal chamber (~20 mm length unfolded) (B). Emergence holes can identify GSOB infested trees due to their unique, uniform D shape and size (3-4 mm). In addition, pupal chambers are formed just beneath the bark surface, so carefully chipping away with a chisel and mallet can reveal its kidney bean shaped chamber. Prepupa will form a hairpin fold that is also telling of this species.

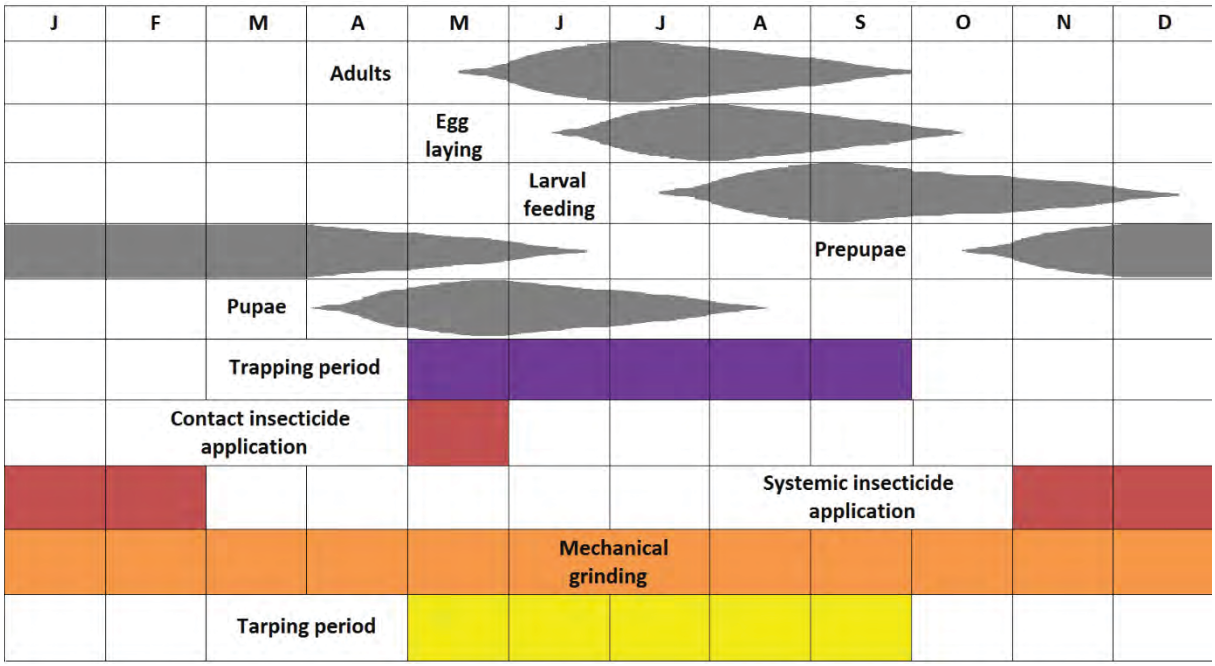

Figure 4. Approximate life cycle of GSOB and associated timing of management applications. *Copied From*: Coleman et al. 2015, USDA Forest Service, Leaflet 183. ***FS/R6/RO/FIDL#183-15/001***

Irvine Ranch Conservancy staff worked with US Forest Service entomologist Tom Coleman and UC Cooperative extension specialists Kevin Turner and Tom Scott to become trained in identification of GSOB exit holes and in developing other traits to measure that would be useful in informing management decisions and trajectories of the infestation. Survey data included: 1) counting the total number of D-shaped exit holes, 2)

tree diameter (inches at diameter beast height, percent canopy thinning (0-10; 11-49; 50-75; 76-100) (Figure 5), 3) a unique identification number and metal tag per observed tree (in 2015, only infested trees were tagged, in 2016, surveyed un-infested trees were also tagged), 4) observer and date, 5) GSOB (yes, no, maybe), 6) flagging color (representing level of infestation based on number of exit holes and corresponding management treatment), 7) comments (e.g. poison oak inhibiting full observation or split trunks), and 8) photo taken with tree ID (yes/no). The number of exit holes corresponded directly with the type of management treatment since it is thought to correspond with level of infestation. Tracking numbers may also help in determining the efficacy of treatment after 2-3 years. Starting in 2016, holes that were counted were spray painted to distinguish them from future holes. In a few cases in 2016, a dead GSOB adult was found as it emerged through the hole. This is noteworthy with respect to a response from chemical treatment, although it is unclear how many beetles may have emerged and died shortly after exiting or been eaten. This was noted in the comments. Other characteristics, such as tree diameter and canopy cover were collected to track individual tree health through the infestation and treatment, or for possible correlations with GSOB impacts and tree traits. GPS units were used to collect data and record the location of each tree.

Figure 5. Thinning canopy of coast live oaks in Weir Canyon, Irvine Ranch Open Space.

Unlike other wood borers, GSOB tends to lay its eggs on the trunk and thicker branches (>10 inches diameter) and on trees that are healthy and not showing signs of stress (Coleman et al. 2015). This greatly facilitated surveying such that counts of exit holes from standing height should have been a fairly accurate estimate of the level of infestation on a given tree. Additionally, this reduced the total number of trees needing

to be surveyed because evidence of GSOB drops drastically in trees smaller than 10-14 inches diameter. Because GSOB attacks healthy and unhealthy trees, it was difficult to predict which tree may be infested from a distance, so all trees over 10-14 inches diameter needed to be checked.

In 2016, exit holes were marked individually with spray paint to help in tracking changes in exit holes between years and to reduce the amount of time spent re-counting holes. Exit holes that were uncertain were circled with a yellow marking crayon and a photo taken for verification. Resources needed to verify whether exit holes were GSOB were reduced greatly in 2016 compared to 2015 because the same volunteers and staff conducted the surveys and became better trained in time. A handful of extremely committed IRC volunteers were trained and contributed greatly to total hours spent surveying both in 2015 and 2016. In both years, this included 2-4 individuals coming out weekly for approximately 5 hours per day over a 5 month period.

The perimeter of the survey border each year was based on working radially outwards from the core infestation area until no more trees with GSOB were found, or the habitat changed such that no more oaks occurred for several hundred feet (Figure 6 and 7). Beyond this point, a buffer of approximately 100 foot was added to ensure no more trees were infested in the vicinity. In 2015, a tributary canyon branching northwest from the main canyon of infestation was spot checked for an additional several hundred feet, but this was limited to trees which had signs of stress based on canopy thinning and branch die back, and were greater in diameter than the average tree. In 2016, approximately 6 trees were found that were heavily infested and missed in 2015, and were within 200 feet of the core infestation area. This was likely partly influenced by their occurrence on the other side of a drainage that perhaps served as a visual break in the stand. Spot surveying, jumping up canyon a few hundred feet from the last known infested oak, was also conducted in 2016. This was done in part to delineate a spray line that would have a 200-300 foot buffer beyond visibly infested oaks. In 2016, it was apparent that GSOB infested both healthy and stressed trees, so every tree greater than 1014 inches diameter within an approximate 75 foot radius was checked.

Survey Results

Surveys for infested trees were conducted between December and April 2014-2015 and October and April 2015-2016. The main survey and treatment period for each season was in mid-winter and spring, and therefore discussion will refer to the year of that period. A total of 1034 trees were surveyed in 2015, and of these, a total of 160 were treated either chemically or by tree removal (78 with exit holes and 82 preventatively) (Table 2, Figure 6). In 2016, approximately 1133 trees were surveyed and all were treated either chemically or by tree removal. Of these, 279 were found to be infested, including the 56 infested and treated trees from 2015 (Table 2, Figure 7). These numbers are approximate because in each year there were some trees where D-shaped GSOB exit holes were recorded as a “maybe”: 5 in 2015 and 44 in 2016. There were more trees recorded as “maybe” in 2016 because more trees were planned for treatment using a less expensive approach, so it was less important to return to trees with questionable GSOB for verification since they would

likely be treated anyway (see management treatment section below). In 2016, 23 trees were recorded having >25 exit holes, versus 4 trees in 2015. The number of exit holes observed ranged from 1-100 with an average of 12 holes and a median of 5 in 2015 and in 2016, the number of exit holes ranged from 1-80 with an average of 8 holes, and a median of 4. In all, 12 trees with GSOB were found dead in 2016 as compared to 3 in 2015. The proportion of infested trees among the different severity levels (Table 2) did not change much between years, with low severity accounting for approximately 70%, moderate for 23% (2015) and 15% (2016), and high for 5-8%. There also does not appear to be a strong relationship between tree diameter and the number of exit holes, but this may also be influenced by the distribution of tree sizes in the area of the initial outbreak, especially if the beetles tend to colonize trees in closer proximity of adequate suitability (Figure 8). There are no data for trees under 8-10 inches because these trees were not surveyed per protocol.

Table 2. Infestation severity among surveyed trees based on the number of exit holes.

Count of Exit Holes	2015	2016
No exit holes (preventative treatment)	**82**	**854**
Low (1-9)	*56*	*215*
Mod (10-24)	*18*	*41*
High (≥25)	*4*	*23*
Total GSOB infested / Total Surveyed (infested + un-infested)	**78* / 1034**	**279* / 1133**
GRAND TOTAL TREATED	**160**	**1133**

*includes 44 “maybes” in count with exit holes in 2016 and 5 in 2015

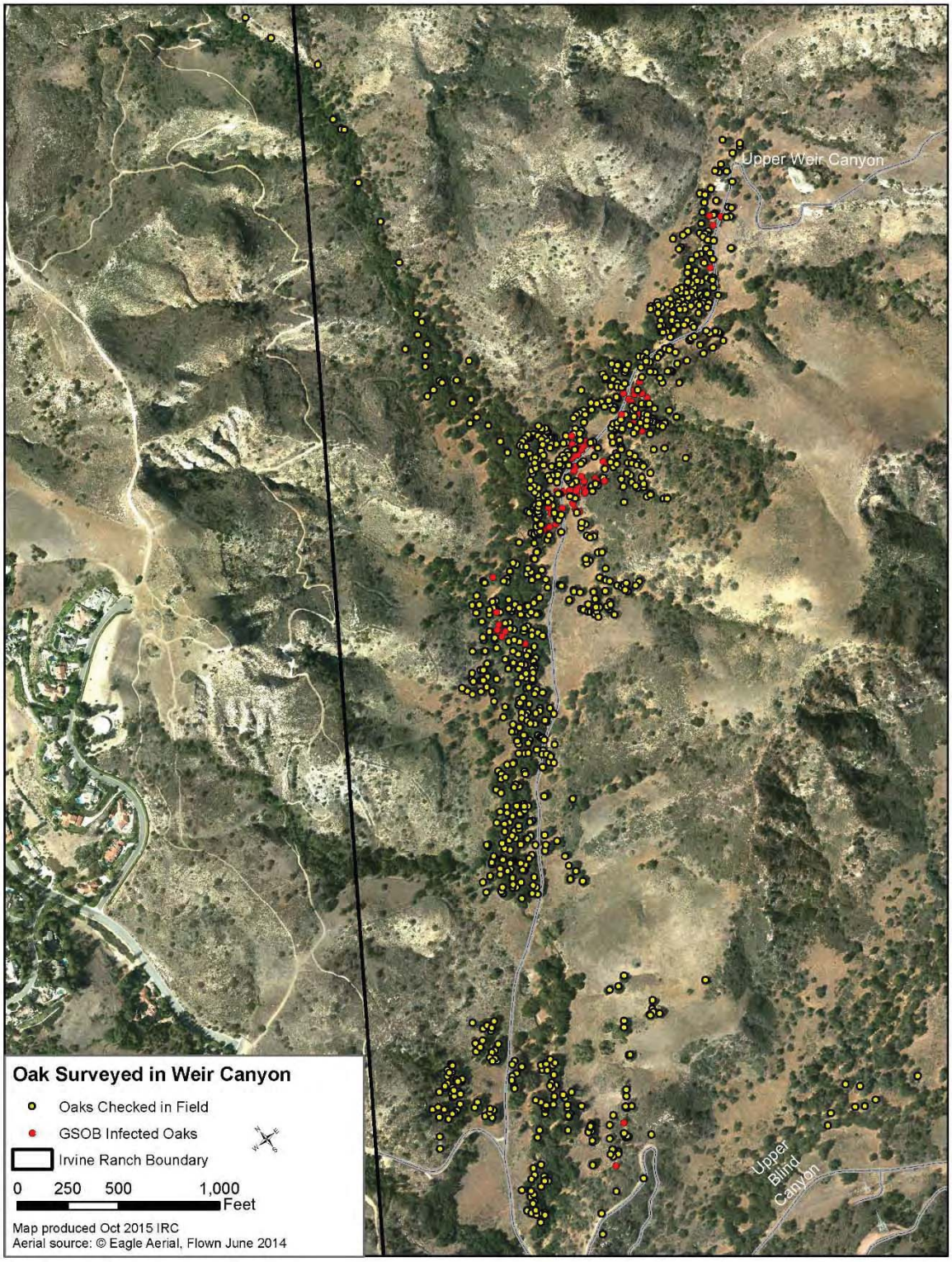

Figure 6. 2015 survey of GSOB infestation (December 2014- May 2015). Surveying began within the core area of initially observed infested trees and continued up and down the main canyon. An exception was an area to the west of infested trees, which occurred on the other side of a drainage.

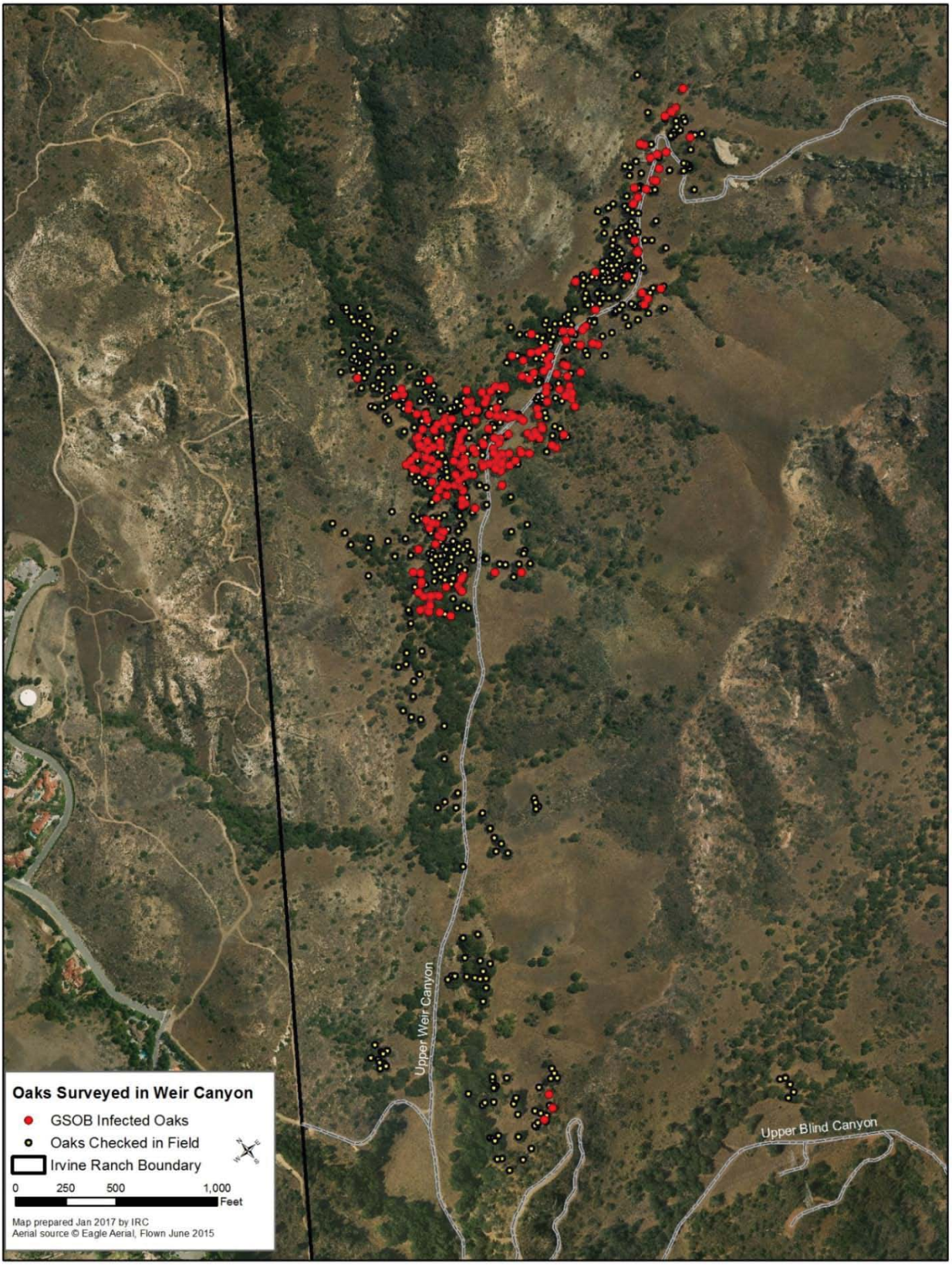

Figure 7. 2016 survey of GSOB infestation (October 2015- April 2016). Surveying began within the core area of initially observed infested trees and continued up and down the main canyon as in 2015.

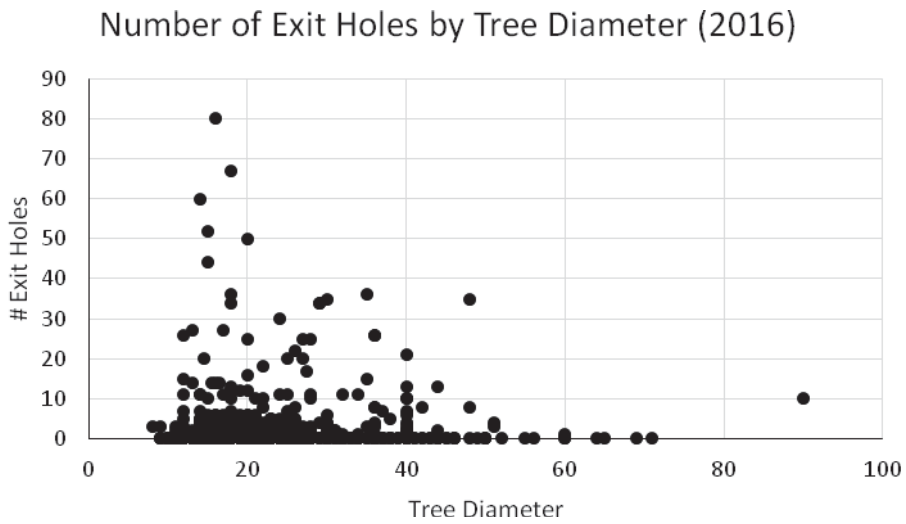

Figure 8. Distribution of the number of exit holes per infested tree and tree diameter for trees greater than 8 inches diameter (smaller trees were not found to be vulnerable to infection in San Diego and it reduces survey time substantially).

Management treatments in 2015 reduced beetle emergence, both by the removal of potential brood trees and by chemical treatment. Removal eliminated thousands of larvae contributing to the next generation, and chemical treatment killed some adults, as evidenced by the observation of dead adult GSOB in exit chambers of treated trees. UC Cooperative Extension specialists Tom Scott and Kevin Turner sampled cross-sections of approximately 18 trees that were removed in 2015 in order to estimate age of infestation through scarring bands in bark tissue. Results were not as unambiguous as had been hoped, but supported the contention that the infestation in Weir Canyon was a minimum of three years old. Scott and Turner also sampled bark from select trees either treated or untreated in 2015. Untreated tree used in this effort were trees that were inadvertently missed in surveying in 2015. On average, treated trees had proportionally fewer live larvae and more dead larvae per pupal chamber compared to untreated trees (Scott, unpublished data). Treatments appear to have been compromised in part, however, based on the occurrence of live larvae in trees in 2016 that had been treated with a systemic and contact pesticides the previous season. This may have occurred due to one or more of the following reasons: 1) Emamectin benzoate, applied as Tree-äge® via stem injection, is dependent on physiological transportation throughout the entire tree trunk, which can be limited in unseasonably dry conditions, and 2014-2015 had historically low rainfall totals. In addition, evidence of canker was observed around several injection plugs. Canker can be transmitted across injection sites when tools are not sterilized between entries. Canker can further weaken and ultimately kill a tree, and therefore poses an additional unwanted threat; 2) The contact barrier spray Carbaryl (Sevin SL) applied at the onset of flight season was not tested for pH level and it is possible that the tank mix was un-buffered. The activity and persistence of Carbaryl decreases dramatically in slightly alkaline conditions, and therefore, a solution with pH < 7 is recommended; 3) Surveys were only able to identify infestation based on the previous season's emergence, and therefore, survey results underrepresent infested trees because recently infested trees containing larvae, but lacking exit holes were not counted; and 4) Trunk surveys of large numbers of trees are

inherently difficult, and a few highly infested trees were missed during initial surveys in 2015. Overall tree health was poor regionally, evidenced by thinning canopies and dying trees due to record drought conditions. This likely exacerbated damage from GSOB and limited the trees defenses mechanism. Tom Scott with UC Cooperative Extension suggested that one cause for such interactive impacts would result from the tree having reduced trunk growth, making the cambium layer more vulnerable to damage.

UC Cooperative Extension specialists Tom Scott and Kevin Turner collected slabs of bark from a heavily infested tree (> 50 holes) just prior to emergence in 2016. The purpose was to observe emergence of GSOB from the bark slabs over time in a contained environment. This tree had been missed in 2015 and therefore had received no treatment. The slabs from the trunk were divided and placed into four fully enclosed barrels and checked weekly until emergence ceased. A total of 23 GSOB emerged among the barrels between May 16th and July 1st 2016. The large majority of beetles emerged in June.

Management Treatments

Background

Prior to the introduction of GSOB in southern California, flat headed borers were only associated with low levels of tree injury or mortality and with trees that had already been weakened by other factors, such as drought or fire. Management strategies therefore focused on harvesting trees prior to damage that would impact commercial use of the wood or eliminating brood trees to minimize damage (California Forest Insect and Disease Pest Training Manual).

The goal of the Weir Canyon GSOB management plan is eradication, and therefore an aggressive approach was taken both in 2015 and 2016. Because the infestation was discovered relatively early, this approach was also considered financially sound, since each year the insect is allowed to reproduce, the greater the expense would be the following year. The effectiveness of eradication is not only dependent on treating every identified infested tree, but also on finding all trees showing signs of infection (the unique D shaped larvae emergence/exit holes) via intensive and extensive surveys (see above), and on treating trees where the pest may occur, but the first generation of larvae have not yet emerged, and therefore no exit hole signs are apparent. This last category of infested trees are referred to in this document as “preventatively” treated trees, since trees are being treated that don’t yet show signs of infection, but are within the understood range of flight during the adult stage of the beetle. The only studies that had been conducted on GSOB flight distances at the time of treatment were computerized flight mill assays, where the beetle was tethered to a computerized mill for 24 hours with measurements taken on velocity, distance, and other attributes (Lopez et a. 2014). In nature, this distance can be much less, particularly if desirable food and egg laying resources are abundant in the vicinity.

Treatment in 2015 (Year 1) and 2016 (Year 2) differed to some extent in the intensity and extent of the different approaches. In 2015, lightly infested trees that were chemically treated received two types of insecticide and the severity of infestation for tree removal was slightly more aggressive, whereas in 2016, the number of trees chemically treated preventatively was much greater and criteria for tree removal slightly more conservative. The most aggressive approach to controlling the infestation would be to remove and chip every infested tree, however, this is also very expensive and results in extensive and potentially preventable loss of habitat. Control methods were compiled from the research, experience and advice of Kevin Turner, goldspotted oak borer Program Coordinator, Dr. Tom Scott, UC Cooperative Extension Natural Resources Wildlife Specialist, Dr. John Kabashima, Orange County UC Cooperative Extension Environmental Horticulture Advisor and Dr. Tom Coleman, US Forest Service Entomologist.

During surveying, the trees were color coded with flagging around their circumference based on the number of exit holes/severity class they fell into, which corresponded with management treatments. This was very helpful on the ground for identifying trees at the time of treatment, along with maps and tree tags to confirm individuals for cutting. In 2015, all trees to be removed received orange flagging, all trees to be treated with pesticide received yellow flagging, and preventative pesticide treatment of adjacent trees received blue flagging. In 2016, red flagging was added to orange or yellow flagging for trees to be removed or debarked (either from 2015 or newly discovered), yellow flagging was used to designate infested trees for pesticide treatment, and orange and white banded flagging was used for checked trees needing preventative pesticide treatment (see chemical treatment below).

Tree Removal and De-barking

Without treatment, highly infested trees become brood trees, potentially yielding thousands of beetles that can infect other trees. In order to eliminate any risk of an impact from a brood tree, all trees considered a significant threat were cut and either removed and chipped or de-barked. The GSOB pupate just below the bark surface and have a kidney bean shape. This creates a vulnerability for GSOB and an opportunity to kill the insect by de-barking the tree at this stage of the life cycle (approximately December-April).

In 2015, classification of the severity of infestation prescribing tree removal/de-barking vs. chemical treatment was more conservative than in 2016: In 2015, trees with ≥10 exit holes were targeted for removal, whereas in 2016 it was ≥12 exit holes if untreated in 2015 and ≥25 exit holes if treated in 2015 (representing total holes from both years) (Table 3). This modification was done to minimize tree loss and costs after consulting USFS entomologists that that this difference in exit hole number was within the margin of error in determining infestation level and corresponding management treatment.

Table 3. The number of trees receiving different management treatments based on the number of exit holes per tree in 2015 and 2016.

Infestation Severity	Treatment	Tree Count 2015	Tree Count 2016
2015: ≥10 exit holes; 2016: ≥12 exit holes untreated and ≥25 exit holes treated 2015	Tree Removal + Contact Spray Stumps (Carbaryl)	20	33 [a]
2015: 1-9 exit holes	Systemic Injection (Emamectin benzoate)	37	0
2015: 1-9 exit holes; 2016: 1-11 exit holes untreated 2015 and 1-24 exit holes treated in 2015 and un-infested trees within 300 feet of infested tree	Contact Spray Trees (Carbaryl)	52 (including 37 treated above)	1046 (+ stumps removed trees)
Preventative, un-infested trees	Systemic Spray Dinotefuron	82	54[b]

[a] 5 trees with 1-24 exit holes that were treated in 2015 were selected as samples for recording the density and status of larvae in all pupal chambers, and due to this damage, it was assumed these trees wouldn't survive and were removed.

[b] including 14 trees sprayed with Carbaryl

Among 18 of the moderately infested trees (12-24 holes) treated in 2015, 5 were selected as samples for recording the density and status of larvae in all pupal chambers, and due to the damage from sampling, it was assumed these trees wouldn't survive some were removed. Tom Scott, Kevin Turner and John Kabashima with UC Cooperative Extension tried various tools in attempts to thinly shave the bark off the circumference of the base of the tree so the pupal chambers were revealed in cross-section and it could be determined if they were empty (from a previous year) or occupied (by a pupae getting ready to emerge) (Figure 10). A comparison of the estimated number of live larvae among trees treated or not treated in 2015 was conducted to assess the effectiveness of the 2015 treatments to inform future treatment decisions. It is not possible to infer treatment effectiveness based on changes in the number of exit holes between 2015 and 2016 because adult beetles could have emerged, but then subsequently died from ingesting the treated wood as they exited.

Figure 10. UC Extension Specialists Tom Scott and Kevin Turner in Weir Canyon 2016 preparing to quantify the proportion of pupae chambers as live, dead, or empty.

Prior to tree removal, pre-disturbance surveys were conducted for birds: a raptor nest survey and a general nesting bird survey within oaks was conducted a week prior to planned tree removal for designated trees in both 2015 and 2016. Three trees had nesting birds in 2016 and were later sprayed with Carbaryl (see below) instead of being cut.

In 2015, all 20 trees designated as moderate or severely infested (Table 3) (Figure 11) were felled and bucked into pieces small enough for transport via a tractor and attachment to a staging area for loading onto a hauling truck (Figure 12). All infested trees were greater than 8 inches diameter breast height, and all branches greater than 8 in diameter were specified for removal. In addition, stumps were ground to ground level. Specifications for chipping bark to eliminate GSOB are to a "3-minus standard" used by the wood grinding industry, which shreds wood into narrow strips no more than 3" long, 1" wide, and ½" thick. IRC and OC Parks staff walked the vicinity of each tree and path to and from the staging area after the tree removal operation was complete to ensure no pieces larger than a golf ball remained from the felled trees. Chipping entire trees or large sections requires a tub grinder, which was too large to transport along the dirt roads in Weir Canyon, and therefore trees were transported off site to where one was located. In addition to the above, bark was removed to below ground level on stumps and stumps were checked to ensure bark was removed and the tree re-tagged. Trees were felled and bucked by OCFA (February 8-10, 2015) and hauled away and chipped by West Coast Arborists (last tree hauled away March 9, 2015). The date for operations were

scheduled prior to the emergence period for adult GSOB. It is best to sample trees to determine the stage of metamorphosis in addition to using estimates based on the literature due to possible environmental differences among regions (Figure 4). One tree was left dead and standing (containing less than 10 exit holes), and one was tarped after falling on its own. Dead GSOB-infested trees without live (pale pink to white) cambium under the bark on the main trunk may be left in place as they no longer harbor GSOB.

April 19-27, 2016, 33 infested trees were felled, 11 of which were accessible to large equipment and hauled away for chipping by West Coast Arborists per specifications in 2015 (in addition to slab pieces from inaccessible trees) (Figure 13). The remaining 22 trees were felled by OCFA crews, bucked, and de-barked, or slabbed bark pieces were gathered and hauled away for chipping. De-barking or slabbing, hauling, and chipping were recommended as treatment options for trees unable to be transported via tractor to a truck for hauling and chipping. The above felled trees included 4-5 trees from a category otherwise treated with pesticides (moderately infested trees, but treated in 2015) due to the need to sample for treatment effectiveness in 2015 (see above). The de-barker tool used was a Log Wizard Debarking Tool, Model # Log W-4000 by Northern Tool and Equipment.

After felling designated trees, OCFA de-barked main trunks up to 20 feet, or to where the tree trunk was less than 8 inches diameter, whichever was less (Figure 14). It was uncertain how much time it would take to de-bark 22 trees, so to be sure all trees would be fully treated prior to GSOB beetles emerging, any limbs greater than 8 inches diameter were not de-barked, but instead bucked and placed (not piled) in an area accessible for spray crews to follow up and spray with Carbaryl (see below). The segments were cut into pieces short enough to be rolled over by one person. The stumps of trees were brushed off and de-barked or slabbed just below the surface of the soil, but this was difficult to accomplish comprehensively by hand (vs. a grinder) and therefore all stumps by OCFA were also sprayed. In addition to trees being marked with red flagging, crew supervisors were given a map with each tree number to be removed, and IRC staff met with the supervisors and observed crews to ensure de-barking was deep enough to destroy pupal chambers.

After the crews had been working for a day or two, IRC staff recorded the time, crew size, and tools to de-bark a given tree (Table 4). De-barking had not been used regionally for GSOB, so these notes were important to evaluate and plan for future management treatment. Slabbing and hauling takes about 25% more time than de-barking for a tree about 100 feet from road, or more if farther away from the road. For a tree that was 27 inches diameter breast height, it took about 2.5 hours to fell the tree, de-limb and buck the trunk and limbs greater than 10 inches diameter breast height, de-bark the bucked truck and limbs, spread smaller branches to a low profile to prevent fire hazard, and slab and haul out slabs of the stump.

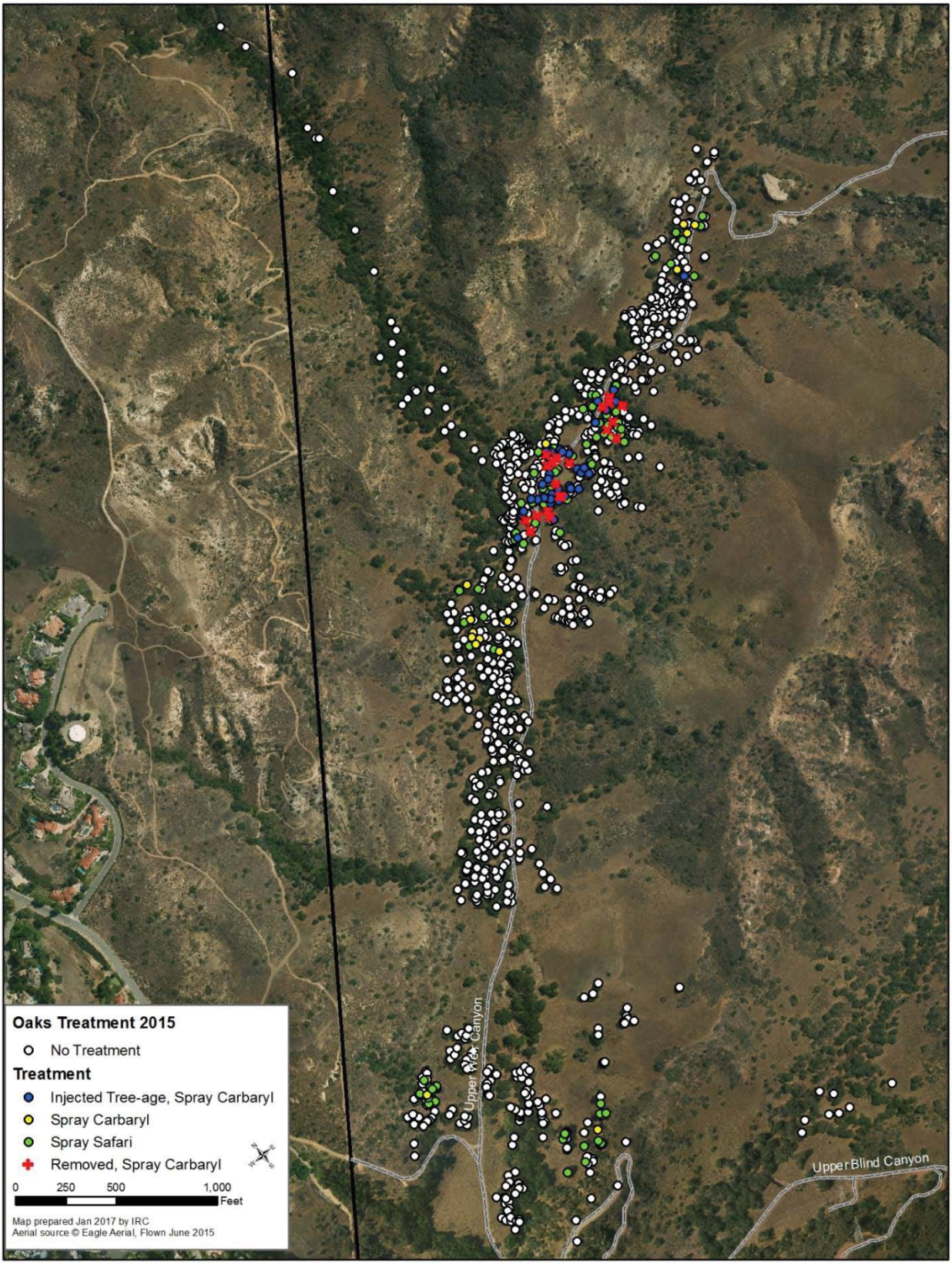

Figure 11. 2015 (December 2014 - May 2015) survey and treatment of infested oaks. All infested oaks and oaks immediately adjacent to infested oaks were treated chemically with either Emamectin benzoate and Carbaryl (infested), or Dinotefuron (adjacent).

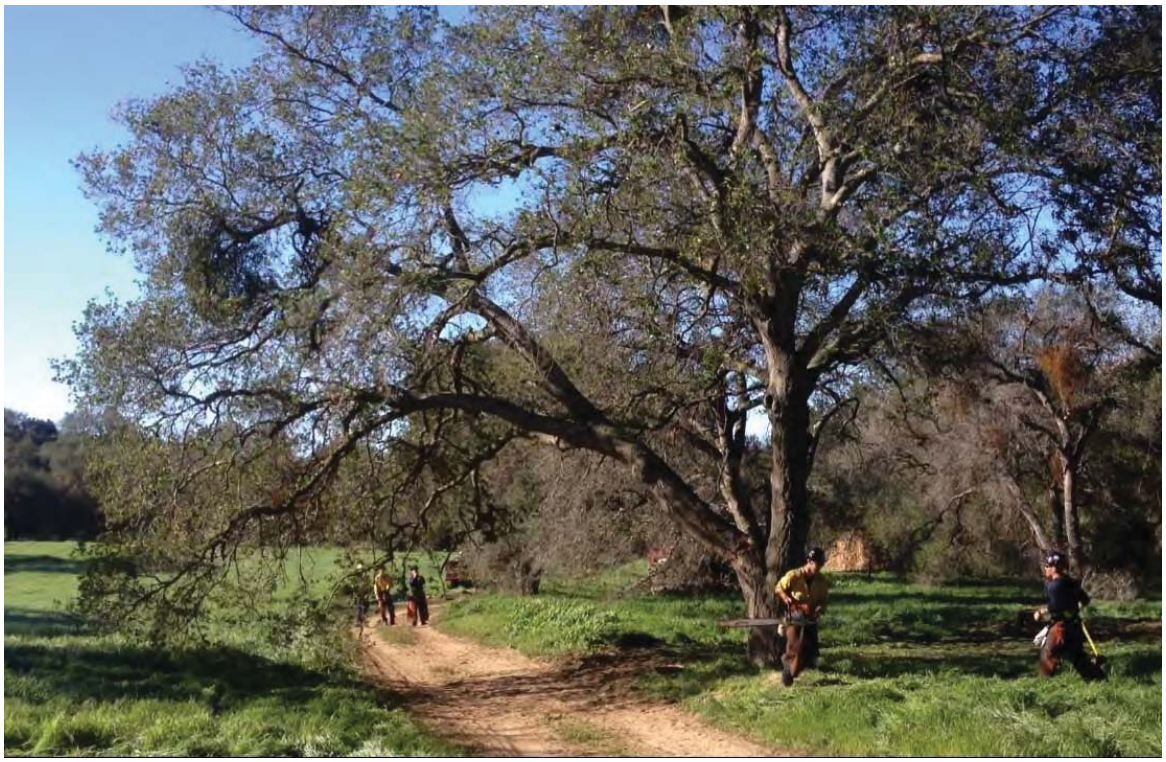

Figure 12. Orange County Fire Authority felling trees for removal in Weir Canyon, 2015.

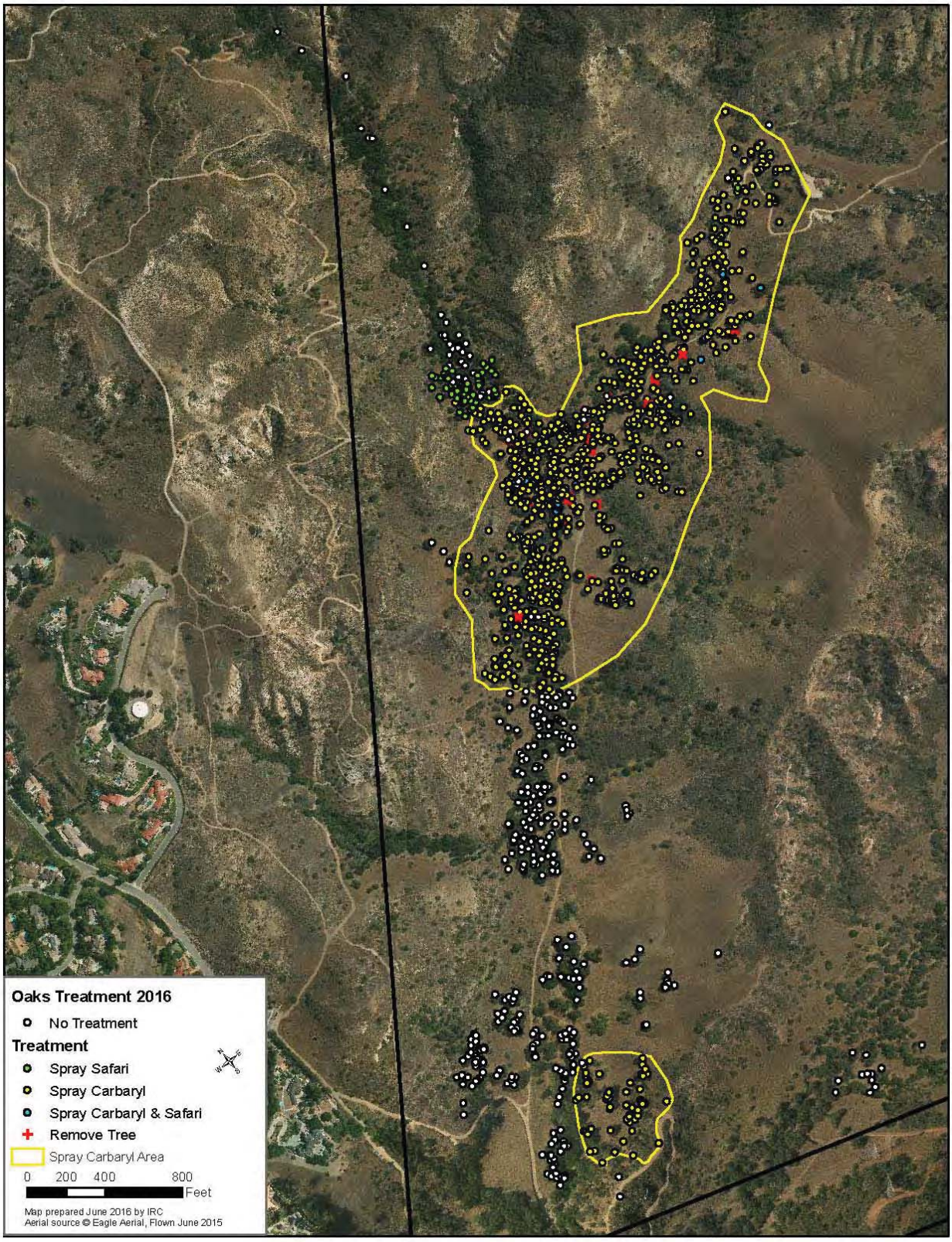

Figure 13. 2016 (October 2015-May 2016) survey and treatment of infested oaks and oaks within approximately 300 feet of an infested oak.

Table 4. Recorded times for felling and de-barking or slabbing a tree (27 inch diameter).

Log Samples	Felling	Trim, De-limb, Buck (Crew 6; + 2 chain saws)	De-barking	Slabbing (2 chain saws + 1 slab hauler)
	10 min	32 min		
3 ft x 18 inch			8 min	
3 ft x 15 inch			9 min	
Stump (2.5 ft x 27 inch)				12 min

A. 

B. 

C. 

Figure 14. De-barking equipment (logger tool, de-barker attachment, chainsaw and bucked pieces. B. Note the GSOB pupa chamber revealed by the de-barker.

Chemical Treatment

All GSOB infested trees not removed and chipped or de-barked in 2016 were treated with insecticides. Systemic insecticides are applied into the soil, injected into trunks, or applied as a trunk spray and taken up through the tree, killing insects feeding within wood or on leaves. Because soil injections and drenches have been shown to be less effective than trunk injections and sprays, and because they can increase pesticide exposure to non-target organisms, only systemic insecticides applied as trunk injections or trunk sprays were used on designated trees in Weir Canyon. Contact, or barrier, sprays kill both larvae hatched from eggs laid on the bark surface as they make their way into the tree, and adults, when they emerge or land on bark to lay eggs. Contact sprays will not control larvae feeding in the tree, but are effective at killing adult beetles as they directly contact the insecticide on the bark surface.

Given the insecticide and application method used at the time of treatment, insecticide applied via injection was much more expensive then applied as a spray (approximately $95/tree for trunk injection, $80/tree for spraying as a trunk drench with a backpack sprayer, and $16/tree for contact insecticide trunk and limb spraying with a pressurized spray rig and hose) (IRC contractor accounting records; Table 1). All of these methods are considerably less expensive than tree removal or debarking, however, estimated at $810/tree, and this cost utilized at cost services of the Orange County Fire Authority. Professional services would likely be more. The contact insecticide used as a spray, however, requires application every year to maintain effectiveness, whereas the injections are estimated for reapplication every two years. Furthermore the effectiveness of pesticides used in a field setting is still unclear.

Field trials with coast live oak suggest that injection of systemic insecticides such as Emamectin benzoate (Tree-äge®) slows the rate of GSOB population growth in lightly infested trees, yet its effectiveness in preventing infection in un-infested trees is still under study (Chen et al. 2014). It is recommended that injection with insecticide into the trunk of the tree be conducted during or just prior to the wet season because translocation by the tree is needed to spread the chemical throughout its system. Systemic treatment has potential to target larvae feeding within the tree and lasts approximately 2 years. In addition, research published in 2016 supports recommendations that the application of a contact, or barrier spray, to the trunk and large branches of trees also significantly reduces the survival and feeding of adult GSOB fed leaves from treated trees in the field. This effect diminished between 1, 8, and 12 months after application, suggesting reapplication is needed between seasons of emergence and flight. The combination of both systemic and contact/barrier sprays should kill multiple stages of the insect's life cycle (Coleman et al. 2016).

In 2015, a total of 52 infested trees and 82 apparently un-infested trees were treated chemically. February 18, 2015, Emamectin benzoate (Tree-äge®), was injected at a dosage of 115 ml per 23" DBH tree to 37 lightly infested trees using QuickJet ArborJet injection equipment (Table 3) (Figure 11, 15). The chemical has a California Signal Word "Warning" and must be applied by a registered pesticide applicator (Qualified Applicator Certificate or License) licensed for Forestry (Category E). Emamectin benzoate persists in plant tissue, but has low bioaccumulation potential. Agriserve Pest Control, Inc. was contracted to apply different chemical treatments in Weir Canyon in both 2015 and 2016. Contracts with IRC specified that label and label supplement specifications must be followed and that use be reported to the land owner (OC Parks) and the

Orange County Agricultural Commissioner. One of the drawbacks of application via trunk injection is that it can injure the tree: long cracks may appear in the bark as a wound response to injection, potentially allowing infection by secondary pathogens. Healthy trees can usually isolate injection wounds without any signs of infection, decay, or structural damage (Doccola et al. 2011). In 2015, the potential benefit of preventing another generation from establishing and maintaining more oak woodland was considered worth the risk of application via injection. In 2016, however, due to an additional year of record drought, canker infection in some trees, and discovering some live larvae in trees that were treated in 2015, Emamectin benzoate (Tree-äge®) was not applied a second time. Dinotefuron (Safari 20SG®) has recently been developed as a topical systemic insecticide that is easy to apply as a trunk spray that may be effective against larvae as well as adults feeding on leaf tissue.

Figure 15. Stem injection of systemic insecticide Emamectin benzoate (Tree-äge®) with QuickJet ArborJet application method.

All trees treated in 2015 with Emamectin benzoate were also treated in May 4, 2015 with the contact/barrier insecticide Carbaryl (Sevin SL®). An additional 15 trees were found to be infested between the mid-February treatment with Emamectin benzoate and were also treated with Carbaryl, totaling 52 trees, plus the stumps of the 20 removed trees (Table 3). Carbaryl is a broad spectrum carbamate that is effective against many pests, including bark beetles. It is a California Restricted Use pesticide, which requires filing a Notice of Intent (NOI) with County Agricultural Commissioner before application. Carbaryl is moderately to very toxic to humans, has a “Caution” Signal Word, is nontoxic to wild bird species, but is toxic to bees and beneficial insects and should not be applied to flowers when bees are active. It is toxic to aquatic and estuarine invertebrates and should not be applied to water. Carbaryl is highly sensitive to pH and has low persistence in soil and water.

Specifications for the application of Carbaryl in Weir Canyon included: dosage at the highest label concentration (5 oz/ga); acidify water to pH 6-7 using acidifier LI700 prior to adding chemical product (added in

2016); agitate tank mixture during mixing and application for uniform suspension; completely cover the trunk and branches greater than 8 inches in diameter; utilize a pressurized spray rig equipped with 600 foot hose; and complete treatment in early May, slightly preceding adult flight activity. In 2015, the pH of the mixture was not checked and may have been sub-optimal, at or above 7. If so, the pesticide would have had lower efficacy in the field.

April 25- May 13, 2016, a total of 279 infested trees, including stumps of removed trees, were treated with Carbaryl in a formulation with acidic (<7) pH. In addition, approximately 800 trees lacking exit holes and greater than 10 inch diameter breast height were treated preventatively within 200-300 feet of infested trees (Figure 13). It is important to note that "preventative" is used to suggest a bet-hedging measure for treating trees that either might have the first generation of larvae feeding, but have not yet made exit holes, or as an extra precaution against adult GSOB landing on un-infested trees and laying eggs (in case treatment or surveying was unsuccessful). It is likely that several trees within 200-300 feet of infested trees had had eggs laid on them and were hosting larvae that hadn't yet exited the trees and formed holes. Chemical treatment in 2016 was much less expensive per tree because injection with Emamectin benzoate (TreeAge®) was not used (Table 1). This allowed more trees to be sprayed "preventatively" and made it less important to have certainty about exit holes that were questionable since they would be sprayed anyway if they were within 200 feet of a tree with GSOB. Every tree treated with Carbaryl was spray painted by the contractor with pink paint and surveyed trees lacking exit holes were flagged with orange and white banded flagging. Contractors were overseen by IRC staff and ensured that the pH of the solution was tested and that all areas of trees were sprayed. An exception to the above was an area on the far end of surveyed trees in the north fork drainage leading into the main canyon. The 600 foot hose was unable to reach one of the infested trees and trees within 200 feet of it. For this area, each infested tree was sprayed with Carbaryl with a backpack sprayer, and another systemic herbicide, Dinotefuron, was applied with a backpack sprayer to nearby trees without exit holes (see below, and Figure 13).

On May 26, 2015, 82 trees adjacent to infested trees were sprayed as a preventative measure, even though they lacked exit holes (Table 3) (Figure 11). These trees were identified prior to spraying with blue flagging. The insecticide used as a preventative measure on apparently un-infested trees was Dinotefuron, a systemic insecticide recommended by UC Extension Specialists and USFS Entomologist Tom Coleman as a promising management treatment, but also one lacking research trials. Dinotefuron (e.g., Safari 20SG®; Caution Signal Word) is a broad-spectrum systemic neonicotinoid that is effective against a variety of tree pests, including flat-headed borers. It has low-to-no vertebrate toxicity, but has non-target effects on beneficial and other insects, especially bees. It has the potential to bioaccumulate and is also toxic to select aquatic invertebrates and should not be applied to water. Risk of pesticide exposure is lower than that for contact/barrier sprays because, as a systemic that penetrates the bark, Dinotefuron does not require high surface area coverage (into canopy) and can be applied without a spray rig. The brand applied was Safari 20 SG®, is a 20% dry formulation mixed at 24 ounces per gallon of water. Penta-bark is a bark penetrating

surfactant, and was added at 2.5 ounces per gallon of solution. An average of 46 ounces of mixed solution for trees estimated at 23" DBH was applied with a backpack sprayer to designated trees from ground level to up to 4.5 feet, but volume varied based on tree size.

May 19, 2016, as the first beetles were just starting to emerge, Dinotefuron was applied to a total of 52 apparently un-infested trees, primarily in an area too far to access with the 600 foot pressurized hose used to apply Carbaryl (Figure 16) (Table 3). It was also applied to some trees as a trial to in addition to Carbaryl. This allowed for a future comparison of apparently un-infested trees treated with Carbaryl only, with Dinotefuron only, or both, within a couple hundred feet of infested trees. Trees receiving Dinotefuron treatment were spray painted with a blue dot in addition to the banded orange and white flagging. In 2016, Isaac Ostmann with IRC had received the Forestry (Category E) license in addition to his Qualified Applicator Certificate and applied Safari 20SG® according to the specifications mentioned above.

Lessons learned

Weir Canyon was one of the first satellite outbreaks of GSOB where eradication is being attempted. Substantial resources were committed by OC Parks and many partners quickly responded to address the threat. The effort to eradicate the population has continued into 2016-2017. There were lessons learned in the first two years of surveying and management treatments that would be good to note for subsequent years at Weir Canyon or for outbreaks in new locations. With respect to surveying, once management treatments were known for different categories of infestation severity, a significant portion of survey hours could have been saved by documenting total exit hole numbers as classes instead of more precise counts of each exit hole, at least for trees with greater levels of infestation. It would be important, however, to separate these estimates for newly emerged vs. emergence holes that are over one year, so a subset of trees with total counts would be necessary for this information. After UC Extension specialists sampled the proportion of live larvae in pupal chambers on different trees and referred to the number of exit holes, it became clearer that the exit hole number was a rather coarse indicator of the live larvae infestation level. This may be particularly important as the boundaries of the infestation expand, even if GSOB population density declines. Infested trees may be fewer, but more spread out, increasing surveying time. To determine efficacy of treatment or track changes in GSOB population numbers, a subsample of trees receiving different treatments and a stratified or random sampling of trees could be designed allowing for more intensive sampling on fewer trees for desired information. Destructive sampling would need to include enough trees from the outset to allow subsampling each year. In addition, recording dead GSOB adults within exit holes may be another indicator of the level of infestation and could be evaluated along with the number of new vs old exit holes. With evidence of chemical treatments having some effect, it would be good to see how emergence hole # changes in subsequent years.

Other surveying notes included marking exit holes with bark marking paint to differentiate holes among years surveyed, and marking all trees observed with a metal tag, not just infested trees. These two changes were made in 2016 and would be good to continue. Even though tagging a tree without holes takes additional

time, trying to determine which trees had been looked at our possibly skipped becomes time consuming down the road. Colored flagging is very helpful for a year or two, but then needs to be removed and updated for current treatments. Trees with exit holes that are “maybe’s” can cause some confusion for precise reporting of the number of infested trees and for subsequent treatment. Re-visiting a tree for confirmation does however take additional resources. In 2016 all trees within a perimeter were sprayed with Carbaryl, whether they were apparently infested or not due to the possibility of a new generation of beetles emerging for the first time in a tree. Continued monitoring of exit holes and densities of live larvae among trees treated in 2017 and beyond will provide valuable information on the efficacy of treatments.

Surveys should begin as early as possible to inform management treatment in upcoming seasons. Delays can result in complications with the nesting bird season beginning in February and add additional costs or possibly alter the best management prescription.

Orange County Fire Authority passed on lessons learned about debarking, including: 1) The de-barker was more efficient for thinner bark and trees further away, whereas slabbing was more efficient for closer trees with thicker bark. Experience with a chain saw can reduce time substantially when slabbing; 2) For a large chain saw (400 series Stihl) adjust the throttle to ¼ to ½ and use 1:25 oil mix vs 1:50 to prevent overheating. 3) Use trash cans to haul bark pieces, not wheel barrows. 4) Larger crews are more efficient, for example, a crew of 20 allows for 6-8 de-barkers, others to haul small pieces away and clear the work area for bucking and de-barking, and 1-2 others to prepare the next tree to be felled. De-barkers work well in pairs, with one using the logger hooks to turn the log and other debarking with the saw. 5) Trees are easier to de-bark if left standing after being limbed compared to debarking bucked logs on the ground.

It appears that the use of Emamectin benzoate in Weir Canyon was poor timing with the record drought. While this insecticide is estimated to be effective for up to two years, eliminating more frequent costs relative to the other methods requiring annual application, it is also much more expensive applied as a trunk injection. Additional research with Dinotefuron would be worthwhile because it would have the advantage of systemic coverage compared to the contact/barrier spray Carbaryl, and would cost less than trunk injection with Emamectin benzoate. Proper training is important, as was learned by having some cases of canker around injection holes and the question of appropriate pH with Carbaryl. The scale and use of these methods in wildland settings requires increased education and training for both land managers and licensed arborists not typical of past management practices. Furthermore, cooperation among stakeholders and partners was critical for a rapid and appropriately scaled response. This structure and support is necessary for future management of GSOB in Weir Canyon and its importance recognized in other areas that may encounter this pest in the future.

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APPENDIX F

RESTORATION PLAN

FOR

DISTURBED LANDS WITHIN PACIFIC HORIZON PRESERVE

AUGUST 2019

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EXHIBITS

PACIFIC HORIZON PRESERVE
RESTORATION PLAN

I. EXECUTIVE SUMMARY

This Restoration Plan (Plan) addresses the decommissioning of an existing trail segment, restoration of disturbed lands, and invasive species removal within the Pacific Horizon Preserve (Preserve) (previously known as Aliso Canyon Preserve[1]) in the City of Laguna Beach, Orange County. The Preserve is situated between Aliso and Wood Canyons Wilderness Park (County Parks/Parks) along the northern and eastern boundaries, City of Laguna Beach (City) open space and Hobo Ridge conservation lands to the south/southwest, The Ranch at Laguna Beach (The Ranch) to the south, and residential development along the northwest boundary. A network of existing trails extends from Moulton Meadows Park and the Aliso Woods Canyon Wilderness Parks "Moulton Meadows Linkage Trail" converging together near the northern boundary of the Preserve before continuing back on to the Aliso Woods Canyon property [Exhibit 1].

The trail decommissioning and restoration is in accordance with stated resource management objectives outlined in the Final Pacific Horizon (Aliso Canyon) Preserve Resource Management Plan (RMP) (OCTA 2018). The implementation of this Plan addresses RMP directives[2] pertaining to public access, trail closure, and habitat restoration by decommissioning a trail segment identified for closure which is threatening a population of many-stemmed dudleya (*Dudleya multicaulis*), as well as restoring other disturbed areas in the vicinity of the trail which support intermediate mariposa lily (*Calochortus catalinae*) and coastal sage scrub habitats. This area has been subject to ongoing disturbance, mainly unauthorized trail modifications that have been created by individuals for mountain bike use. Disturbance has included the establishment of new unauthorized trails through native/sensitive habitat, and the movement and piling of soil to create various berms and jumps, including into native vegetation and sensitive plant habitat. As such, targeted areas for restoration include unauthorized trails, bicycle trails and jumps, soil mounds and erosional cuts, as well as invasive species associated with the disturbance including hottentot fig iceplant (*Carpobrotus edulis*), pampas grass (*Cortaderia selloana*), and fountain grass (*Pennisetum setaceum*) that have invaded native coastal sage scrub habitat along the northern boundary of the site. Note that the trail segment to be closed does not preclude public access into the Preserve; it is an offshoot trail that connects to the main trail and is a duplicative and unnecessary segment through sensitive habitat [Exhibit 2 and Exhibit 2A].

Specific topics discussed herein include trail closure and restoration, fence repair and sign installation, soil decompaction and removal of bicycle jumps/soil mounds, invasive species removal within restoration areas, native plant and seed installation in disturbed areas, maintenance, and monitoring. Restoration within the trail closure area will require decompaction using hand tools and revegetation with native seed and cactus cuttings. The trail that will be kept open for public access will require erosion repair and bicycle jump removal. Preserve boundary fencing will be repaired and replaced with smooth wire to replace existing barbed wire fencing to facilitate wildlife movement and eliminate a public safety hazard. Signage will be installed with language indicating "Habitat Restoration in Progress –Do Not Enter". Monitoring cameras will be installed to monitor human use and wildlife movement. Signage and camera locations are depicted on Exhibits 3 and 4.

[1] The OCTA Preserves were officially renamed through a public voting process in February 2018.
[2] RMP Sections 3.2.1 (Public Access) and 3.2.3 (Habitat Restoration)

Note that camera locations are approximate and may need to be moved for various reasons including repeated vandalism, site conditions such as wind or overgrown vegetation interfering with functionality, targeting a new area of concern, or if the camera is not providing useful data.

Additionally, this Plan proposes initiation of invasive plant species removal targeting high priority invasive species described in the Pacific Horizon Invasive Species Management Plan (ISMP)[3]. Previously mapped invasive species will be removed using the least damaging methodology to the surrounding habitat, and consistent with the ISMP for the Preserve, which has been approved by the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife. Target species include artichoke thistle (*Cyanara cardunculus*) and pampas grass as depicted on Exhibit 4. Removal methods described herein are in accordance with the ISMP. Re-treatment of the target invasive species is anticipated to occur over a five-year period for effective control.

This Plan also includes a monitoring component that is expected to occur on a quarterly basis for the first year and continue biannually for five years in the disturbance restoration areas and invasive species removal areas. Monitoring outlined in this Plan is consistent with the approved RMP and ISMP for the Preserve and will be incorporated into the overarching ongoing stewardship monitoring within the Preserve. Further detail is provided in Section VII.

II. SITE INFORMATION

A. Background Information

In 2006, Orange County voters approved the renewal of Measure M, effectively extending the half cent sales tax to provide funding for transportation projects and programs in the County. As part of the renewed Measure M (or Measure M2), a portion of the M2 freeway program revenues were set aside for the M2 Environmental Mitigation Program (EMP) to provide funding for programmatic mitigation to offset impacts from the 13 freeway projects covered by Measure M2. The Orange County Transportation Authority (OCTA) prepared the M2 Natural Community Conservation Plan/Habitat Conservation Plan (Conservation Plan) as a mechanism to offset potential project-related effects on threatened and endangered species (Covered Species) and their habitats in a comprehensive manner. A key component of the Conservation Plan conservation strategy has included the identification and acquisition of habitat Preserves to offset habitat impacts. The Pacific Horizon Preserve was purchased by OCTA in April 2015, and is one of seven properties acquired by OCTA as part of the M2 EMP. Currently, the Preserve is being managed by OCTA. It is anticipated that a new long-term Preserve Manager will be identified within the next three to five years. The Preserve Manager is responsible for the implementation of management and monitoring tasks as outlined in the Final Pacific Horizon RMP.

[3] ISMP prepared by Glenn Lukos Associates and dated December 2018.

B. Responsible Parties for Implementation of the Restoration Plan

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Since the proposed restoration areas are situated along the northern boundary of the Preserve immediately adjacent to lands managed by County Parks, including trails and invasive species straddling the property lines, OCTA has coordinated with County Parks to ensure consistency of restoration activities. As a result, hottentot fig iceplant removal on lands adjacent to the Preserve are included in this Plan.

C. Landscape Setting of Pacific Horizon Preserve

The approximately 150-acre Preserve is located east of Pacific Coast Highway in the City of Laguna Beach in Orange County. The northwestern edge of the property is adjacent to residential development along Barracuda Way and Loretta Drive, while the southeastern edge of the property is adjacent to The Ranch. The northern and eastern boundaries abut open space in Aliso and Wood Canyons Wilderness Park.

Topography on the property is hilly, with the main ridgeline running through the middle of the property and canyons draining steep slopes to either side. Elevations range from approximately 40 feet above mean sea level (msl) at the southeastern edge of the property to 840 feet above msl at the northwestern edge. Two unnamed blueline streams occur in the northwestern portion of the property, with smaller drainage features present in the canyon bottoms.

D. Covered and Special-Status Species and Sensitive Habitats

Covered Species documented on Pacific Horizon Preserve include California gnatcatcher (*Polioptila californica californica*), many-stemmed dudleya, and intermediate mariposa lily (*Calochortus weedii* var. *intermedius*). Additional Covered Species with the potential to occur but that have not been documented on the Preserve include coast horned lizard (*Phrynosoma blainvillii*), orange-throated whiptail (*Aspidoscelis hyperythra beldingi*), and bobcat (*Lynx rufus*). Other non-covered special-status plant species occurring on the Preserve include western dichondra (*Dichondra occidentalis*), bigleaf crownbeard (*Verbisina dissita*), and Catalina mariposa lily. Exhibits 3 and 4 depict the locations of mapped Covered Species and non-covered special-status plant species in and adjacent to the restoration areas.

E. Existing Conditions within Proposed Restoration Areas

Current conditions within the proposed restoration areas include an existing trail and entry point into the Preserve from County Parks lands, bare areas, unauthorized bicycle trails as well as berms and jumps for bicycle use, erosional cuts, and invasive species, including hottentot fig iceplant that occurs on the boundary both on the Preserve and County Parks property (0.07 acre on the Preserve and 0.13 acre on Parks), pampas grass (0.01 acre), and fountain grass (0.02 acre). Approximately 0.23 acre of disturbed area supporting mixed native scrub and non-native vegetation intermixed with bare areas including 843 linear feet of existing trail are proposed for restoration as a part of this Plan. An additional 0.22 acre of native scrub occurring immediately adjacent to proposed restoration areas may be subject to "passive restoration" including minor removal of annual weeds and native seed dispersal to promote native habitat infill and support recovery of mapped Covered Species in areas immediately adjacent to the disturbance sites. These areas are differentiated from the disturbance areas in that while they are occupied primarily by native plants, slight degradation was noted including thinning cover and presence of annual weeds due to adjacency to the disturbance areas. Passive restoration will include minor weeding and native seed dispersal, as needed. Exhibit 2 provides a map depicting the locations of existing disturbance areas and Exhibit 3 provides proposed restoration activities. Exhibit 2A provides site photos of the work areas.

Additionally, this Plan proposes initiation of invasive plant species removal, targeting high priority invasive species described in the Pacific Horizon ISMP. Initial removal of mapped invasive species including 2.34 acres of artichoke thistle and 1.42 acres of pampas grass as depicted on Exhibit 4 will commence as a part of this Plan. Removal methods described in this Plan are in accordance with the ISMP, with the pertinent sections included herein. Retreatment of the target invasive species is anticipated to occur over a five-year period for effective control.

F. Archeological Resources

LSA Associates, Inc. (LSA) conducted an Archaeological Sensitivity Assessment (ASA) for the Pacific Horizon Preserve in August 2015. No archaeological resources were identified within the boundaries of the Preserve. However, one archaeological site, 30-000006, is recorded as located adjacent to the Preserve at its northwestern boundary [Exhibit 5]. Observation from the Preserve during the survey indicates this site was likely destroyed by the development of Moulton Meadow Park.

Based on the negative results of the field survey and the geomorphological setting of the Preserve, the Preserve is not considered sensitive for the presence of archaeological resources. However, due to the proximity of 30-000006, it was recommended that any ground-disturbing activities that take place at the northwest boundary of the Preserve in the vicinity of this adjacent site be monitored by a professional archaeologist to ensure that the site does not extend into the Preserve. An exhibit depicting the monitoring area recommended by LSA with an overlay of the restoration area is attached as Exhibit 5. As recommended, monitoring will be conducted by a professional archaeologist during ground-disturbing activities in this monitoring area.

III. GOALS AND OBJECTIVES

The goal of this Restoration Plan is to address trail decommissioning of a previously identified trail segment on the Preserve and restored disturbed areas within the vicinity of this trail. The restoration was referenced in the RMP (Sections 3.2.1 – Public Access and 3.2.3 – Habitat Restoration).

Per Section 3.2.3.1 of the RMP, the Preserve Manager may propose decommissioning of the trails identified herein and initially allow passive restoration to natural habitat. During the first five years after adoption of the RMP, the Preserve Manager may monitor conditions at these locations using photo monitoring methods to track progress of passive restoration. After five years, the stated goal in the RMP is native plant cover of at least 70-percent of the closed trails. After five years, the Preserve Manager, in consultation with the Restoration Ecologist, may determine the need for active (versus passive) restoration, including invasive plant control and supplemental seeding, to improve the cover and quality of native habitat on closed trails. If it is evident before five years that active restoration is warranted, the Preserve Manager has the option to move forward with the active restoration actions sooner.

Per the RMP, if active restoration is pursued, the Restoration Plan will provide guidelines for 1) site preparation, including any needed soil treatments, grading, supplemental water, and weed control; 2) plant establishment, including planting and seeding palettes and methods; and/or 3) follow-up maintenance, including weed abatement, supplemental water, pest control, and replanting/reseeding.

As a part of site preparation for habitat restoration in trail closure areas, this Trail Restoration Plan includes all of the above-referenced guidelines including invasive species removal and/or treatment methods consistent with the Pacific Horizon ISMP. In addition to invasive removals in the trail closure areas, this Plan also proposes initiation of removal of “high priority” invasive species including artichoke thistle and pampas grass mapped as for removal as part of the ISMP, as depicted on Exhibit 4.

A. Partial Trail Closure and Habitat Restoration

The intent of the partial trail closure is to restrict public access and limit unauthorized activities within an area containing sensitive resources consistent with the RMP. Activities such as fence and trail repair will improve public safety. Proposed restoration activities include:

1) Fence repair, installation of signage and camera locations
2) Site preparation (trail contouring/hand-repair of bike jumps, erosion control and soil decompaction, invasive species removal)
3) Native plant procurement and installation (seed, container stock, cactus pads)
4) Maintenance (weed abatement, replanting/reseeding, fence and sign repair)
5) Monitoring

B. Invasive Species Removal

1) Target Invasive Species Profiles, removal methods, and schedule
2) Maintenance (follow-up treatments)
3) Monitoring

IV. PARTIAL TRAIL CLOSURE AND HABITAT RESTORATION

This Plan will be implemented consistent with the Pacific Horizon RMP under the direction of the Preserve Manager's qualified ecologist or biologist, referenced herein as Preserve Biologist, with extensive experience in habitat restoration in southern California. The Preserve Biologist will be a valuable resource in the field for ensuring effective implementation of this Plan, and for making any necessary in-field modifications to this Plan should unanticipated site conditions warrant alternate approaches.

A. Fencing, Signage, and Camera Locations

Existing rusted barbed wire fencing marking Preserve boundary limits is down in several areas. The barbed wire will be removed and replaced with smooth wire fencing. Approximately 1,114 linear feet of fence line will be repaired. Existing T-posts will be left in place, but will be compacted to support new wire, as necessary.

Signage restricting access and providing information regarding habitat restoration at sections of trails intended for closure be installed with "Habitat Restoration Area – Do Not Enter". Large invasive species removal areas, adjacent to access trails will be marked with the same restrictive signage. Monitoring cameras will be installed to monitor wildlife movement and human use. Proposed signage and camera locations are depicted on Exhibits 3 and 4. Note that camera locations are approximate and may need to be moved for various reasons including repeated vandalism, site conditions such as wind or overgrown vegetation interfering with functionality, targeting a new area of concern, or if the camera is not providing useful data.

B. Site Preparation

a) Contouring and Soil Decompaction

Existing bicycle jumps/berms and erosional cuts in the proposed restoration areas pose an immediate threat to Covered Species (many-stemmed dudleya and intermediate mariposa lily) and coastal sage scrub habitat for the California gnatcatcher. Bicycle jumps and berms will require dismantling and decompaction using hand tools such as pickaxes and shovel. Erosional cuts on access trails will be filled with native soil from onsite or with sand and gravel. Soil within trail closure restoration areas will be decompacted using pick axes, shovels, or a hand-held auger to make areas ready for planting. Wheelbarrows may be used for transport of materials, if necessary.

b) Erosion Control

Straw wattles will be installed, if necessary, to secure erosive areas within the restoration sites and to keep restoration seed and cuttings from washing away during natural rain events before plants are sufficiently established.

c) Invasive Species Removal in Restoration Areas

Target invasive species in the proposed restoration areas include iceplant, pampas grass, and fountain grass. Small quantities of sweet fennel (*Foeniculum vulgare*), and ruderal vegetation such as Russian thistle (*Salsola tragus*) and milk thistle (*Silybum marianum*) as well as non-native grasses were observed within some disturbed areas. However, the disturbance itself, including digging/soil mounding and creating bicycle

jumps/berms are the primary threat to the Covered Species, primarily the many-stemmed dudleya. As a part of this Plan, as well as routine maintenance, all invasive species and ruderal species associated with disturbance will be removed.

C. Native Plants

It is preferred that the source of all plant material (seed and cactus) used at the restoration site be from the Pacific Horizon Preserve or from wild sources within coastal Orange County and collected as close to the restoration site as possible to preserve regional genetic integrity. Seed and cactus installation will occur between the months of November and February to take advantage of natural rainfall, as no supplemental irrigation is being proposed as a part of this Plan.

a) Seed

Seed may be collected onsite or purchased from a native seed nursery with collection areas from coastal Orange County. Native seed will be dispersed within the disturbance restoration areas by hand. Seed will be lightly incorporated into the soil to a maximum depth of ¼-inch by broadcasting and raking into the soil. Table 1 below provides the recommended seed mix to be dispersed within the disturbance restoration areas.

TABLE 1
Coastal Sage Scrub Seed Mix (0.5 Acre)

Botanical Name	Common Name	Lbs/Acre	Total Quantity
Acmispon glaber	Deerweed	2	1.0
Artemisia californica	California sagebrush	5	2.5
Encelia californica	Bush sunflower	3	1.5
Eriogonum fasciculatum	California buckwheat	2	1.0
Mimulus aurantiacus	Bush monkeyflower	1	0.5
Salvia mellifera	Black sage	5	2.5
Stipa pulchra	Purple needlegrass	7	3.5
Total		**25**	**12.5**

b) Cactus Pad Collection

Up to 100 prickly pear cactus pads will be collected from existing cactus stands within the Preserve for use in the restoration areas. Cactus pads will be planted in strategic areas in groupings to deter entry into the restoration areas and provide an added physical barrier to protect Covered Species or special-status plant species. Cactus pads may be planted in treated iceplant to provide infill.

D. Maintenance

The restoration areas will be maintained for a minimum of one year following restoration activities. Maintenance will include primarily weed abatement consisting of hand-pulling to avoid impacts to newly establishing native species, maintaining erosion control materials such as straw wattles, and maintaining fencing and signage, as needed. Herbicide use shall occur only in areas where native species will not be

affected and only after consulting the Preserve Manager. Best management practices described in Section VI. below will be implemented during all invasive species removal activities.

Invasive species removals will continue over a five-year period consistent with the ISMP for the Preserve.

V. INVASIVE SPECIES REMOVAL

A. Target Invasive Species Profiles

Invasive species targeted as a part of this Restoration Plan include iceplant, pampas grass, fountain grass, and artichoke thistle. Small quantities of sweet fennel, Russian thistle, and non-native grasses were noted as well, and will be removed incidentally as a part of the invasive species removal.

Invasive species that will be targeted as a part of this Plan including recommended control methods are listed below in alphabetical order by common name. Detailed plant profiles and life history of target species are listed within the ISMP. Target occurrences are depicted on Exhibits 3 and 4.

Artichoke Thistle (*Cynara cardunculus*)

Artichoke thistle was mapped in a relatively large contiguous polygon accessible by the main trail. As such, it is possible to eradicate this species from the property with repeated treatment as described herein. This species is rated as "moderate" invasiveness by the California Invasive Plan Council (Cal-IPC) and is a high priority for treatment in the ISMP and this Restoration Plan.

Removal work is recommended to begin along trails to reduce the spread of this species. Within the larger mapped polygon, starting spray work in areas where artichoke thistle is interspersed with native shrubs and working into the larger field of solid artichoke thistle cover is recommended. This allows natural regeneration of the surrounding coastal sage scrub plant community through seed dispersal above ground and mycorrhizal expansion at the root level to naturally displace invasive species over time.

Physical Treatment
Grubbing of small seedlings may be performed in areas where the artichoke thistle occurs in small isolated patches interspersed with native vegetation and immediately adjacent to Covered Species or non-covered sensitive species. It is labor intensive and therefore it is not a practical approach on a large scale. Cutting and removing seed heads can stop seed production in small populations where timely eradication of the plant is not possible.

Chemical Treatment
Artichoke thistle has the ability to resprout after chemical spraying and to build up a seedbank that lasts five years or more; therefore, yearly monitoring and repeat treatment is necessary. Eradication is most effective when mature plants are bolting, during the wet season, generally in early to mid-April in Southern California.

Chemical treatment using glyphosate herbicide has been effectively used in eradication of artichoke thistle. Foliar spot spray, or cut stump method can be used, depending on proximity to sensitive resources. Spraying seedlings, particularly in new areas of infestation, can be very effective. The cut-stump method involves

cutting the plants as close to the base as possible with a machete, loppers, or a brush cutter and applying a concentrated solution of herbicide to the stump. Cut stump applications have been found to be effective at all growth stages. This method is useful for isolated plants or remote populations where spray equipment is impractical or when it is in close proximity to sensitive species and foliar spray is not advised. This method is the preferred method of application in areas where artichoke thistle is interspersed with coastal sage scrub habitat, or adjacent to mapped occurrences of Covered Species.

In flatter areas that are easily accessible, cutting down dense patches with power tools is a useful preparation prior to chemical treatment as it provides easier access to large patches with less damage from spines on standing dead plants and reduces the amount of required herbicide. If this method is employed, seed heads must be removed and bagged before mowing to prevent seed dispersal.

Recommended Treatment Timeline

- December through March – Grub or spray new seedlings.
- March through June – Cut and stump treat with herbicide. Alternatively, if unable to treat with herbicide, cut, bag, and remove seed heads to prevent seed production.
- Perform annual follow-up treatment (up to five years).

Fountain Grass (*Pennisetum setaceum*)

Fountain grass individuals were mapped along the northern border of the preserve comprising 0.02 acre. This species is rated as "moderate" invasiveness by Cal-IPC and is listed as high priority for treatment in the ISMP and this Restoration Plan.

Physical Treatment

If currently flowering or seeding, occurring from July to August, the heads must be removed and placed in bags for offsite removal as disturbance to the plant will spread seeds. Small populations may be controlled through hand removal through twisting and pulling of small segment of vegetation or uprooting the whole plant. Axes can be used on larger individuals. Removal may need to occur several times throughout the year as fountain grass seedlings repopulate after removals.

Chemical Treatment

In high density infestations, Hexazinone (as Velpar®) can be used as a post-emergent herbicide once a year but may not be used in areas with a shallow water table or near trees. Fluazifop (as Fusilade®) or Sethoxydim (Poast®) are herbicides effective on grass species. An addition of crop oil will enhance activity.

Recommended Treatment Timeline

- October through March – Hand pull, digging, mowing, or tilling, or cut and treat with herbicide.
- Perform follow up herbicide treatment as needed.

Iceplant (*Carpobrotus edulis*)

Iceplant is present in the northeastern borders of the preserve and approximately 0.07 acre will be removed as a part of this Plan. Iceplant was identified within disturbed mixed sage scrub along the northern edge of

the Preserve along the existing main access trail. This species is rated as "high" invasiveness by Cal-IPC and is a high priority for treatment in this Plan due to its proximity to Covered Species.

Physical Treatment
The shallow root system of iceplant allows for the species to be easily removed through hand pulling. Iceplant can be pulled up or rolled up to prepare for disposal. Due to its ability to resprout through fragments of vegetative matter, complete removal and disposal off-site or mulching is recommended along with a follow up visit to remove any new sprouts.

Chemical Treatment
Glysophate in a 2-percent or higher solution has been shown to be effective at controlling this species. Additionally, placing an acidifier into the water before adding in herbicide has been reported to show a higher mortality in iceplant populations.

Recommended treatment timeline
- All year round – Hand removal of entire plant or treat with herbicide.
- Perform follow-up monitoring and treatment.

Pampas Grass (*Cortaderia selloana*)

Pampas grass individuals were mapped along the northern border of the preserve comprising 0.01 acre within the restoration areas. Additionally, a population of approximately 1.24 acres has established in a canyon on the eastern portion of the Preserve, which will be targeted as a part of this Plan. This species is rated as "high" invasiveness by Cal-IPC and a is high priority for treatment in this Plan.

Physical Treatment
Smaller individual plants may be entirely dug up by the root using a shovel. Seed heads can be cut and placed in plastic bags before removal to prevent spread during the removal process. Seedlings may be dug up as they emerge in the spring months.

Chemical Treatment
Chemical control of pampas grass can be achieved by spot treatment with a glyphosate herbicide. Fall applications have shown more effective results as compared to summer applications. However, if viable seeds are produced, it may be necessary to apply the herbicide prior to seed maturation. For large clumps, the top foliage can be removed by cutting and the regrowth treated with herbicide.

Recommended Treatment Timeline
- October through March – Dig up entire plants or cut and stump spray with herbicide.
- Perform annual follow-up treatment during the fall months until eradicated (up to five years).

Sweet Fennel (*Foeniculum vulgare*)

Sparse instances of fennel were identified along a trail in an area of mixed sage scrub in the center of the property along the main access trail. This species is rated as "moderate" invasiveness by Cal-IPC and a high

priority for treatment in this Plan. As sweet fennel grows most readily in disturbed, plowed soils, measures to reduce any continual disturbance will prevent the spread of this species.

Physical Control

Hand digging may be labor intensive but highly effective in removing the entire tap root. Cutting of stalks is inefficient as sweet fennel readily sprouts after being cut or mowed. Repeated cuttings may exhaust the plant's resources if done with a short period of time in between treatment as regrowth of this species is rapid. Avoid cutting when the species is seeding which spreads seeds.

Chemical Control

Studies show that triclopyr (as Garlon 3A® or Garlon 4®) at a rate of 6 1bs/100 gallons of water is most effective when sprayed in early Spring. Glysophate (as Roundup®) has also been shown to effectively reduce sweet fennel coverage. Stump treatment has not shown any increase in effectiveness as compared to foliar chemical control.

Recommended Treatment Timeline

- March through April – Dig up entire plant or cut down stalks before the seeding period.
- February through May – Apply herbicide to species.
- Perform monthly monitoring and follow up herbicide treatment when regrowth occurs.

B. Maintenance

If native plant establishment occurs after initial weed control, follow-up non-native species control will largely consist of hand-pulling or spot spray to avoid impacts to newly establishing native species. Herbicide use shall occur only in areas where native species will not be affected and only after consulting the Preserve Manager. Best management practices described below will be implemented during all invasive species removal activities.

VI. BEST MANAGEMENT PRACTICES

This Plan sets forth BMPs to limit the introduction, transport, and proliferation of invasive species within Pacific Horizon Preserve, and to ensure that all work is performed with the least incidental impact to native plant communities. All work will be performed in conformance with BMPs outlined in this Plan and under the directions of the Preserve Manager's Biological Monitor experienced in habitat restoration and resource management in Southern California plant communities.

A. Contractor Education

Prior to start of restoration and invasive removal work, Preserve Management personnel and Contractors will receive prevention training as outlined in this Plan. Training will include identification and location of target invasive species, priority treatment areas, sensitive species and habitat avoidance areas, prevention of transport, eradication methodology, and BMPs.

B. Nesting Birds Policy

The Preserve Manager will implement a Nesting Birds Policy to conform to existing regulations and procedures for protection of nesting birds. Migratory native bird species are protected by international treaty under the Migratory Bird Treaty Act (MBTA) of 1918 (50 CFR 10.13). Sections 3503, 3503.5, and 3513 of the California Fish and Game Code make it unlawful to: *take, possess, or needlessly destroy the nest or eggs of any bird* (3503); *take, possess or destroy any birds in the orders of Falconiformes or Strigiformes (birds--of--prey) and the nest and eggs of any such bird* (3503.5); and take or possess any migratory nongame bird, or any part thereof, as designated in the MBTA. Under State law, take means to *hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture or kill* (Fish and Game Code Section 86), and includes take of eggs and/or young resulting from disturbances that cause abandonment of active nests.

Proposed activities with the potential to impact nesting birds (including, but not limited to, vegetation removal and use of heavy construction equipment) are not expected to occur on this Preserve, and if deemed necessary, should occur outside of the avian breeding season, which generally runs from March 1 to September 15 (as early as January 1 for some birds) to avoid disturbance to breeding birds or destruction of the nest or eggs. Depending on the avian species present, a qualified biologist may determine that a change in the breeding season dates is warranted.

If the Preserve Manager determines that avoidance of the avian breeding season is not feasible, at least two weeks prior to the initiation of project activities, a qualified biologist with experience in conducting breeding bird surveys will conduct surveys as deemed appropriate by the Preserve Manager to detect presence/absence of native bird species occurring in suitable nesting habitat that is to be directly or indirectly disturbed and (as access to adjacent areas allows) any other such habitat within an appropriate buffer distance of the disturbance area. Generally, the buffer distance should be 300 feet (500 feet for raptors). If a narrow buffer distance is warranted, the Preserve Manager will have a qualified biologist identify the appropriate buffer distances for raptors and non-raptors and notify Wildlife Agencies. The surveys should continue on a weekly basis with the last survey being conducted no more than three days prior to the initiation of project activities. If a native or nesting bird species is found, the Preserve Manager will do one of the following to avoid and minimize impacts on native birds and the nest or eggs of any birds.

- Implement default 300-foot minimum avoidance buffers for all birds and 500-foot minimum avoidance buffers for all raptor species. The breeding habitat/nest site will be fenced and/or flagged in all directions, and this area will not be disturbed until the nest becomes inactive, the young have fledged, the young are no longer being fed by the parents, the young have left the area, and the young will no longer be impacted by the project.

- If a narrower buffer distance is determined appropriate by the qualified biologist, the Preserve Manager will develop a project-specific Nesting Bird Management Plan. The site-specific nest protection plan will be developed collaboratively with Wildlife Agencies and submitted to the Wildlife Agencies, although the Wildlife Agencies will not be responsible for approving the narrower buffer distance and the Nesting Bird Management Plan. The Nesting Bird Management Plan should include detailed methodologies and definitions to enable a qualified avian biologist to monitor and implement nest-specific buffers based on topography, vegetation, species, and individual bird behavior. This Nesting Bird Management Plan will be supported by a Nest Log

that tracks each nest and its outcome. The Nest Log will be submitted to the Wildlife Agencies at the end of each week.

- The Preserve Manager may propose an alternative plan for avoidance and nesting birds for Wildlife Agencies' review and approval.

- Flagging, stakes, and/or construction fencing should be used to demarcate the inside boundary of the buffer between the project activities and the nest. The personnel working for the Preserve Manager, including any contractors working on site, should be instructed on the sensitivity of the area. The Preserve Manager will document the results of the recommended protective measures described above to demonstrate compliance with applicable State and Federal laws pertaining to the protection of native birds.

The Biological Monitor will be present on site during all grubbing and clearing of vegetation to ensure that these activities remain within the project footprint (i.e., outside the demarcated buffer) and that the flagging/stakes/fencing is being maintained, and to minimize the likelihood that active nests are abandoned or fail due to project activities. The Biological Monitor will send weekly monitoring reports to the Preserve Manager during the grubbing and clearing of vegetation and will notify the Preserve Manager immediately if project activities take, possess, or needlessly destroy the nest or eggs of any bird as well as birds-of-prey and their nest or eggs. Within 48 hours of damage to an active nest or eggs or observed death or injury of birds protected under State law or the MBTA (which includes, but not is limited to, the birds on the Covered Species list), the Preserve Manager will notify the OCTA NCCP/HCP Administrator and Wildlife Agencies.

C. Integrated Pest Management

An IPM approach will be used where feasible to eradicate target invasive plant species. The IPM approach incorporates the least biologically intrusive control methods at the most appropriate period of the growth cycle and based on current site conditions in order to effectively achieve eradication goals. Methods described and recommended herein for control of target invasive species have been cross-referenced using field tested methodologies cataloged on the Cal-IPC website, in addition to published studies on experiments with various treatment methods on given invasive species.

D. Chemical Herbicide Specifications

This Plan provides information on currently accepted chemical methods for eradication of the various target invasive species within the Southern California region. While this Plan outlines typically used herbicides to eradicate invasive plant species, the type, quantity, and method of herbicide application must be determined by a California licensed Pest Control Advisor (PCA) who will inspect the site and recommend herbicide type and mixture. All licenses are issued by the State of California and should be registered in Orange County and be of current status.

Chemical herbicide recommendations shall include, but are not limited to, the herbicides to be used, rates of application, methods of application, and areas to which herbicides are to be applied. A licensed Pest Control Operator (PCO) may work under the supervision of the PCA who will employ BMPs regarding the timing, quantity, and type of herbicide for each species. If a PCA is not present during the herbicide treatment, all applicators should have undergone documented herbicide application training. Personnel must wear all

protective clothing required by law and follow all label directions and precautions. All re-entry times specified on an herbicide label should be observed and posted.

The PCA will determine both immediate and follow-up herbicide application for each target species. Herbicides that are registered for use in California for natural areas are specified for particular weed species at specific rates noted on the labels. Only EPA-approved, systemic herbicides lacking chelating compounds are legally allowed when applying herbicides within 100 feet of a natural watercourse or body of water.

Because of the cost and potential effects on native flora and fauna, herbicide treatment should be conducted only when weather conditions are conducive to effective uptake of the herbicide by the target species (e.g., sunny, dry with moderate temperatures, and when plants are at the peak growing stage), and when wind conditions are such that herbicide drift is minimized (five mph or less). Contact with native shrub and grass species shall be avoided as much as possible. In the event of gusty winds or winds in excess of five miles per hour, all work will be temporarily discontinued to protect applicators and adjacent natural resources. Treatments shall also be temporarily discontinued in the event of rainfall since rainfall reduces the effectiveness of the herbicide.

During herbicide application, it is recommended that a brightly colored dye or food coloring be used to aid the applicator in achieving good coverage of the target species. The material should be a non-toxic material (i.e. Blazon, Turfmark, or equivalent). The dye should be mixed with the herbicide at no more than half the rate specified on the label.

Sprayed vegetation shall be left undisturbed for seven days to allow the herbicide to be distributed throughout the entire plant. Visible effects of herbicide application consist of wilted foliage, brown foliage, and disintegrated root material.

As directed by the Preserve Biologist, treated plant materials may be reduced by a string trimmer or other appropriate equipment and/or disposed of in a landfill off site.

E. Sequence of Work

It is recommended that invasive removal work begin in areas where invasive species are interspersed with native plant communities supporting Covered Species and work outward. In many cases, it is more effective to begin in areas of low concentration and move into areas of high concentration. This allows natural regeneration of native plant communities and prevents the invasive species from gaining a foothold. The following regime should be implemented in areas that contain a mix of native and invasive species:

1) Begin work in the areas with the highest native plant population and lowest invasive population; then work out to more heavily infested areas.
2) Avoid disturbing native plants during invasive removal activities.
3) Conduct invasive species removals in the cool season outside nesting and blooming season for annual sensitive plants including Covered Species and non-covered special-status species.
4) Do not leave areas completely devoid of vegetation. If an area has been completely cleared of invasive species, introduce native plant material either through container planting or seed.
5) Prioritize follow-up treatment of invasive species intermixed with native species to achieve control before moving on to other areas.

F. Prevention Measures

When working in or adjacent to mapped Covered Species and special-status species locations and sensitive habitats, limits of work, access trails, and maintenance areas will be flagged prior to start of work.

Flagging, stakes, and/or construction fencing should be used to demarcate the inside boundary of the buffer between the project activities and the sensitive habitat/species. All contractors working on site should be instructed on the sensitivity of the area.

The following measures are recommended to prevent the transport and spread of invasive species between treatment areas within the Preserve:

- Provide prevention training and invasive species identification to OCTA staff and contractors prior to initiation of work.
- Identify a vegetation management schedule to maximize the effectiveness of control efforts and minimize the spread of invasive species.
- Identify equipment staging areas outside infested areas prior to start of work.
- Retain native species where possible.
- Identify areas designated for cleaning tools, equipment, clothing, and gear away from infested areas.
- Clean tools, equipment, clothing, and gear before entering and leaving work sites containing invasive species.
- Consider the sequence of operations. Work first in uninfested areas when equipment is free from invasive plant material.
- Access trails are a primary conduit for transferring invasive species from infested areas to non-infested areas. As such, avoidance of infested areas during equipment transport is one of the most important factors in prevention of seed transport to new areas.
- Identify access routes to avoid areas infested with invasive species prior to start of work.
- Exclude areas infested with invasive plants from equipment travel corridors and staging areas.
- Avoid leaving equipment or gear in areas infested with invasive plants.
- Maintain access trails free of invasive species to avoid transport through the Preserve, as needed.
- Identify waste disposal areas for invasive plant material at an offsite facility prior to start of work.

When access through infested areas cannot be avoided:

- Consider the sequence of operations. Arrange access routes from uninfested areas to infested areas. Work first in uninfested areas when equipment is free from invasive plant material.

- Treat invasive plants at access trails and staging areas before entering them.

- Work under dry conditions when feasible. Working under wet conditions elevates the risk of picking up invasive plant seeds and transporting them.

- Limit the number of paths traveled to minimize soil disturbance and the risk of unintentionally transporting invasive plant parts and seeds on equipment into uninfested areas.

- Perform trail maintenance such as road grading, brushing, and ditch cleaning from uninfested to areas infested with invasive plants. If possible, schedule such activities when invasive plant parts or seeds are least likely to be viable.

G. Waste Disposal

All invasive plant materials that are removed from the Preserve shall be disposed at a landfill or on-site at a secure, designated location to avoid the spread of nonnative plant species through seeds or propagules. Nonnative plant material will be removed off-site to a "green" waste recycling facility or otherwise legally disposed of, as necessary. Nonnative plant material will be covered during transport.

H. Trail Maintenance

Use of equipment and power tools may be necessary for trail maintenance tasks such as installation of erosion control BMPs. In the event that the proposed work requires use of loud and disruptive equipment and tools in carrying out the restoration work, these activities shall be restricted during the general breeding season for birds and raptor species (March 1 to September 15). If vegetation clearing or other loud/disruptive activities is required within or adjacent to areas potentially supporting nesting bird species between March 1 to September 15, refer to the Nesting Bird Policy in Section VI.B.

VII. MONITORING AND REPORTING

A. Monitoring

The purpose of this monitoring program is to remain consistent with the overarching management directives outlined in the RMP and ISMP for the Preserve, which include multiple layers of monitoring for biological resources including targeted wildlife and plant surveys, general stewardship monitoring, and effectiveness monitoring for restoration activities. Monitoring is ongoing in perpetuity as a part of the RMP.

The goal of monitoring is to assess the effectiveness of recommended invasive species treatment and restoration actions and allow for adaptive management strategies to be implemented in the future, if

necessary. As such, the goal is not to set stringent performance standards; rather, to set targets based on stated management goals and achievable conditions existing in intact reference plant communities within the Preserve.

As stated in the ISMP for the Preserve, monitoring methodology may consist of a combination of qualitative and quantitative methods. Qualitative and quantitative monitoring will inform future adaptive management recommendations and actions.

It should be noted that all monitoring methods described below are potential tools to be selected by the Preserve Biologist using best professional judgement in coordination with the Preserve Manager. Due to the dynamic nature of invasive species spread, the monitoring program must be adaptable, less focused on meeting performance standards, and more focused on continual identification and removal of invasive species as observed. Per the ISMP, as an important part of routine monitoring, the Preserve Manager's Biologists will employ an early detection rapid response (EDRR) management approach during all routine monitoring surveys including targeted species monitoring surveys, or general stewardship monitoring in order to identify and effectively eradicate new invasive plant populations before they infest an area as a part of routine Preserve monitoring.

Qualified habitat restoration specialists, biologists, or horticulturists with appropriate credentials and experience in native habitat restoration shall perform monitoring. Continuity within the personnel and methodology of monitoring shall be maintained insofar as possible to ensure comparable assessments.

a) Photo-documentation

Photo-documentation locations will be established before initial restoration to document baseline conditions prior to commencement of the restoration and invasive treatment work. Photos will be taken from the same vantage point and in the same direction at the time of each monitoring event and shall reflect restoration and invasive species treatment activities for each year of monitoring.

b) Qualitative Monitoring - Quarterly

The RMP requires that active restoration be qualitatively monitored on a quarterly basis for at least one year. Monitoring will include a qualitative assessment of native plant cover, including progress toward meeting the 70-percent coverage goal; identification of invasive plant species establishment; and identification of necessary remedial actions, including additional native seeding, adjustments to invasive species plant control methods and timing, and modifications to site protection measures.

The 70-percent coverage goal outlined referenced herein, as stated in the RMP and ISMP, is not performance standard, but a coverage goal. The success of the restoration program will be addressed through an adaptive management program as a part of OCTA's ongoing monitoring efforts at the Preserve that continue in perpetuity including planning, implementing, monitoring, and refining management strategies over time.

Following quarterly monitoring in the first year following restoration initiation, consistent with the ISMP, qualitative monitoring will continue at least biannually each year following invasive removals for a five-year period and may occur concurrently with other routine biological monitoring within the Preserve. Qualitative

monitoring will consist of documentation of all invasive species removal activities and visual characterization of native plant establishment within the restoration areas in a given year.

c) Quantitative Monitoring

Consistent with the RMP and the ISMP, monitoring methodology may consist of a combination of qualitative and quantitative methods. Three potential quantitative monitoring methods were included in the ISMP in the context of invasive species removals, including point-intercept transect, quadrat sampling, and relevé. While all three methods are described in the ISMP, the goal of quantitative monitoring is not achievement of any particular success criteria, but rather to inform future adaptive management actions.

In addition, annual and five-year mapping of invasive species polygons will be conducted, as described in the ISMP, and outlined below, as a part of the ongoing stewardship of the Preserve.

Annual Mapping

The mapping of invasive species will be maintained over time through surveys completed by the Preserve Manager, Monitoring Biologist, or volunteers, focusing on areas that function as natural conduits of dispersal including roads, trails, fence lines, streams, and disturbed areas. Surveys will be conducted during general stewardship monitoring, biological monitoring, or volunteer patrols. The invasive mapping will be updated yearly based on mapping results.

Five-Year Mapping

Mapping of treated invasive species polygons will be updated every five years to assess changes (expansion, reduction, or new infestation) in the treated invasive species population. The methodology will be the same as baseline mapping described the ISMP, and will assess invasive species distribution within treated areas, threat to Covered Species and sensitive habitats, proximity to conduits of spread such as streams and roads, and adaptive management recommendations, as appropriate.

B. Reporting

An annual report documenting all restoration and invasive management activity will be submitted to the Preserve Manager and CCC at the end of each year. The report will provide the following information to inform future adaptive management directives:

- A log of initial and follow-up invasive species removal actions including date, techniques employed, types of tools, types of herbicide and quantity, and any other pertinent notes describing treatment;
- Site characterization in terms of recolonization of native species, new colonization of new non-native or invasive species that would trigger further restoration actions; and
- Notes on stress factors such as prolonged drought, new disturbances such as fire, wildlife use, or any other notable conditions resulting from the implementation of the invasive removal program.
- Annual mapping of invasive species in restoration and invasive species treatment areas.
- Representative photographs of treatment activities and site conditions including date, GPS coordinates of photo-location point, compass bearing, and a description.

VIII. REFERENCES

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Pacific Hori on Preserve

Restoration Areas

Existing Fence Repair

A C P - Authori ed Trails: Open Access

A C P - SOC A CTP Access Road
Aliso Cree Trail: Managed Access

N

0 500 1,000 2,000

Feet

1 inch 1,000 feet

PACIFIC HORIZON PRESERVE

icinity Map

GLENN LUKOS ASSOCIATES

Exhibit 1

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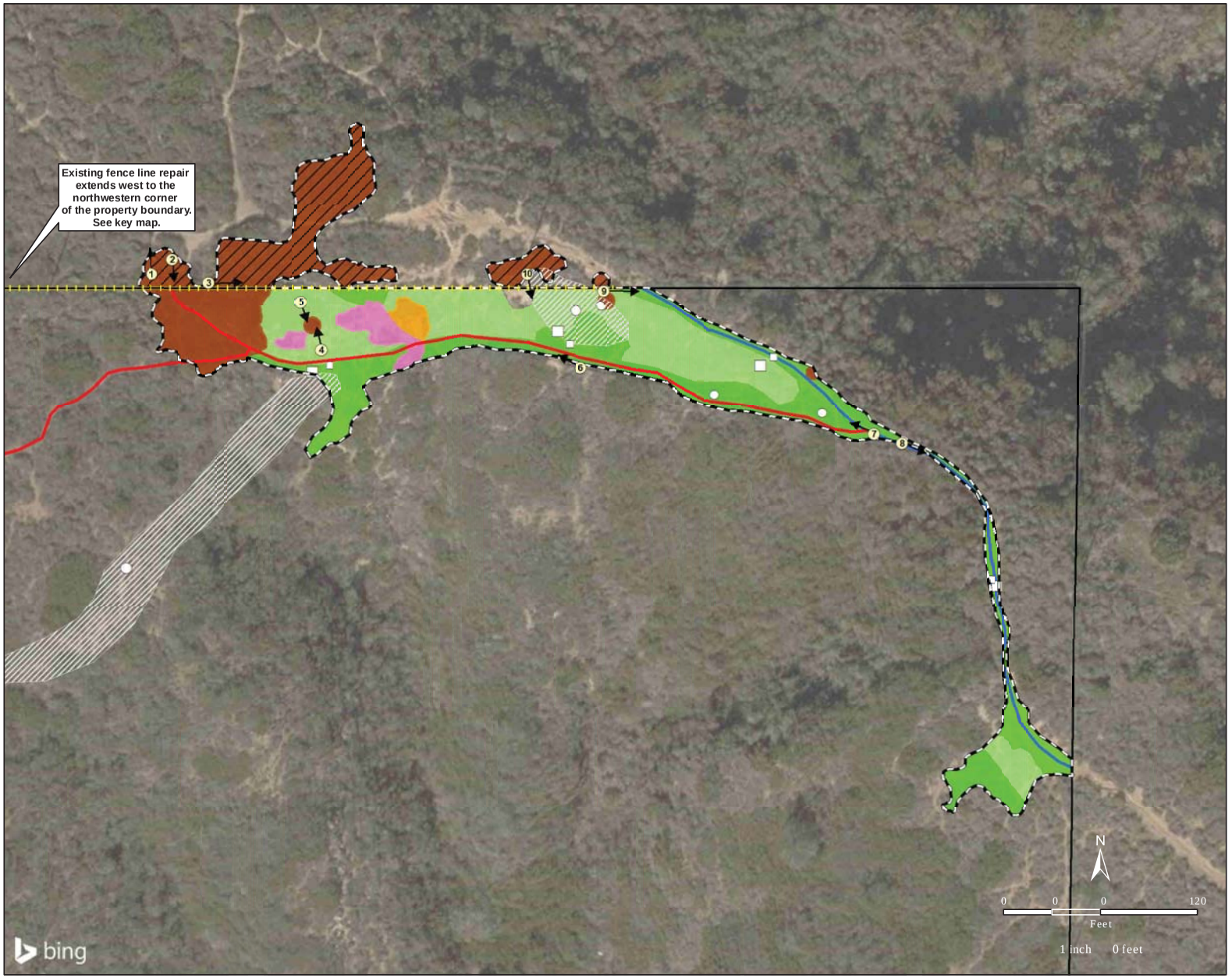

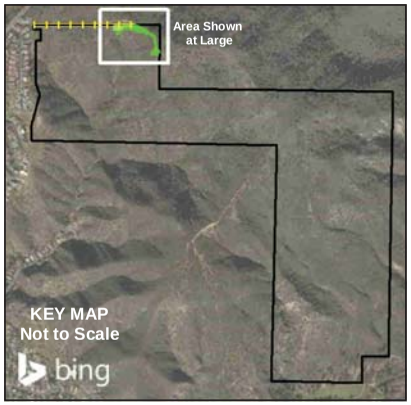

Pacific Hori on Preserve

Disturbed Lands Restoration or Area

Fence Repair

Iceplant County Property - 0.1 ac.

Iceplant - 0.07 ac.

Fountain Grass - 0.02 ac.

Pampas Grass - 0.01 ac.

Mixed ative on-native Scrub and Intermixed Bare Areas - 0.22 ac.

Sparsely egetated Bare Areas - 0.2 ac.

Trail Segment To Be Decommissioned

Existing Trail to Remain Open

5 Photo Location

Covered Species

Intermediate Mariposa Lily

Intermediate Mariposa Lily

Many-stemmed Dudleya

PACIFIC HORIZON PRESERVE

Existing Conditions Disturbed Lands Restoration Map

GLENN LUKOS ASSOCIATES

Exhibit 2

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Photograph 1: View of iceplant located on County of Orange property to be removed. Photo dated March 14, 2019.

Photograph 2: View of trail to be closed and existing fence line to be repaired. Photo dated March 14, 2019.

Photograph 3: View of iceplant located on County property to be removed (left side of fence) and iceplant located on OCTA property to be removed (right side of fence, background). Photo also depicts existing fence line to be repaired. Photo dated March 14, 2019.

Photograph 4: View of bare areas being used for bike jump and fountain grass (left of photo) and iceplant (center of photo), all of which is proposed for restoration. Photo dated March 14, 2019.

GLENN LUKOS ASSOCIATES

Exhibit 2A

PACIFIC HORIZON PRESERVE

Site Photographs

Photograph 5: View of bare areas being used for bike jump and fountain grass (right of photo) and iceplant (center of photo), all of which is proposed for restoration. Photo dated March 14, 2019.

Photograph 6: View of sample bike berm to be removed and recontoured/revegetated as appropriate depending on if berm is within an open trail or closed trail area. Photo dated March 14, 2019.

Photograph 7: View of trail to be closed on the left side and trail to remain open and recontoured using hand tools on the right side. Photo dated March 14, 2019.

Photograph 8: View of sample area in need of proposed trail recontouring using hand tools. Photo dated March 14, 2019.

GLENN LUKOS ASSOCIATES

Exhibit 2A

PACIFIC HORIZON PRESERVE

Site Photographs

Photograph 9: View of downed barbed wire fence to be removed. Fence line repair will stop in this location. Photo dated April 23, 2019.

Photograph 10: View of bare area proposed for camera placement. Photo dated April 23, 2019.

Photograph 11: View of artichoke thistle to be removed and area revegetated. Photo dated March 14, 2019.

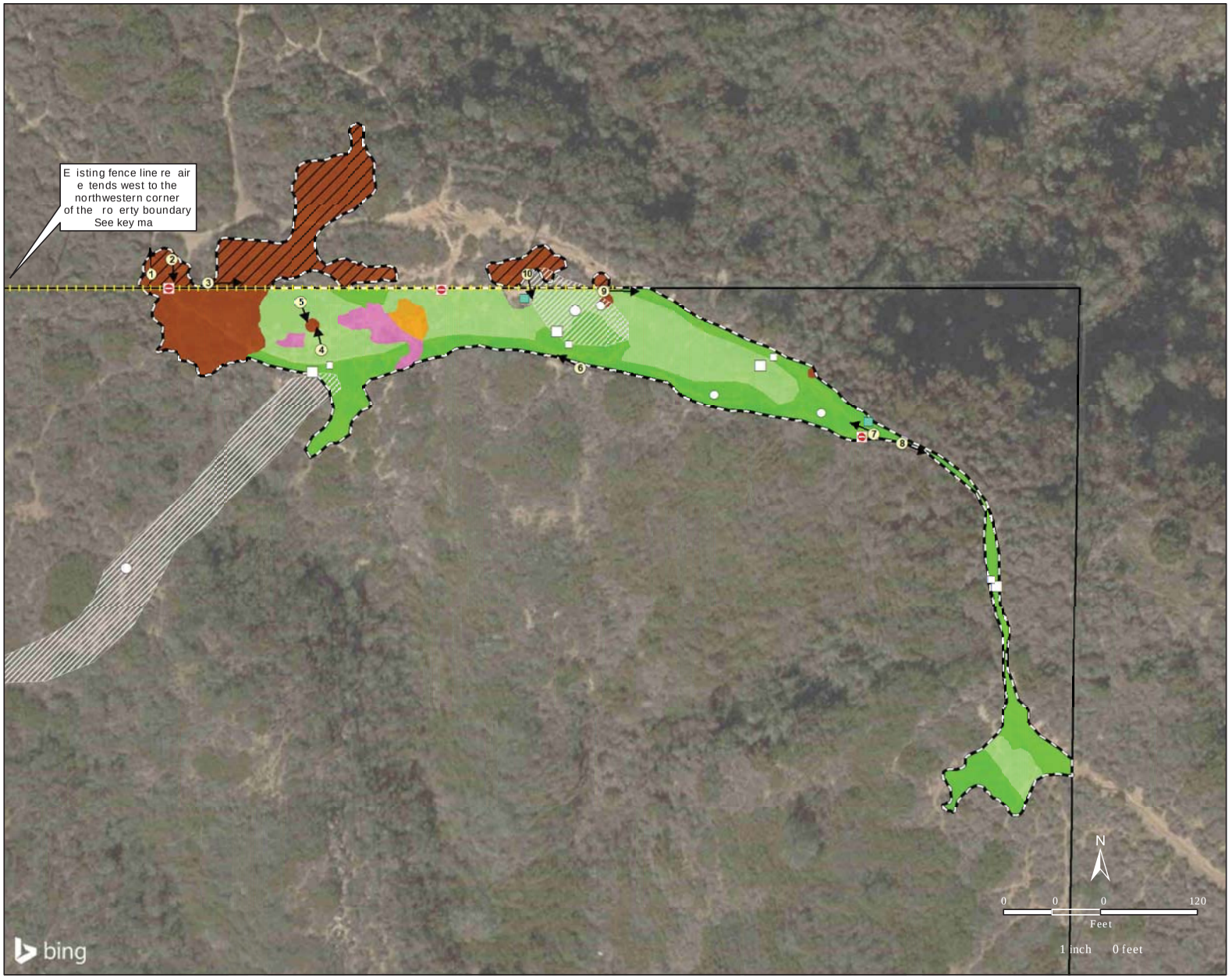
Photograph 12: View of artichoke thistle to be removed and area revegetated. Photo dated March 14, 2019.

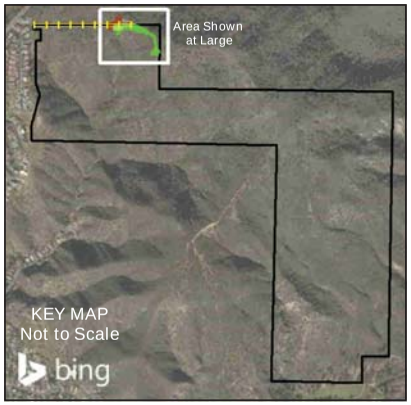
GLENN LUKOS ASSOCIATES

Exhibit 2A

PACIFIC HORIZON PRESERVE

Site Photographs





Pacific Hori on Preserve

Disturbed Lands Restoration or Area

Existing Fence Repair

Iceplant Removal Areas County Property - 0.1 ac.

Iceplant Removal Areas - 0.07 ac.

Fountain Grass Removal Areas - 0.02 ac.

Pampas Grass Removal Areas - 0.01 ac.

Passive Restoration - 0.22 ac.

Active Restoration - 0.2 ac.

Proposed Do ot Enter Restoration in Progress Sign

Proposed Approximate Location of Permanent Camera Station

Photo Location

Covered Species

Intermediate Mariposa Lily

Intermediate Mariposa Lily

Many-stemmed Dudleya

PACIFIC HORIZON PRESERVE

Disturbed Lands Restoration Map

GLENN LUKOS ASSOCIATES

Exhibit

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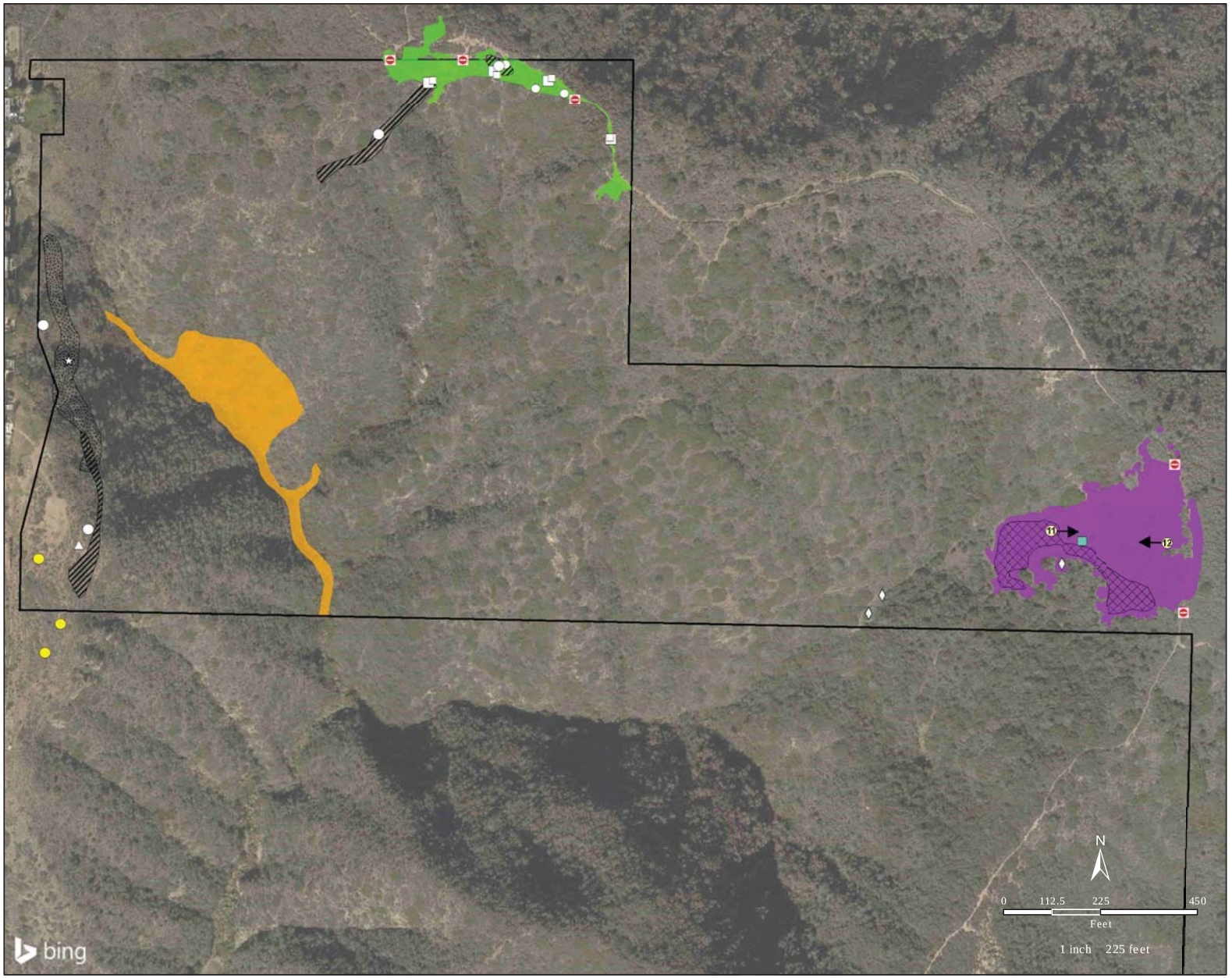

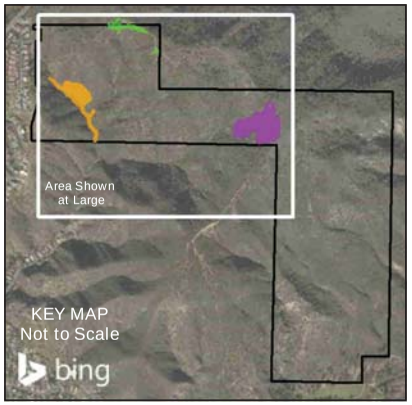

Pacific Hori on Preserve

Articho e Thistle Removal Area - 2. 4 ac.

Pampas Grass Removal Area - 1.42 ac.

Disturbed Lands Restoration Area - See Exhibit

Proposed Do ot Enter Restoration in Progress Sign

Proposed Approximate Location of Permanent Camera Station

Photo Location

Covered Species

Intermediate Mariposa Lily

Intermediate Mariposa Lily

Many-stemmed Dudleya

California Gnatcatcher

Non- Covered Sensitive Species

Catalina Mariposa Lily

Cro nbeard

Catalina Mariposa Lily

Cro nbeard

estern Dichondra

PACIFIC HORIZON PRESERVE

Invasive Species Removal Map

GLENN LUKOS ASSOCIATES

Exhibit 4

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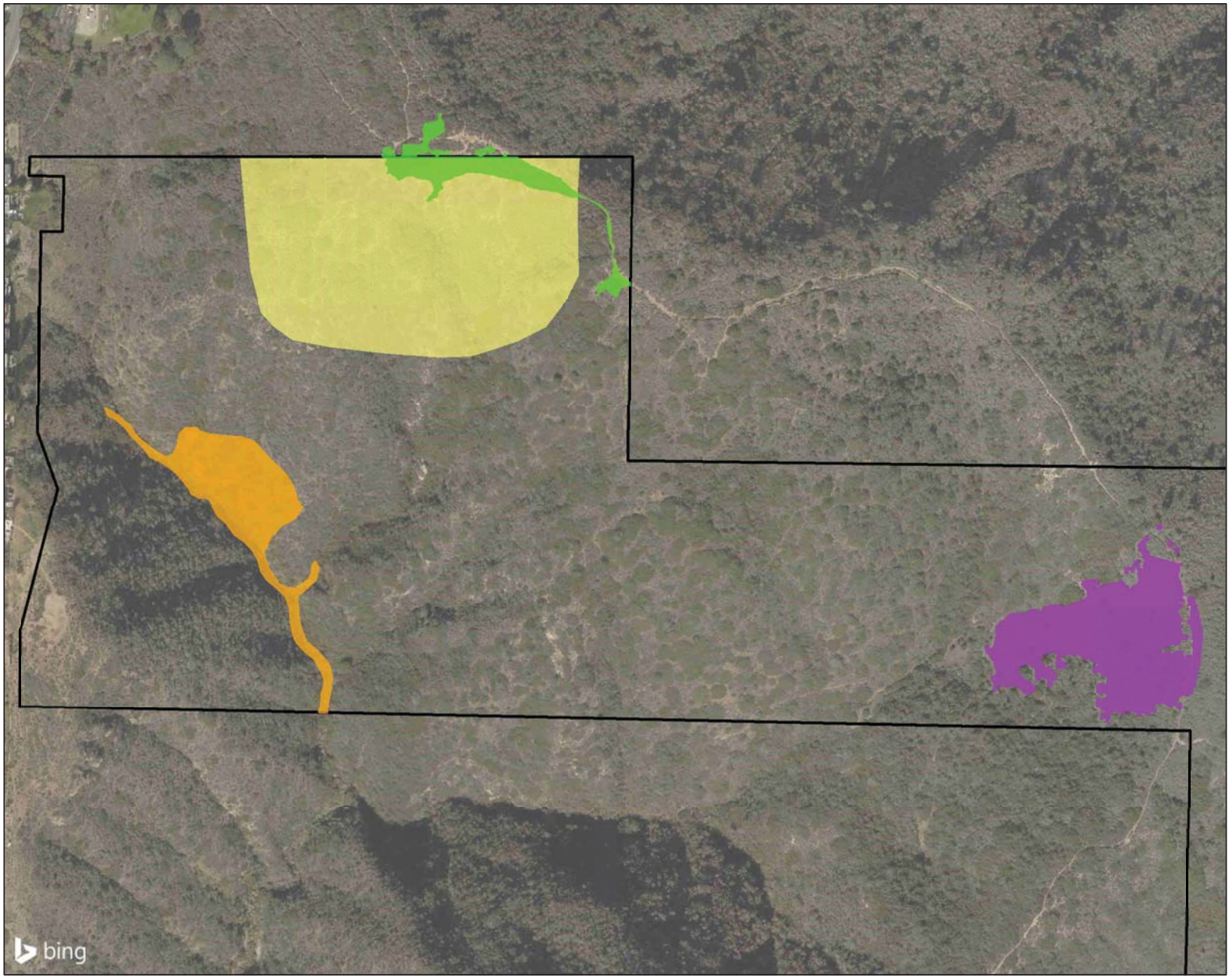

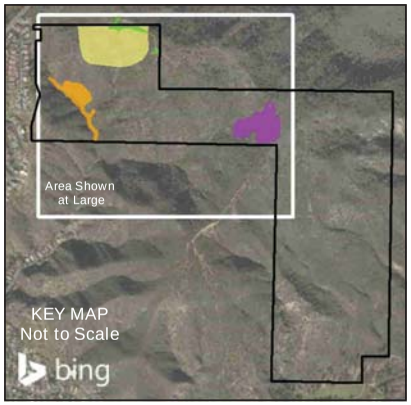

Pacific Hori on Preserve

Monitoring by a ualified Archaeologist During any Ground-Disturbing Activities Recommended in This Area

Disturbed Lands Restoration Area

Articho e Thistle Removal Area - 2. 4 ac.

Pampas Grass Removal Area - 1.42 ac.

N

0 112.5 225 450

Feet

1 inch 225 feet

PACIFIC HORIZON PRESERVE

Archaeological Monitoring Location Map

GLENN LUKOS ASSOCIATES

Exhibit 5

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APPENDIX G

MEMORANDUM

GLENN LUKOS ASSOCIATES
Regulatory Services

TO: Lesley Hill, OCTA

FROM: Lexi Kessans and Sheri Asgari, GLA

DATE: May 16, 2019

SUBJECT: Second Qualitative Monitoring Associated with the Road Encroachment Area at OCTA's Bobcat Ridge Preserve, Located in Trabuco Canyon, Orange County, California

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The purpose of this memorandum is to document the 2019 qualitative monitoring associated with the road encroachment area at Bobcat Ridge Preserve, a property owned by Orange County Transportation Authority (OCTA). The Preserve is one of seven of OCTA's properties associated with their Measure M2 Environmental Mitigation Program. The 48-acre Preserve is located northwest of the City of Rancho Santa Margarita in Trabuco Canyon, immediately adjacent to the east side of Live Oak Canyon Road, north of its intersection with Shelter Canyon Road and is accessed from Live Oak Canyon Road, Shelter Canyon Road, and Hunky Dory Lane.

OCTA was notified by California Department of Fish and Wildlife (CDFW) in January 2017 of a disturbance at the southern boundary of the Bobcat Ridge Preserve. The adjacent resident had cleared and graded a dirt road to provide access to an additional part of his property. OCTA and Glenn Lukos Associates (GLA) conducted a site visit on February 2, 2017 to review and map the disturbed area, which totaled approximately 0.135 acre (617 linear feet) to areas mapped as California sagebrush-California buckwheat scrub and scrub oak chaparral. Three individual intermediate mariposa lily points and one intermediate mariposa lily point mapped as a population of three were located in the disturbance footprint. OCTA has been in contact with the resident to discuss the property boundary location and sensitivity of the Preserve's resources. GLA conducted additional site visits on August 18, 2017 and November 21, 2017 to review status of the encroachment area and conducted the first qualitative monitoring event on December 18, 2018.

On May 2, 2019, GLA biologists Stephanie Cashin and Trina Ming conducted a second qualitative monitoring event and took photographs from the same position and orientation as photo location points established in 2018 along the road encroachment area. Qualitative monitoring included walking the entire length of the road encroachment area to document native habitat re-establishment, including percent cover and species recruitment [Exhibit 1: Road Encroachment Area Map (showing photo locations), Exhibit 2: Site Photos].

The road encroachment area currently exhibits a lower percentage of bare ground at the time of the second qualitative monitoring event at approximately 30-percent in comparison to approximately 85-percent of bare ground cover in 2018. The soil within the road is compact and

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sometimes rocky with almost no topsoil. Total vegetative cover is approximately 70-percent, of which native plant species contribute approximately 48-percent cover and non-native species contribute approximately 22-percent cover. In comparison to species coverage observed in 2018, total vegetative coverage was approximately 15-percent, of which native plant species contributed approximately 10-percent cover and non-native species contributed approximately 5-percent cover.

Native plant species detected within the encroachment area include (listed in order of relative dominance), deerweed (*Acmispon glaber*), California cottonrose (*Logfia filaginoides*), purple needle grass (*Stipa pulchra*), foothill needlegrass (*Stipa lepida*), sandaster (*Corethrogyne filaginifolia*), California buckwheat (*Eriogonum fasciculatum*), California sagebrush (*Artemisia californica*), black sage (*Salvia mellifera*), telegraph weed (*Heterotheca gradiflora*), lupine (*Lupinus* sp.), saw-toothed goldenbush (*Hazardia squarrosa*), purple owl's clover (*Castilleja exserta*) and Spanish clover (*Acmispon americanus*). Non-native plant species detected within the encroachment area include (listed in order of relative dominance), crete weed (*Hedypnois cretica*), red brome (*Bromus madritensis* ssp. *rubens*), tocalote (*Centaurea melitensis*), ripgut brome (*Bromus diandrus*), summer mustard (*Hirschfeldia incana*), scarlet pimpernel (*Lysimachia arvensis*), soft chess (*Bromus hordeaceus*), yellow sweet clover (*Melilotus indicus*), wild oats (*Avena* sp.), and longbeak stork's bill (*Erodium botrys*).

The road encroachment has developed in native and non-native coverage since the 2018 qualitative monitoring event. Deerweed continues to be dominant with many mature individuals located within the eastern half of the road. California sagebrush and black sage have developed further in shrub structure since the last year's monitoring event. Purple needle grass and foothill needlegrass have naturally recruited within the last year. Annual species observed include lupine, telegraph weed, California cottonrose, purple owl's clover, and Spanish clover. The western portion is dominated by bare ground and non-native species.

The condition of the road encroachment area exhibits significant growth of native and non-native vegetation since the 2018 monitoring event. The eastern portion of the road continues to exhibit higher cover than the central and western portion and has expanded in coverage in the 2019 year. Continued growth of native young shrubs and seedlings at the central portion of the road and observations of newly established seedlings suggest there is ample seed input from the surrounding habitat for successful habitat re-establishment. Significant rainfall events in the winter of 2018/2019 have increase non-native species coverage. Hand weeding of non-natives may be necessary in the future if there is evidence that non-native presence is affecting native vegetation development.

Given that there is noted growth in native vegetation within the western and central portions since the 2018 monitoring event along with continuing natural recruitment, passive habitat re-establishment is expected to succeed given there is no future disturbance. If native species do not successfully displace the non-native annuals noted within the disturbance area, active restoration including hand weeding and native seed dispersal may be recommended. GLA recommends continuing monitoring to document shrub maturation and non-native species coverage.

Monitoring in the spring months is recommended to detect the most number of both native and non-native species to inform management decisions.

Please contact Lexi Kessans at (949) 340-3942 with any questions.

Preserve Boundary
Encroachment to OCTA - 0.1 5 ac.
California Sagebrush - California Buc heat Scrub
Disturbed Bare Ground
Scrub Oa Chaparral
Cactus ren
Intermediate Mariposa Lily
Photo Location

N

0 25 50 100
Feet

inch feet

BOBCAT RI GE PRESERVE

Encroachment Area Map

GLENN LUKOS ASSOCIATES

Exhibit 1

X:\1100 AFTER THE REST\1184-2MO I:\1184-2_GIS\BobcatRidgeGIS\1184-2 BobcatSitePhotos.mxd

Photograph Location 1: Taken December 18, 2018, depicts the above area, downslope at the preserve boundary and facing northeast. Detected species include non-native longbeak stork's bill (*Erodium botrys*) and smooth cat's ears (*Hypochaeris glabra*) and bare ground.

Photograph Location 1: Taken May 2, 2019 depicting bare areas and non-native species dominated with crete weed (*Hedypnois cretica*), red brome (*Bromus madritensis* ssp. *rubens*), and ripgut brome (*Bromus diandrus*).

BOBCAT RIDGE PRESERVE ROAD ENCROACHMENT

Site Photographs

Photograph Location 2: Taken December 18, 2018. Species recruitment includes deerweed (*Acmispon glaber*) within road and California buckwheat (*Eriogonum fasciculatum*) along road at center.

Photograph Location 2: Taken May 2, 2019, depicting growth of deerweed seedlings noted in 2018.

Photograph Location 3: Taken December 18, 2108, depicts native recruits including deerweed, and lupine (*Lupinus sp.*) and chia (*Salvia columbriae*) seedlings within the road.

Photograph Location 3: Taken May 2, 2019 depicting growth of deerweed seedlings noted in 2018 and infill of native shrub seedlings including California sagebrush *(Artemisia californica*), California buckwheat, and sandaster (*Corethrogyne filaginifolia*).

BOBCAT RIDGE PRESERVE ROAD ENCROACHMENT

Site Photographs

Photograph Location 4: Taken December 18, 2018, depicting the area above, down slope and facing northeast. The road remains generally bare with deerweed continues to be the dominant species.

Photograph Location 4: Taken May 2, 2019 depicting significant growth of deerweed seedlings noted in 2018 and natural recruitment of California sagebrush, needle grass *(Stipa* sp.), black sage (*Salvia mellifera*).

BOBCAT RIDGE PRESERVE ROAD ENCROACHMENT
Site Photographs

Photograph Location 5: Taken December 18, 2018, depicting the area with an increase in native species cover. Deerweed and California sagebrush continue to be the dominant species within the road area.

Photograph Location 5: Taken May 2, 2019, depicting significant growth of deerweed and California sagebrush noted in 2018.

BOBCAT RIDGE PRESERVE ROAD ENCROACHMENT

Site Photographs

APPENDIX H

MEMORANDUM

GLENN LUKOS ASSOCIATES
Regulatory Services

TO: Lesley Hill, OCTA

FROM: Zack West, GLA

DATE: June 7, 2019

SUBJECT: Focused Meeting Associated with Mountain Bike Encroachment at OCTA's Silverado Chaparral Preserve, Located in Silverado Canyon, Orange County, California

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The purpose of this memorandum is to document a focused field meeting on May 20, 2019, associated with unauthorized mountain bike encroachment at the Silverado Chaparral Preserve (the Preserve), a property owned by Orange County Transportation Authority (OCTA). The Preserve is one of seven of OCTA's properties associated with their Measure M2 Environmental Mitigation Program. The approximately 204-acre Preserve is located west of the unincorporated community of Silverado in Silverado Canyon, between Baker Canyon Road to the north, Ladd Canyon Road to the east, Silverado Canyon Road to the south, and Black Star Canyon Road to the west. Attendees included Lesley Hill (OCTA), Adam Shuck (OC Parks), Raquel Atik (Recon Environmental), Adam Maywhort (Irvine Ranch Conservancy), Tony Castillo (High level Security Solutions, Inc.), and Zack West (Glenn Lukos Associates, "GLA").

As a part of regular environmental stewardship monitoring, GLA has documented and mapped the locations of unauthorized encroachment and habitat disturbance in the form of active trail improvements associated with unauthorized mountain bike activity at the Preserve. During the monitoring, GLA noted progressively escalating trail improvements, as well as apparent ingress/egress points, and notified OCTA of the encroachment. As part of adaptive long-term management, GLA recommended several measures to OCTA, including increased signage and fencing, as well suggested locations for the placement of trail cameras to document the encroachment.

The field meeting was held on May 20, 2019, to review the severity of encroachment, and to identify locations for the installation of additional fencing, signage, and trail cameras; as well as to review access and routes for regular security patrols by High level Security Solutions, Inc. and OC Parks law enforcement staff.

Several types of trail cameras, and the cost and effective usage of each type, were discussed. Adam Maywhort suggested a real-time cellular data portable video camera, and deployed a single camera of this type along the main trail to demonstrate its effective usage. Adam noted that the camera would send instant notifications via text or e-mail messages once triggered, allowing for real-time security patrol and law enforcement interception of future encroachment.

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Several potential locations for additional signage and fencing were reviewed and suggestions were made by Adam Shuck, Raquel Atik, and Zack West to install these features at locations that would complement additional cable tie fencing, barb wire fencing, and signage recently installed by OC Parks at the interface between parklands and the Preserve.

Adam Maywhort also suggested designating some of the trails recently subject to unauthorized improvements as active restoration areas, which, once designated and signage placed, would elevate any future disturbance from a County Code violations to a California Penal Code violations for Environmental Damage.

Action items in the coming weeks: Adam Maywhort will continue to monitor the deployed video trail camera; OC Parks law enforcement and High level Security Solutions, Inc. will actively patrol the Preserve for encroachment; GLA and Recon Environmental will collaborate to install additional fencing and signage at locations of ongoing unauthorized ingress/egress; GLA and the Irvine Ranch Conservancy will collaborate to install additional trail cameras.

Please contact Zack West at (949) 340-6490 with any questions.

Appendix D
2019 Summary Letter for Maintenance Activities Performed on OCTA Preserves (RECON Number 8316)

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RECON

An Employee-Owned Company

April 24, 2020

Ms. Lesley Hill
Environmental Mitigation Program
Orange County Transportation Authority
550 South Main Street
Orange, CA 92863-1584

Reference: 2019 Summary Letter for Maintenance Activities Performed on OCTA Preserves
(RECON Number 8316)

Dear Ms. Hill:

This letter summarizes the maintenance activities that were performed in 2019 (January–December) on Orange County Transportation Authority (OCTA) Preserves. The Preserves where maintenance occurred during 2019 include Trabuco Rose, Wren's View, Live Oak Creek, Bobcat Ridge, Silverado Chaparral, Pacific Horizon, and Eagle Ridge. The maintenance work was performed by a RECON field crew with supervision/coordination from a RECON Restoration Biologist. The specific maintenance tasks and dates performed, for each Preserve, are included below. Additionally, photographs taken in 2019 of maintenance work at the Preserves have been included in Attachment 1.

Trabuco Rose Preserve

During 2019, the majority of the maintenance work was conducted at the Trabuco Rose Preserve (Figure 1a). Tasks included the following: access/fire road maintenance, tasks for public safety, fence repairs, the installation of a hitching post for equestrian use, cactus salvage and planting, invasive plant treatments, and trail maintenance in preparation for equestrian rides. A summary of the work completed at Trabuco Rose has been included in Table 1.

During 2019 at the Trabuco Rose Preserve, debris was removed from streambeds, including Rose Canyon Creek (Photograph 1; all photographs are in Attachment 1), and vegetation on all fire roads/access roads on Trabuco Rose, for fire prevention/removal of fire hazards (see Figure 1a). Depending on the plants' stage of growth and proximity to sensitive species growing on or near the fire roads (i.e., intermediate mariposa lily [*Calochortus weedii* var. *intermedius*]), vegetation was removed either by hand, mechanically with line trimmers, and/or sprayed with herbicide. Additionally, vegetation was also removed and/or thinned within two fuel modification zones on Trabuco Rose, which include the zones adjacent to the following residences: 20022 Trabuco Oaks Drive (see Figure 1a, Trabuco Rose A; Photograph 2), and 1 Windy Ridge Road (see Figure 1a, Trabuco Rose B; Photograph 3). Vegetation was also removed along all fire roads/access roads, and fallen limbs from oak and sycamore trees that blocked access were also cut up and removed regularly throughout the year (see Table 1). This material was placed away from roads and drainages and spread out as to not create a fire hazard.

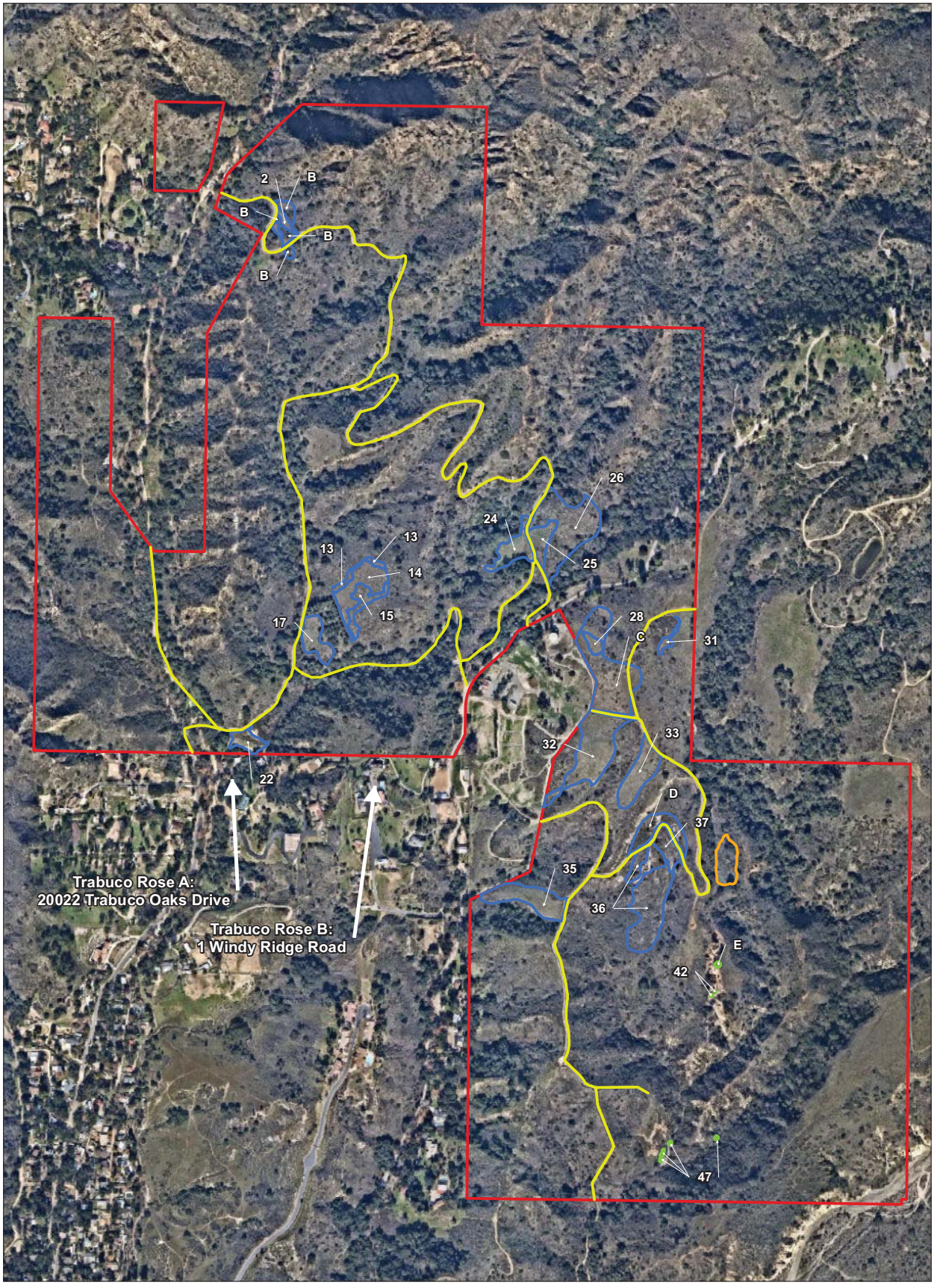
Invasive species control work on Trabuco Rose began in early 2019 (see Table 1) and followed the methodology in the approved *Invasive Species Management Plan for OCTA M2 Preserves – Trabuco Rose Preserve*, prepared by Glen Lukos Associates (GLA; 2017). The initial treatment of the Priority 1 invasive species and some of the Priority 2 invasive species, as classified by GLA (2017), was completed in fall 2018, and retreatments occurred in spring 2019. The areas of the Trabuco Rose Preserve that were treated for invasive species in 2019 are presented in Figure 1a. All areas originally treated in 2018 are presented in Figure 1b. Photographs of the work areas, taken in 2019, have also been included as Photographs 4 through 15.

Table 1
Summary of Work Completed at Trabuco Rose during 2019*

Date	Task
January 18, 2019	Removed debris within Rose Canyon Creek by hand and with chainsaws, to ensure unobstructed passage of water through the culvert. Debris was dispersed (not stockpiled) in areas outside of waterways and roads.
February 18–19, 2019	Repaired erosion using hand tools and sand bags along Trabuco Oaks Drive and a portion of Hickey Spur Road. Hand tools were also used at the creek crossing to smooth the ingress and egress through the creek.
February 19–20, 2019	Non-native invasive species treatment work was conducted at (going in the order they were treated): Areas 22, 17, 13, 14, 15, 24, 25, and 26 (see Figure 1a).
March 4–5, 2019	Non-native invasive species treatment work was conducted at (going in the order they were treated): Areas 35, D, a portion of 36, a portion of 37, and a portion of 32 (see Figure 1a; certain areas were not treated in their entirety due to very wet road conditions and limited access).
March 8, 2019	Removed fallen oak tree debris near main gate and made repairs to fence line along Trabuco Oaks Drive and Rose Canyon Road.
April 5, 2019	In preparation for a public event and for safety, regrading/recontouring work occurred on the fire roads using a piece of heavy equipment; the public outreach area and single-track trail were line-trimmed; and cactus pads (*Opuntia littoralis)* were trimmed back near an access gate and planted in another area.
April 11–12, 2019	Installation of a hitching post with ring and concrete footing, near main gate for equestrian use; vegetation thinning and removal within fuel modification zone adjacent to 20022 Trabuco Oaks Drive (see Figure 1a, Trabuco Rose A); and line trimming of herbaceous non-native vegetation along Trabuco Oaks Drive.
April 22–25, 2019	Non-native invasive species treatment work was conducted at (going in the order they were treated): Areas 36, 37, 33, 31, C, 28, 47, 42, E, B, and 2 (see Figure 1a).
May 6, 2019	Non-native invasive species treatment work was conducted in the remaining portion of Area 32 (see Figure 1a).
May 9, 2019	Vegetation thinning and removal within fuel modification zone adjacent to 1 Windy Ridge Road (see Figure 1a, Trabuco Rose B).
June 5–6, 2019	Regraded/recontoured fire roads for safe ingress/egress, following rainy season (focusing on Rose Canyon side of property and northern section of property).
June 17, 2019	Line-trimmed fire roads where vegetation had grown back on Rose Canyon side of property.
June 19 & 27, 2019	Non-native invasive species treatment work (artichoke thistle [*Cynara cardunculus*] and tamarisk [*Tamarix* spp.]) in newly discovered areas that needed weed treatments, within the eastern portion of Rose Canyon.
July 15–16 & 29, 2019	Removed fallen branches and other biomass from within fuel modification zone adjacent to 20022 Trabuco Oaks Drive (see Figure 1a, Trabuco Rose A).
July 29, 2019	Removed vegetation on a section of fire road on Rose Canyon side of property, where vegetation had grown back.
August 9, 2019	Cut up and removed a fallen oak tree along Trabuco Oaks Drive and also removed fallen branches from within fuel modification zone adjacent to 20022 Trabuco Oaks Drive (see Figure 1a, Trabuco Rose A).
August 13, 2019	Removed additional vegetation from within fuel modification zone adjacent to 20022 Trabuco Oaks Drive (see Figure 1a, Trabuco Rose A) and limbed-up oak trees located along Hickey Spur for safe passage of emergency vehicles.

*RECON field crews performed maintenance work, with direction and oversight conducted by a RECON Restoration Biologist. Prior to maintenance tasks (performed during bird breeding season), a biologist would check work areas for nesting birds, and proceed accordingly based on findings of surveys. All work was done consistent with the OCTA Resource Management Plans (RMPs).

Image source: Nearmap (flown September 2019)



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Trabuco Rose
Fire Road / Access Road

Invasive Species Control Areas (Treated in 2019)
Artichoke Thistle and Tamarisk (Discovered and Treated in 2019)
Artichoke Thistle
Pampas Grass

Fuel Modification Zones
Trabuco Rose A
Trabuco Rose B

Note: Polygons with numbers were mapped by Glen Lukos Associates; polygons with letters were mapped by RECON

RECON

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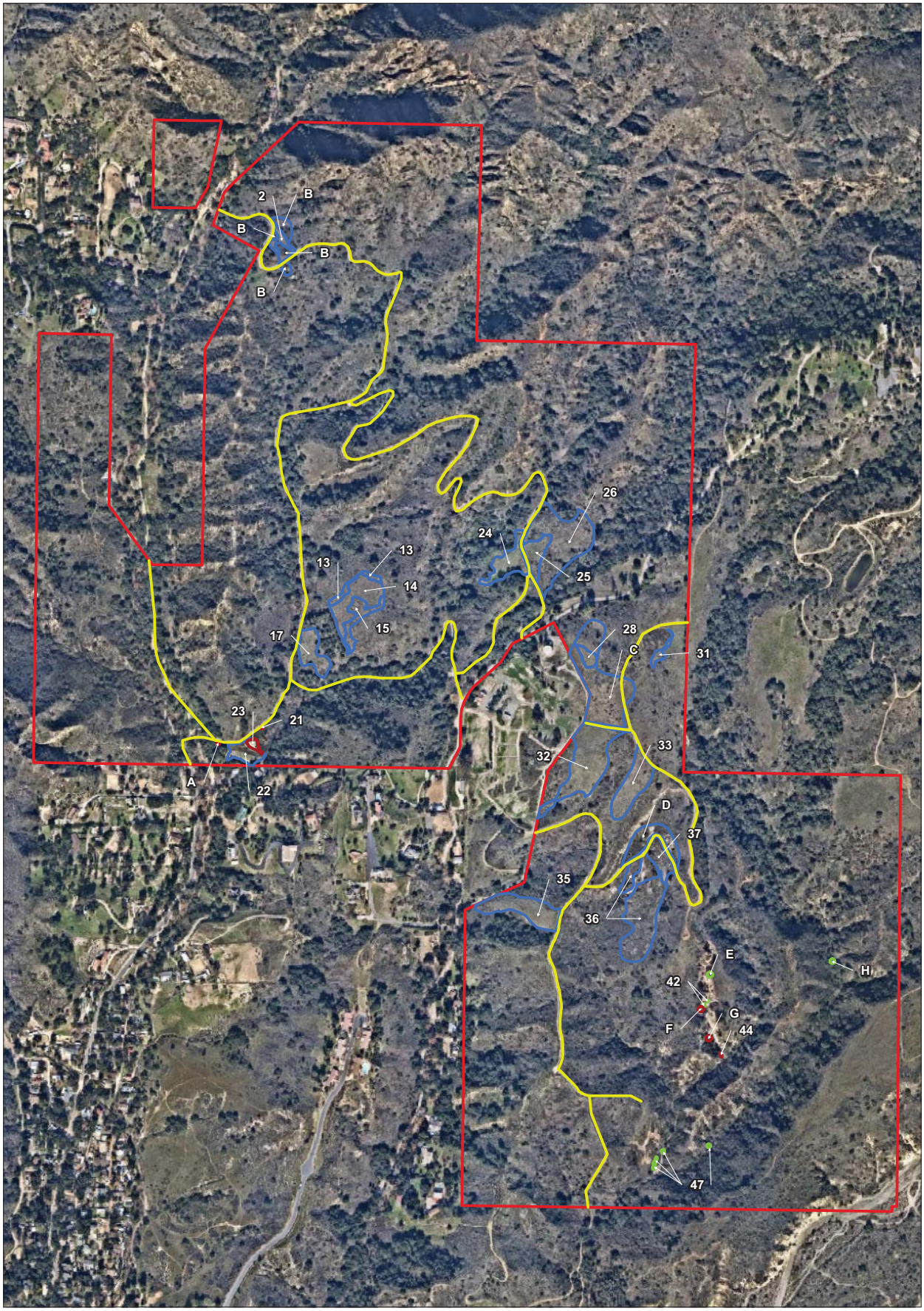
FIGURE 1a
Trabuco Rose Preserve

Image source: Nearmap (flown September 2019)



Trabuco Rose
Fire Road / Access Road

Invasive Species Control Areas (Treated in 2018)
Artichoke Thistle
Tamarisk
Pampas Grass

0 Feet 500

Note: Polygons with numbers were mapped by Glen Lukos Associates; polygons with letters were mapped by RECON

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FIGURE 1b

Trabuco Rose Preserve, Invasive Treatment Areas in 2018

Invasive species control work began on February 19, 2019, and was completed on May 6, 2019. Due to regular rain events and unsafe road conditions following the rainstorms, there was a delay in the work being completed. Following each rain event, the roads were assessed to determine if road conditions were safe enough for the field crew to use for accessing the treatment areas. Although the treatment period was over a two-month period, the species were treated adequately and at an appropriate time of the year based on their stage of growth.

RECON field crews, under the direction of a RECON biologist and in close coordination with OCTA, retreated pampas grass (*Cortaderia selloana*), and artichoke thistle. There was also an area within the eastern portion of the Preserve where artichoke thistle and tamarisk were discovered and subsequently treated in 2019 (see Figure 1a for location). This area was not treated in 2018. Of the original tamarisk plants that were mapped, there was no retreatment of tamarisk necessary during 2019 because the tamarisk treated in fall 2018 was either completely submerged in water or had been washed downstream by debris flows. The canyon located in the southeastern section of Trabuco Rose, that had mapped pampas grass and tamarisk had become so eroded following the 2018/2019 winter rains, that hiking to the upstream end of the canyon is no longer safe due to the large amounts of rock, boulders, soil, and vegetation that have sloughed into the channel (Photograph 15). Areas that were not retreated in 2019 were either due to standing water, were inaccessible, or were already dead and did not require retreatments in 2019. Areas not retreated in 2019 included: A, 23, 21, 44, G, F, and H (see Figure 1b for all treated locations from 2018).

Following the end of the rainy season, erosion along the fire roads was repaired using a piece of heavy equipment for the purpose of allowing safe ingress and egress of the Preserve; ruts and rills were filled using on-site soil (Photograph 16).

Wren's View Preserve

Maintenance tasks performed at the Wren's View Preserve included removal of three sycamore trees infested with the invasive shot hole borer (ISHB), and vegetation removal on the fire roads/access roads of the Preserve (Figure 2). For the sycamore trees that were infested with ISHB, one of the trees was already dead, therefore the tree was cut down to the stump and biomass was left on-site. The other two sycamore trees were in very poor condition and were infested but still alive. These trees were cut down to the stump and all biomass was chipped to less than 1 inch (Photograph 17).

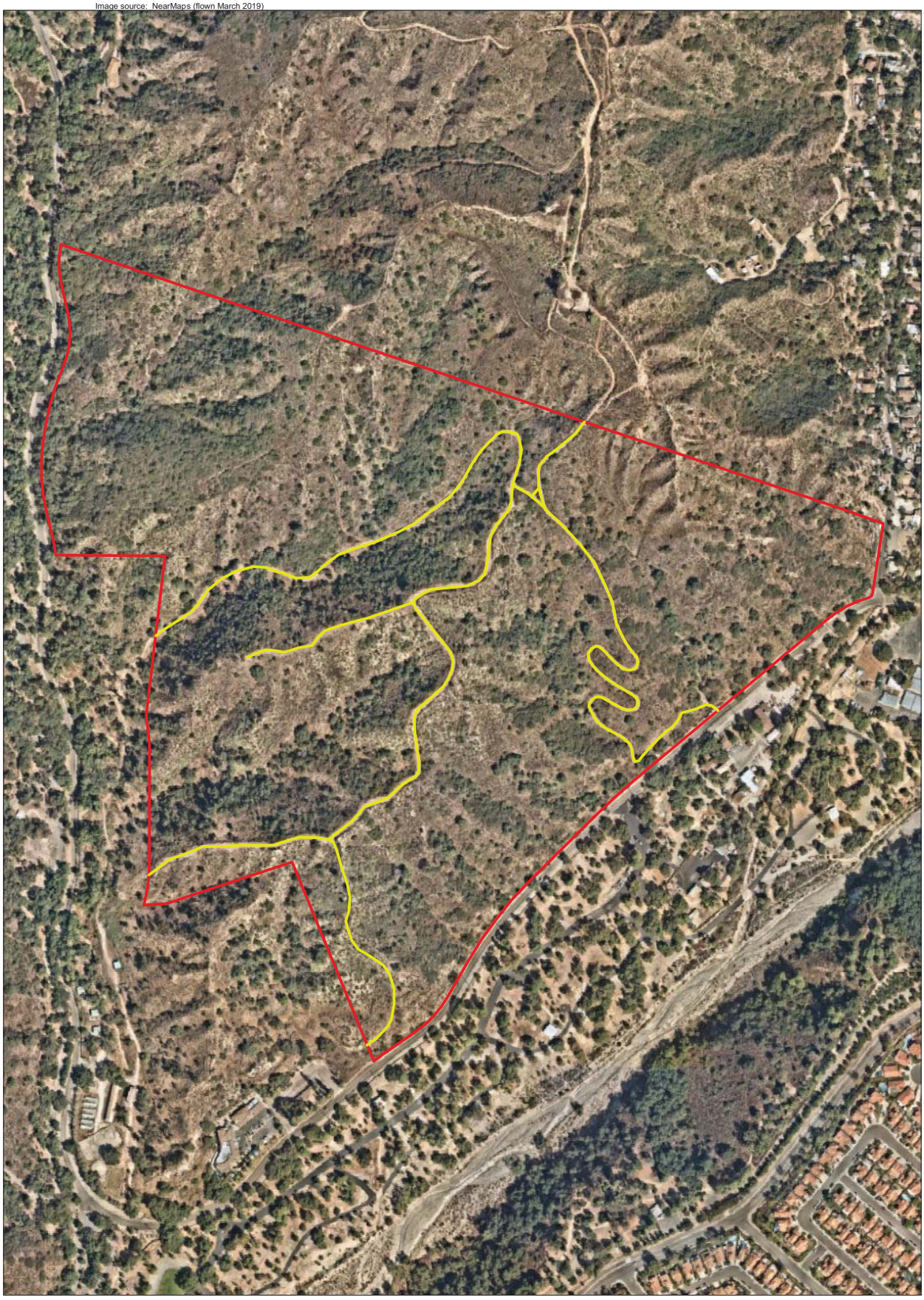
For vegetation removal along the fire roads/access roads, there were several mapped locations of intermediate mariposa lily located within or adjacent to the roads. Therefore, special care was taken in these areas to detect the plant and avoid any disturbances while vegetation removal occurred. Vegetation was removed along Trabuco Canyon Road and the entrance to Wren's View, as well as on all fire roads (Photographs 18 and 19). A summary of the work completed at Wren's View has been included in Table 2.

Table 2
Summary of Work Completed at Wren's View during 2019*

Date	Task
April 26, 2019	Three sycamore trees were removed along Trabuco Canyon Road due to ISHB infestation.
June 12–13, 2019	Vegetation removal, with line-trimmers, on fire roads/access roads, taking special care to avoid areas where sensitive species had been found (i.e., intermediate mariposa lily.

*RECON field crews performed maintenance work, with direction and oversight conducted by a RECON Restoration Biologist. Prior to maintenance tasks (performed during bird breeding season), a biologist would check work areas for nesting birds, and proceed accordingly based on findings of surveys. All work was done consistent with the OCTA RMPs.

Image source: NearMaps (flown March 2019)



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Wren's View Preserve Boundary
Fire Road / Access Road

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FIGURE 2
Wren's View Preserve

Live Oak Creek Preserve

Maintenance tasks performed at the Live Oak Creek Preserve included vegetation thinning and removal within two fuel modification zones, vegetation removal on the fire roads/access roads, and regrading of the fire roads. Vegetation was either thinned or removed around two properties which included: 19071 Live Oak Canyon Road (Figure 3, Live Oak Creek A; Photographs 20 and 21) and 19041 Lambrose Canyon Road (see Figure 3, Live Oak Creek B). Vegetation was also removed from all fire roads/access roads within the Preserve. Additionally, in early June 2019, the roads were regraded/recontoured with a piece of heavy equipment to fill in ruts and rills and provide safe ingress/egress for the Preserve (Photograph 22). A summary of the work completed at Live Oak Creek has been included in Table 3.

Table 3
Summary of Work Completed at Live Oak Creek during 2019*

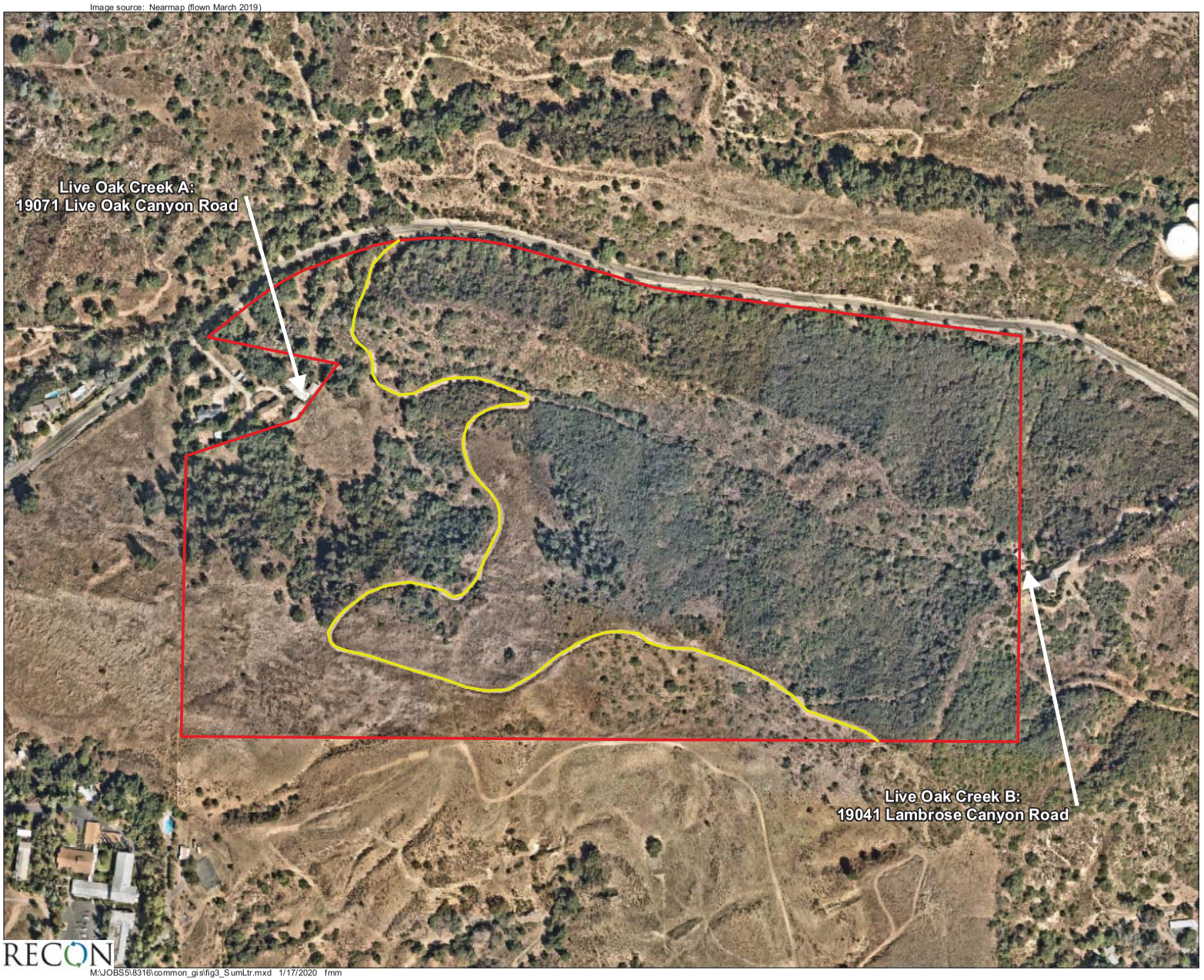
Date	Task
May 7–8, 2019	Vegetation thinning and removal within fuel modification zones adjacent to 19071 Live Oak Canyon Road (see Figure 3, Live Oak Creek A) and 19041 Lambrose Canyon Road (see Figure 3, Live Oak Creek B).
May 10, 2019	Vegetation removal on fire roads/access roads.
June 4, 2019	Regraded/recontoured fire roads for safe ingress/egress, following the rainy season.
June 21, 2019	Additional vegetation removal on fire roads on the mesa top of the Preserve.
*RECON field crews performed maintenance work, with direction and oversight conducted by a RECON Restoration Biologist. Prior to maintenance tasks (performed during bird breeding season), a biologist would check work areas for nesting birds, and proceed accordingly based on findings of surveys. All work was done consistent with the OCTA RMPs.	

Bobcat Ridge Preserve

For the Bobcat Ridge Preserve (Figure 4), maintenance tasks performed included the installation of three Preserve signs, the installation of two posts for wildlife cameras, the cutting back of vegetation along the ridge trail, and the removal of fallen oak limbs/trees. For the two oak trees that fell along Live Oak Canyon Road, the biomass was pulled off the road, cut up, and stockpiled in upland areas on the Preserve's property (Photograph 23). While removing the oak tree debris, a section of posts with barbed wire fencing (installed by previous owners) was discovered and also removed, and disposed of at an off-site facility. Additionally three new Preserve signs were installed along the southern perimeter of the property, along with two posts for wildlife cameras. Vegetation was also trimmed back in select areas of the primary ridge/access road to allow for safe passage for the monitors and field crew. A summary of the work completed at Bobcat Ridge has been included in Table 4.

Table 4
Summary of Work Completed at Bobcat Ridge during 2019*

Date	Task
July 1, 2019	Installed three new Preserve signs (one was replacing a faded sign and two were installed with new signs, posts, and concrete footing). Also installed two posts for wildlife cameras and trimmed back vegetation on native shrubs along the ridge trail for safer passage for monitors and field crew.
August 1, 2019	Cut up and removed a fallen oak tree found along the perimeter of Preserve on Live Oak Canyon Road.
August 12, 2019	Cut up and removed a fallen oak tree found along the perimeter of Preserve on Live Oak Canyon Road and removed a section of older posts and barbed wire fencing.
*RECON field crews performed maintenance work, with direction and oversight conducted by a RECON Restoration Biologist. Prior to maintenance tasks (performed during bird breeding season), a biologist would check work areas for nesting birds, and proceed accordingly based on findings of surveys. All work was done consistent with the OCTA RMPs.	



Live Oak Creek Preserve Boundary
Fire Road / Access Road

Fuel Modification Zones
Live Oak Creek A
Live Oak Creek B

0 Feet 300

FIGURE 3
Live Oak Creek Preserve

FIGURE 4
Bobcat Ridge Preserve

Silverado Chaparral Preserve

Maintenance tasks performed at the Silverado Chaparral Preserve included the installation of Preserve signs and wildlife-friendly fencing in select locations (Photographs 24 and 25). The installation of fencing included barbless wire 3-strand fencing, with the lowest strand of fencing at least 18 inches from the ground to allow for the safe passage of wildlife (i.e., deer). Fencing was installed in three separate locations at access points along the perimeter of the Preserve's property (Figure 5), for a total of approximately 140 linear feet of new fencing. Additionally, six Preserve signs were installed at four separate locations (see Figure 5). A summary of the work completed at the Silverado Chaparral Preserve has been included in Table 5.

Table 5
Summary of Work Completed at Silverado Chaparral during 2019*

Date	Task
June 10–11, 2019	Fencing was installed along the perimeter of the Preserve, in three separate locations, for a total of approximately 140 linear feet of fence line. Six Preserve signs were installed at four separate locations, and along the perimeter of the Preserve.
*RECON field crews performed maintenance work, with direction and oversight conducted by a RECON Restoration Biologist. Prior to maintenance tasks (performed during bird breeding season), a biologist would check work areas for nesting birds, and proceed accordingly based on findings of surveys. All work was done consistent with the OCTA RMPs.	

Pacific Horizon Preserve

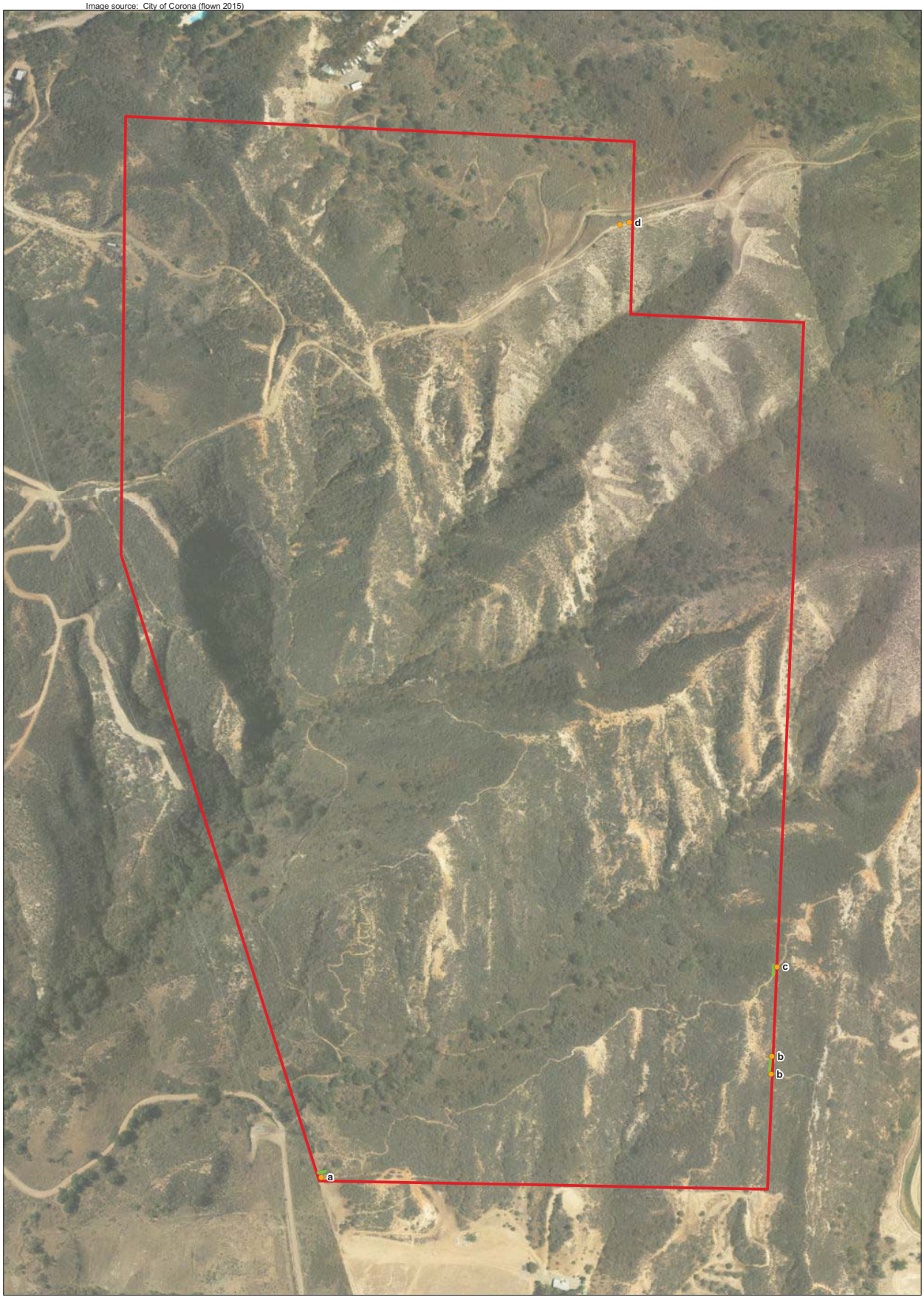
The maintenance tasks performed at the Pacific Horizon Preserve during 2019 included the removal of illegal bike jumps, treatment of artichoke thistle plants (Figure 6), and the installation of wooden stakes.

Work associated with the removal of the bike jumps consisted of using non-mechanized hand tools to remove all soil piles. The disturbed areas were recontoured to match the surrounding areas; all soil was balanced on-site. In previously disturbed areas, prickly pear cactus pads (*Opuntia* spp.) were collected from surrounding areas and installed within the unauthorized bike trails to prevent future off-road use. Only a small percentage of cuttings were salvaged from numerous plants in the vicinity, so as to not negatively impact any prickly pear cactus patches. During the April 2019 site visit, it was observed that these plantings are doing well and no additional disturbances have been made in areas where trails were closed (Photograph 26).

The field crew also treated artichoke thistle plants with a glyphosate-based herbicide within an area approximately 2.34 acres in size. The herbicide was applied to the foliage of the plants, taking care not to overspray onto neighboring native vegetation. As this is an invasive plant that has been growing on-site for many seasons, it will take several treatments to successfully eradicate the species from the Preserve. Figure 6 shows the two locations where the bike jumps were removed and where the artichoke thistle was treated with herbicide. Additionally, wooden stakes were installed along the western perimeter of the Preserve to mark the property boundary. A summary of the work completed at Pacific Horizon has been included in Table 6.

Table 6
Summary of Work Completed at Pacific Horizon during 2019*

Date	Task
April 29–30, 2019	Removed illegal bike jumps from along the access trail and artichoke thistle plants were treated with herbicide.
July 15, 2019	Installed wooden stakes along the western perimeter of Preserve property.
*RECON field crews performed maintenance work, with direction and oversight conducted by a RECON Restoration Biologist. Prior to maintenance tasks (performed during bird breeding season), a biologist would check work areas for nesting birds, and proceed accordingly based on findings of surveys. All work was done consistent with the OCTA RMPs.	



Silverado Chaparral Preserve Boundary
Fence (Installed June 2019)
Preserve Sign (Installed June 2019)

a One preserve sign and 30 linear feet of fence
b Two preserve signs and 70 linear feet of fence
c One preserve sign and 40 linear feet of fence
d Two preserve signs

RECON

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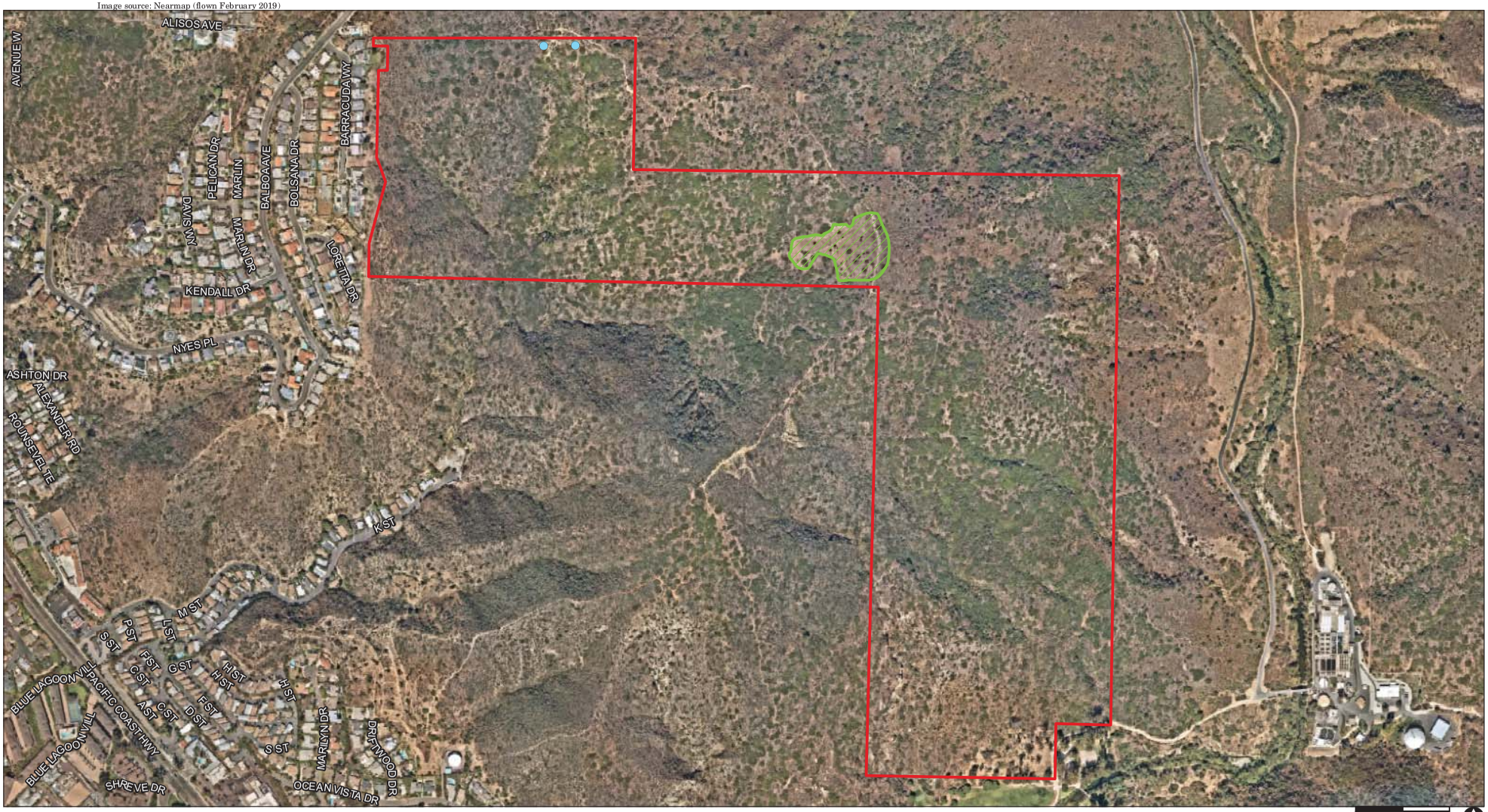
FIGURE 5
Silverado Chaparral Preserve

Image source: Nearmap (flown February 2019)



Pacific Horizon Preserve Boundary

Artichoke Thistle Control (April 2019)

Bike Jumps (removed April 2019)

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FIGURE 6

Pacific Horizon Preserve

Eagle Ridge Preserve

For the Eagle Ridge Preserve (Figure 7), maintenance tasks included vegetation removal along the primary fire road that traverses through the property (Photograph 27). It is unknown when the last time this road was maintained, making it inefficient for line trimmers or hand tools to remove the vegetation. Therefore, a skid steer with a mower attachment was used to cut down vegetation on about half of the road. For fire prevention, a water truck was also stationed on-site during all days the skid steer was on-site. A summary of the work completed at Eagle Ridge has been included in Table 7.

Table 7
Summary of Work Completed at Eagle Ridge during 2019*

Date	Task
July 22, 2019	Began vegetation removal, with line trimmers, along the ridge road of the Preserve.
August 7–8, 2019	Continued to remove vegetation with line trimmers and other hand tools on the ridge road of the Preserve.
September 3–6, 2019	Removed the remaining vegetation on the ridge road of Preserve with skid steer and mowing attachment; line trimmers were used for clean-up work along edges of the ridge road.

*RECON field crews performed maintenance work, with direction and oversight conducted by a RECON Restoration Biologist. Prior to maintenance tasks (performed during bird breeding season), a biologist would check work areas for nesting birds, and proceed accordingly based on findings of surveys. All work was done consistent with the OCTA RMPs.

If you have any questions regarding this letter, please contact me by email (ratik@reconenvironmental.com) or by phone (619-308-9333 ext. 178).

Sincerely,

Raquel Atik
Associate Restoration Biologist

Reference Cited

Glen Lukos Associates (GLA)
2017 Invasive Species Management Plan for OCTA M2 Preserves – Trabuco Rose Preserve. November.

Image source: Nearmap (flown March 2019)

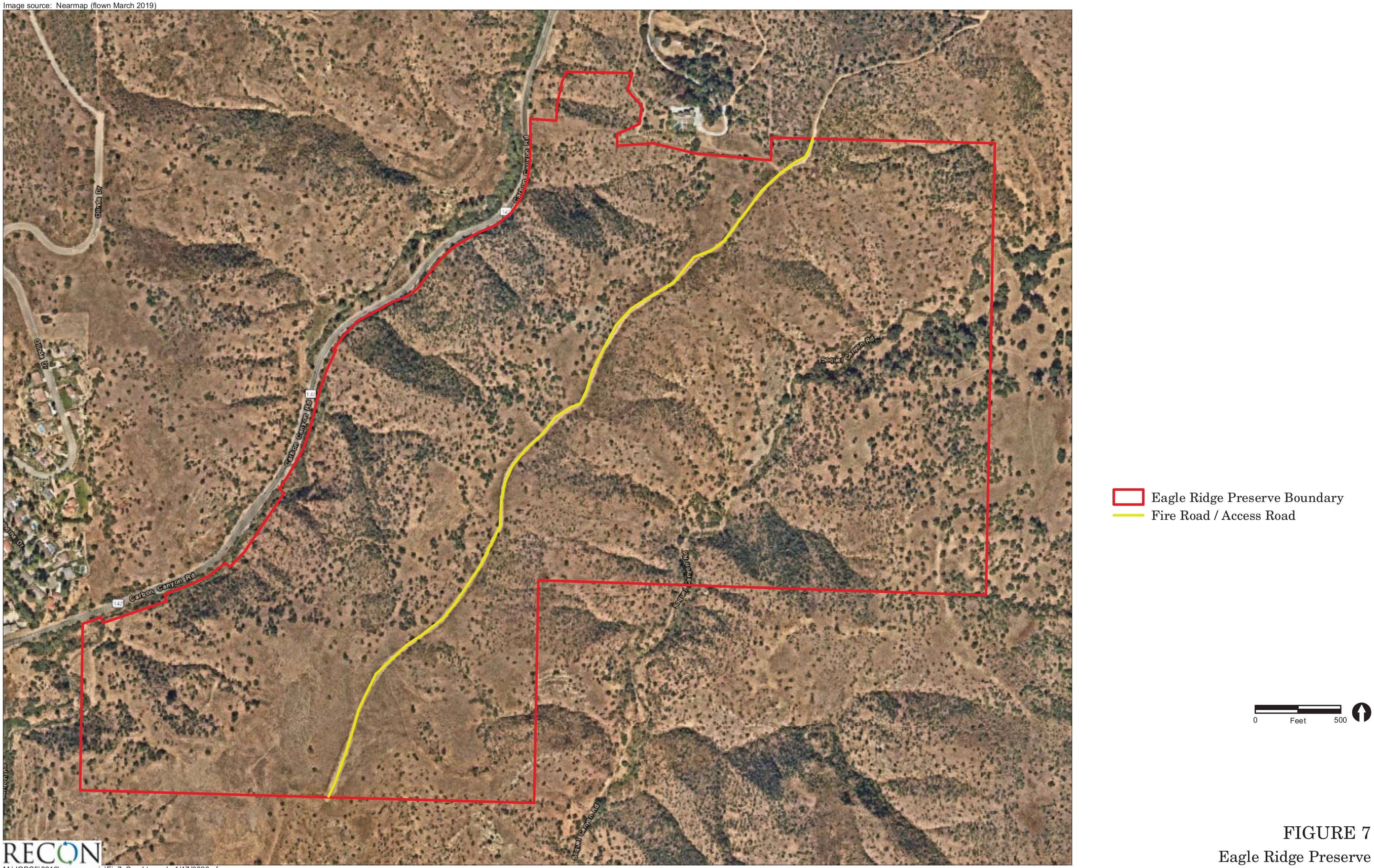

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FIGURE 7
Eagle Ridge Preserve

ATTACHMENT 1

Photographs

PHOTOGRAPH 1
Biomass Removal from Rose Canyon Creek at Trabuco Rose Preserve,
January 2019

PHOTOGRAPH 2
Vegetation Removal within Trabuco Rose A Fuel Modification Zone,
April 2019

PHOTOGRAPH 3
Vegetation Removal within Trabuco Rose B Fuel Modification Zone,
April 2019

PHOTOGRAPH 4
Trabuco Rose, Area 17, Before Herbicide Application, February 2019

PHOTOGRAPH 5
Trabuco Rose, Area 17, During Herbicide Application, February 2019

PHOTOGRAPH 6
Trabuco Rose, Area 24, During Herbicide Application, February 2019

PHOTOGRAPH 7
Trabuco Rose, Area 25, During Herbicide Application, March 2019

PHOTOGRAPH 8
Trabuco Rose, Area 25, Following Herbicide Application, March 2019

PHOTOGRAPH 9
Trabuco Rose, Area 32, During Herbicide Application, March 2019

PHOTOGRAPH 10
Trabuco Rose, Area 35, Following Herbicide Application, March 2019

PHOTOGRAPH 11
Trabuco Rose, Area 37, Following Herbicide Application, March 2019

PHOTOGRAPH 12
Trabuco Rose, Area D, Following Herbicide Application, March 2019

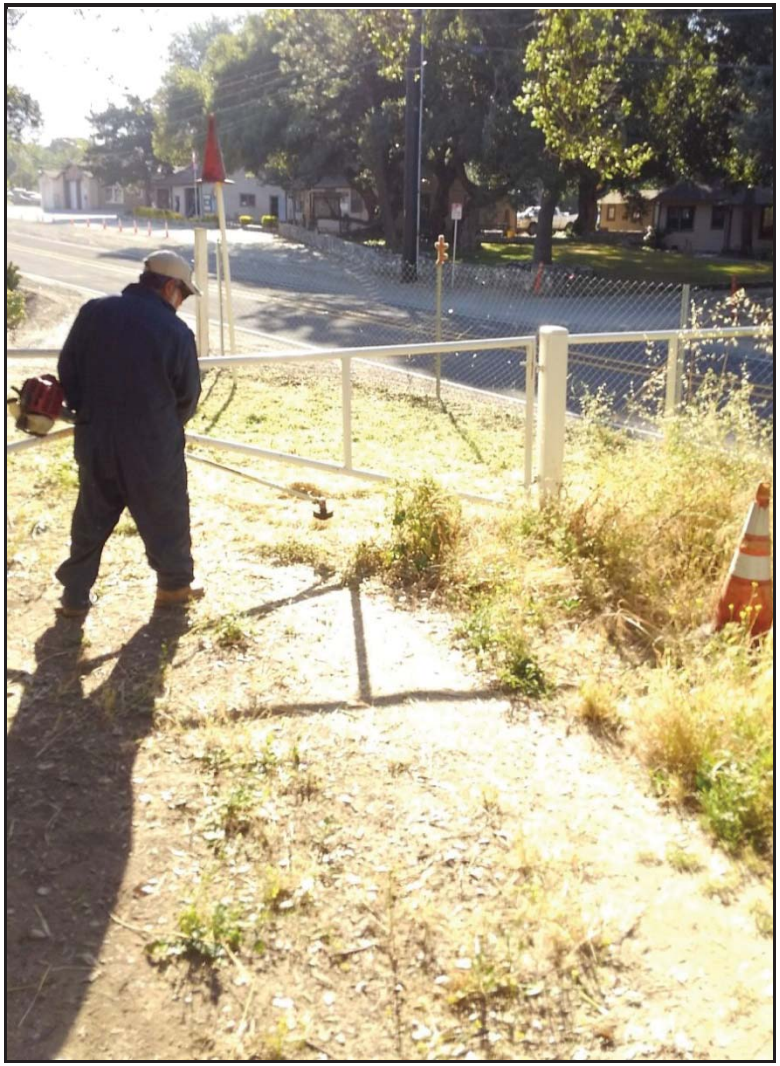
PHOTOGRAPH 13
Trabuco Rose, Area B, Following Herbicide Application, April 2019

PHOTOGRAPH 14
Trabuco Rose, Area 47, During Herbicide Application, April 2019

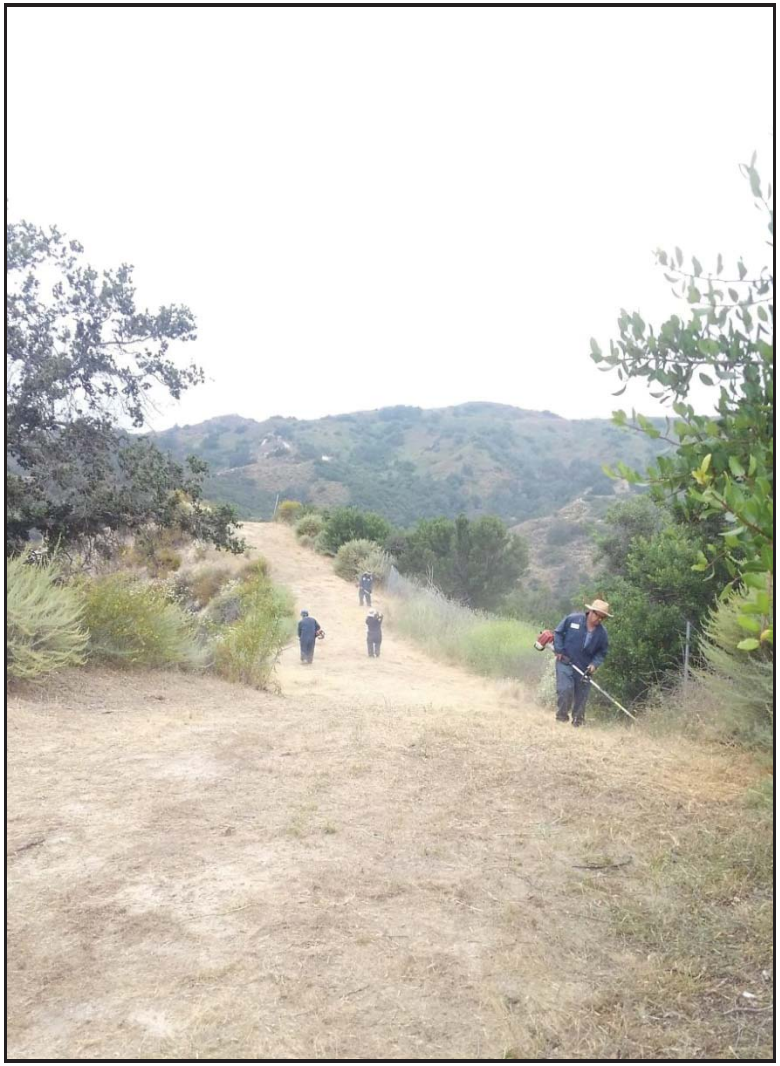
PHOTOGRAPH 15
Trabuco Rose, Erosion within Canyon, Looking Upstream, Following Winter Storms, April 2019

PHOTOGRAPH 16
Regrading of Fire Roads at Trabuco Rose Preserve to Repair Erosion, June 2019

PHOTOGRAPH 17
Sycamore Tree Removal along Trabuco Canyon Road Due to Invasive Shot Hole Borer Infestation, April 2019



PHOTOGRAPH 18
Vegetation Removal along Trabuco Canyon Road
and Entrance to Wren's View Preserve, June 2019



PHOTOGRAPH 19
Vegetation Removal on Fire Roads at
Wren's View Preserve, June 2019

PHOTOGRAPH 20
Vegetation Removal within Live Oak Creek A Fuel Modification Zone, May 2019

PHOTOGRAPH 21
Live Oak Creek A Fuel Modification Zone, Following Vegetation Removal at Live Oak Creek, June 2019

PHOTOGRAPH 22
Regrading of Fire Road at Live Oak Creek Preserve to Repair Erosion, June 2019

PHOTOGRAPH 23
Removal of Fallen Oak Tree and Barbed Wire Fencing on Live Oak Canyon Road at Bobcat Ridge Preserve, August 2019

PHOTOGRAPH 24
Installation of Signage and Fence at Silverado Chaparral Preserve (northeastern perimeter location), June 2019

PHOTOGRAPH 25
Installation of Signage and Fence at Silverado Chaparral Preserve (southeastern perimeter location), June 2019

PHOTOGRAPH 26
Pacific Horizon Preserve, Cactus Plantings on Closed Trail, April 2019

PHOTOGRAPH 27
Vegetation Removal on Ridge Road/
Fire Road at Eagle Ridge Preserve

Appendix E
Audubon California, Starr Ranch Sanctuary/Vegetation Monitoring on Three Orange County Transportation Authority Preserves: Bobcat Ridge, Wren's View, and Live Oak Creek July 2019

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Vegetation Monitoring on Three Orange County Transportation Authority Preserves:

Bobcat Ridge, Wren's View, and Live Oak Creek

Operating Agreement 3-5-3711

July 2019

Prepared by:

Dr. Sandra DeSimone, Director of Research and Education

Matthew Skarie, Field Supervisor

Maggie Shirley, Field Assistant

Audubon CALIFORNIA
STARR RANCH SANCTUARY

Summary

Monitoring is an essential component of ecosystem management. During April 2016, Audubon Starr Ranch completed baseline quantitative monitoring on three preserves owned and managed by the Orange County Transportation Authority (OCTA): Bobcat Ridge (formerly Hafen), Wren's View (formerly O'Neill Oaks), and Live Oak Creek (formerly Saddlecreek South) all renamed in 2018. As per our agreement with OCTA, in April 2017, 2018 and this year in April 2019 Starr Ranch completed three seasons of qualitative monitoring on the preserves. A crew of two recorded cover classes of plant species in areas around transects permanently marked in 2016 for shrublands and grasslands and took a meandering route through oak woodlands and recorded cover classes for both canopies and understories. Vegetation reflected patterns observed elsewhere in Southern California that we hypothesize are associated with the relatively high rainfall winter (24.4 inches recorded at Starr Ranch) and some extreme periods of intense rainfall or low temperatures. Chaparral at all three preserves remained stable relative to 2016 -2018. As in the previous seasons, in our 2019 observations, chaparral understory at Wren's View preserve was unique among the three sites with relatively high cover of the annual grass species *Bromus diandrus* but concentrated in one area adjacent to a cattle disturbed oak woodland.

Coastal sage scrub at Bobcat Ridge and Wren's View preserves was not stable relative to 2018 and had especially high cover of the non-native annual grass *Bromus madritensis* and the nonnative forb *Hirschfeldia incana.* Otherwise the sage scrub appears in good condition. The succulent *Opuntia littoralis* was also present at Wrens View and in good condition. At Live Oak Creek the crew again observed distinct differences in non-native annual grass cover between the two subtypes of CSS on the preserve. The non-native annual grass *Bromus diandrus* was observed in higher cover classes in 2019 in the white sage subtype polygon, which is adjacent to a road, and not in the singular California sagebrush subtype polygon. As in previous years, *Opuntia littoralis*, a common native cactus that provides habitat for species such as the San Diego Cactus Wren, was most commonly observed in extensive patches in the California Sagebrush polygon in the north of the preserve.

Live Oak Creek grasslands experienced eruptions of mustard species (*Brassica nigra* and *Hirschfeldia incana*) in the higher rainfall seasons, 2017 and 2019, and high non-native annual grass biomass similar to other preserves in Orange County and elsewhere in Southern California. With *B. nigra* averaging about six feet in height in 2019 and obscuring observations it was difficult to determine, in the one of three grassland polygons with the native bunchgrass, if *Stipa pulchra* cover was stable.

In 2019 we observed a decline in woodlands on Bobcat Ridge (i.e. thinning canopies) and Wren's View but not on Live Oak Creek preserve. For the first time since 2016 the crew observed signs of tree disease (i.e. *Fusarium* dieback staining) and crown, limb and tree dieback on Wren's View property. Woodland understories were stable with non-native annual grasses and forbs dominating under the relatively open tree canopy of the (formerly) cattle-disturbed Wren's View woodland. We again reported many olive trees in one larger Live Oak Creek woodland. The polygon designated "coast live oak woodland" at

the northwest edge of the Live Oak Creek preserve includes an old home site with many ornamentals, including oleander, succulents, fruit trees, and pines as well as non-natives such as *Foeniculum vulgare* (fennel).

Extreme weather events continued in 2018-19. Though OCTA properties (and Starr Ranch) were spared the intense and widespread fires of fall 2018, the new year brought unexpected and unusual weather events. The 2018-19 season was a relatively wet period after five seasons of drought. El Niño conditions brought almost 25 inches (635 mm) precipitation to South Orange County (data from Starr Ranch weather station), well above the 15 inch (381 mm) average annual rainfall the region experiences, with periods of intense rainfall (e.g. 5 inches, 127 mm precipitation in one day, February 14). Additionally, February 2019 was the coldest that month has been in Los Angeles in 60 years (LA Times 2/29/19) and at Starr Ranch temperatures of 32-37 degrees were recorded over almost a three week period. Oak and sycamore canopies at Audubon Starr Ranch that had begun to thin markedly after the hot and dry conditions of the previous seasons, appeared to recover (S. DeSimone personal observation). A similar pattern was observed on the OCTA properties with the exception of the sycamores on the Bobcat Ridge property where the coast live oak canopies appeared healthy but sycamore canopies were thin. The changing climate will likely bring shifts in vegetation over the coming years. Southern California will likely become hotter and drier with periods of intense rainfall during the rainiest months of December through February. We reiterate our suggestion from past seasons for regular visits to CSS and grassland during spring months to check for and, where possible, control invading grasses in CSS but especially dicot non-natives in both habitats, as well as concentrated non-native removal in the chaparral adjacent to the formerly cattle disturbed woodland at Wren's View.

Monitoring for the invasive borer beetles plaguing areas of Southern California woodlands is critical as is following any new recommendations from researchers on control. We further suggest removing olive trees in Live Oak Creek as well as removal of ornamental and other potentially invasive species (e.g. fennel) from the area mapped as oak woodland in the northwest corner of the Live Oak Creek preserve. The abandoned buildings in this area continue to have the potential to become a hazard. Planting of oaks may help to close the canopy and perhaps reduce the non-native cover in the understory of the formerly cattle-disturbed Wren's View woodland.

Table of Contents

Introduction

Monitoring is the cornerstone of ecosystem management (Seastedt et al. 2008). To address the uncertainties associated with climate change requires a flexible management approach that includes management actions coupled with monitoring and evaluation to provide feedback loops so that management can continuously change to address new knowledge (Lawler et al. 2010). Scientists assert that monitoring must complement a broad suite of research and management activities designed to benefit ecological systems (Geupel et al. 2011). With direction and support from the Orange County Transportation Authority (OCTA), Audubon Starr Ranch has undertaken a five year project to quantitatively and qualitatively monitor plant communities to assess stability of vegetation cover on three Measure M2 mitigation preserves owned by OCTA: Bobcat Ridge, Wren's View, and Live Oak Creek (Fig. 1) with special attention to a cattle-disturbed woodland on the Wren's View preserve.

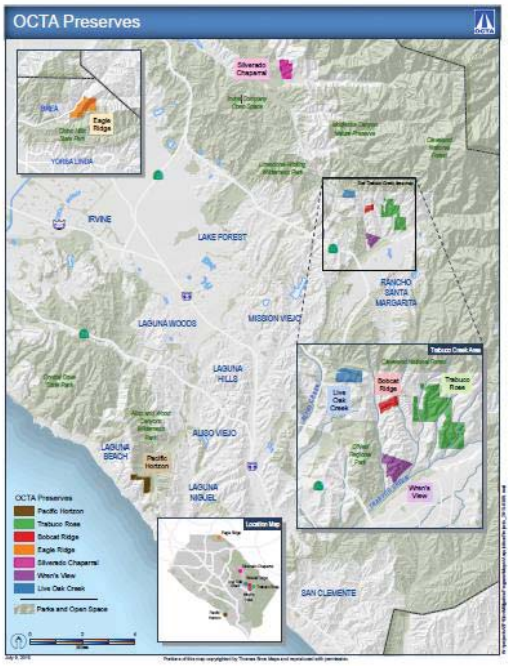


Fig. 1. Locations of three preserves in South Orange County monitored for vegetation cover. Map courtesy of Lesley Hill, Project Manager, Environmental Programs, for the Orange County Transportation Authority.

Methods

Methods for monitoring OCTA preserves were developed as per recommendations from Resource Management Plans (ICF International 2015) and based on the work of Deutschman and Strahm (2009, 2011, 2013, 2013b) who established monitoring methods for the Natural Communities Coalition and The Nature Conservancy's Irvine Ranch Open Space Easement preserves in Orange County. As per our agreement (Interim Operating Agreement No. C-5-3711), monitoring in 2017 was qualitative. Since the Deutschman and Strahm approach was largely quantitative, the Starr Ranch research director developed a qualitative approach.

In April 2019 a team of two from the Starr Ranch field crew observed each major vegetation type per preserve in a standardized way, described below, and recorded cover classes or categories (as per Braun Blanquet cover classes in Mueller-Dombois and Ellenberg 1974). For chaparral, coastal sage scrub, and grassland the team located the zero end of 2016 quantitative transects per major vegetation type polygon (i.e. vegetation type polygons designated in GIS maps, ICF International 2015) then observed vegetation 360˚ within type around the point and recorded species (native or non-native) and cover class (i.e. category) per species (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5 = >70 - >100%). Additionally the crew recorded and ranked the following:

> Disturbance (ranked as 0 – 5 with 0 or 1 least severe) and types of disturbance were human (e.g. fence cut, new trail cut, cattle) or climate (e.g. mudslide)
>
> Habitat condition (ranked as 0 – 5 with healthy ranked 0 or 1) and types of habitat condition were healthy, stressed, or disturbed

In oak woodlands, the team collected similar data as above but indicated overstory or understory and moved in a meandering fashion through all woodland polygons.

For data summary, we calculated average cover class per species per vegetation type per site as well as overstory or understory. We also had assigned cover categories per life forms (i.e. evergreen shrub, drought deciduous shrub, etc.) per vegetation type per site. We included in results only those species with an average cover category ≥ 1. Data are summarized below in "Results."

Photopoints

<u>Chaparral, coastal sage scrub, grassland</u>

Photopoints were taken at the 2016 permanently marked transects and as in 2016 from the zero point and towards the four cardinal compass directions. We placed a small white board in each photo labelled with date/site code/vegetation type or subtype code/ transect no./N, S, E, or W. When shrubs were too tall to make photography feasible, we moved to vantage points above the area. Because of the low visibility among the tall chaparral

shrubs, as in 2016, the team took photos from vantage points that offered an overall view of chaparral health in each site.

Oak woodland

Dudek (2013) for Rancho Mission Viejo Land Trust, found that vantage point reconnaissance was the most effective method to identify potential woodland issues over a large scale and recommended use of this method annually. Vantage point reconnaissance evaluates general woodland health and canopy decline on a wide scale from accessible, elevated vantage points. Data collected include the woodland location, canopy decline observations, canopy photographs, and suspected issues. "This monitoring provides a filter for targeting woodlands that may be experiencing change," said Christopher Kallstrand, a Dudek urban forestry specialist. "From our observations, we are able to better identify stressed woodlands to be further assessed using more detailed plot- centered data collection" (Dudek 2013).

We took photos per woodland from the same vantage points from photos included in the 2016 report, which optimized an overall view of woodland condition. We placed a small white board in each photo labelled with the date, site, woodland number, compass bearing (N, NE, E, SE, S, SW, W, NW) (see examples in Dudek 2013).

As requested by OCTA, we placed one photopoint in a cattle-disturbed woodland in Wren's View.

Results

It is important to consider disturbance history when examining vegetation pattern, especially in the fire prone natural landscape of Southern California where cattle grazing historically occurred. There is no evidence of grazing on the Bobcat Ridge preserve and it will be prohibited in the future. Historically, there was low intensity grazing on the Wren's View preserve, especially in the western part of the preserve, and remnant fencing, most likely to manage cattle, is still present. Though there is no grazing currently on the Live Oak Creek preserve, there was historical grazing prior to OCTA purchase of the land, especially in the southern part of the preserve, and evidence of cattle can still be observed (ICF International 2015).

Extreme weather events continued in 2018-19. Though OCTA properties (and Starr Ranch) were spared the intense and widespread fires of fall 2018, the new year brought unexpected and unusual weather events. The 2018-19 season was a relatively wet period after five seasons of drought. El Niño conditions brought almost 25 inches (635 mm) precipitation to South Orange County (data from Starr Ranch weather station), well above the 15 inch (381 mm) average annual rainfall the region experiences, with periods of intense rainfall (e.g. 5 inches, 127 mm precipitation in one day, February 14). Additionally, February 2019 was the coldest that month has been in Los Angeles in 60 years (LA Times 2/29/19) and at Starr Ranch temperatures of 32-37 degrees

were recorded over almost a three week period. Oak and sycamore canopies at Audubon Starr Ranch that had begun to thin markedly after the hot and dry conditions of the previous seasons, appeared to recover (S. DeSimone personal observation). A similar pattern was observed on the OCTA properties with the exception of the sycamores on the Bobcat Ridge property where the coast live oak canopies appeared healthy but sycamore canopies were thin.

Most of the 250 acres of the three non-contiguous preserves have not burned since 1919 (Fig. 2, Table 1). The large Santiago Fire of 2007 and the Holy Fires of 2016 and 2018 did not burn any of the three preserves; the Nelson Fire of 1970 burned only in the northern portion of the Wren's View preserve.

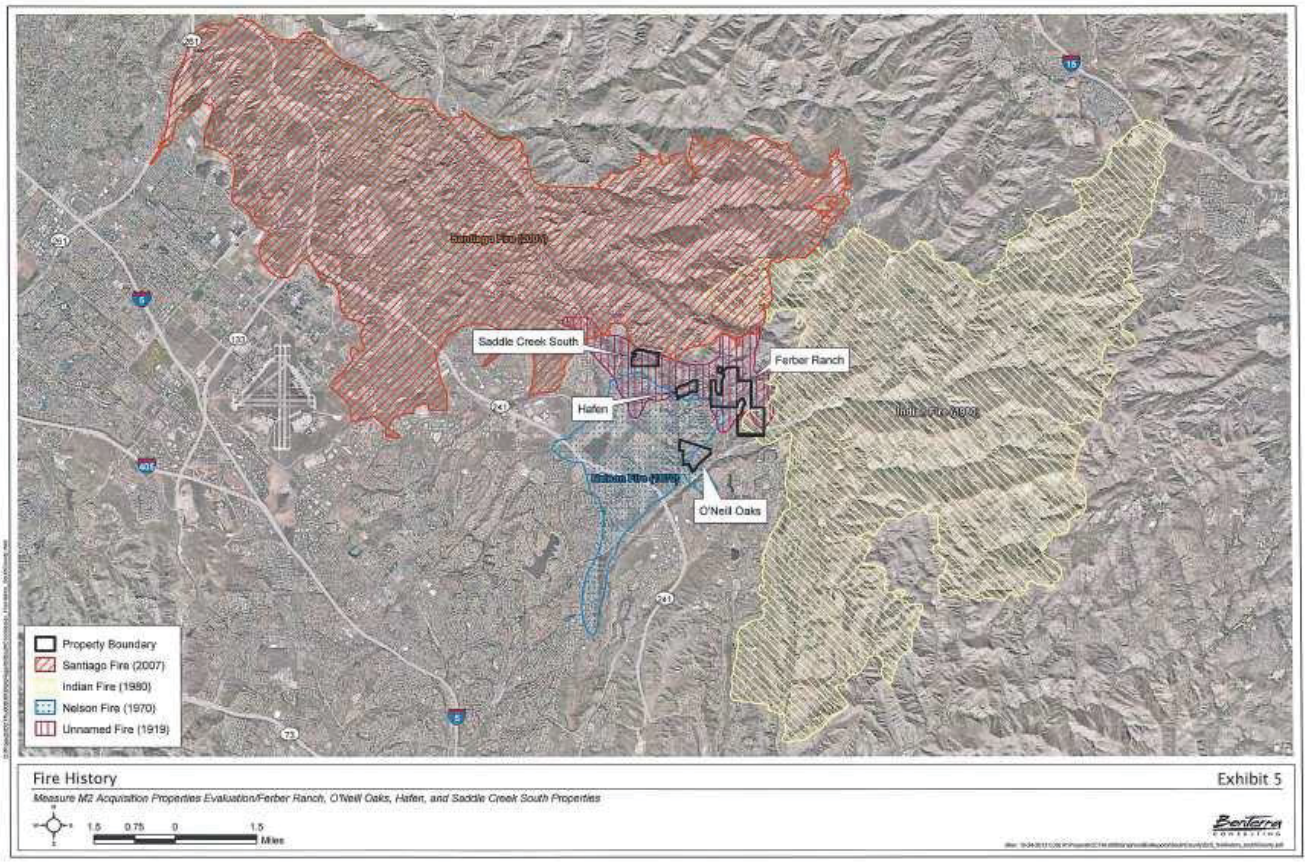


Fig. 2. Fire history of South Orange County including the three OCTA preserves. Map courtesy of Lesley Hill, Project Manager, Environmental Programs, Orange County Transportation Authority. See text for 2018 preserve name changes.

Table 1. Fire history of the three OCTA preserves.

Site	Most recent fire	Extent
Bobcat Ridge	1919	**Entire preserve**
Wren's View	1919, 1970	**Northern half preserve, Nelson Fire of 1970**
Live Oak Creek	1919	**Entire preserve**

Shrublands, grasslands

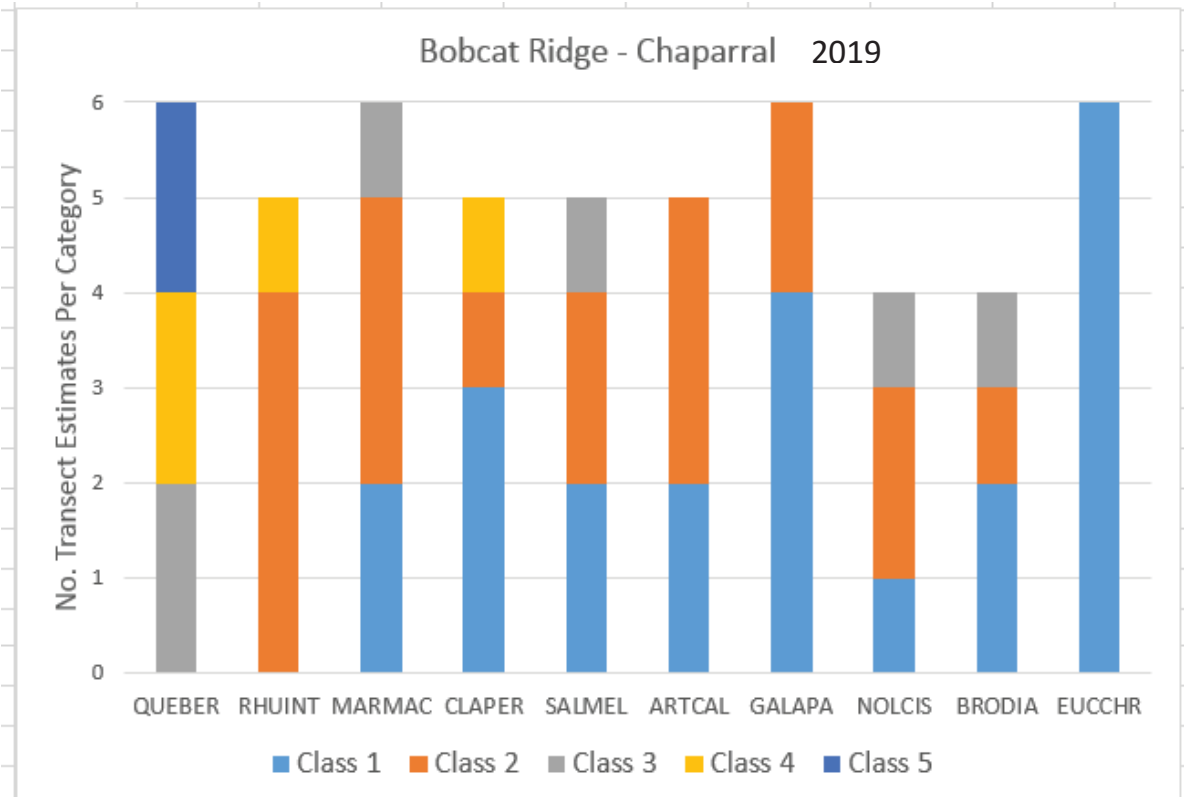
Shrublands of the OCTA properties generally continue to appear to be typical of undisturbed, intact vegetation in South Orange County at long unburned preserves such as Audubon Starr Ranch and areas of Rancho Mission Viejo Reserve. However, biomass of particularly mustards (*Brassica* and *Hirschfeldia s*pecies) was higher at the OCTA preserves than in the drought season of the previous year (2018) and more similar to 2017 when heavy rains of January stimulated high biomass of non-native annual grasses and mustards throughout Orange County and in some areas of the OCTA preserves. All graphs that follow include only six letter codes for plant species; please see the attached Excel file "Plants" for species, six letter codes, and native or non-native status. In April 2017 we added 27 new species to the vascular plant species list (total of 160 vascular plant species).

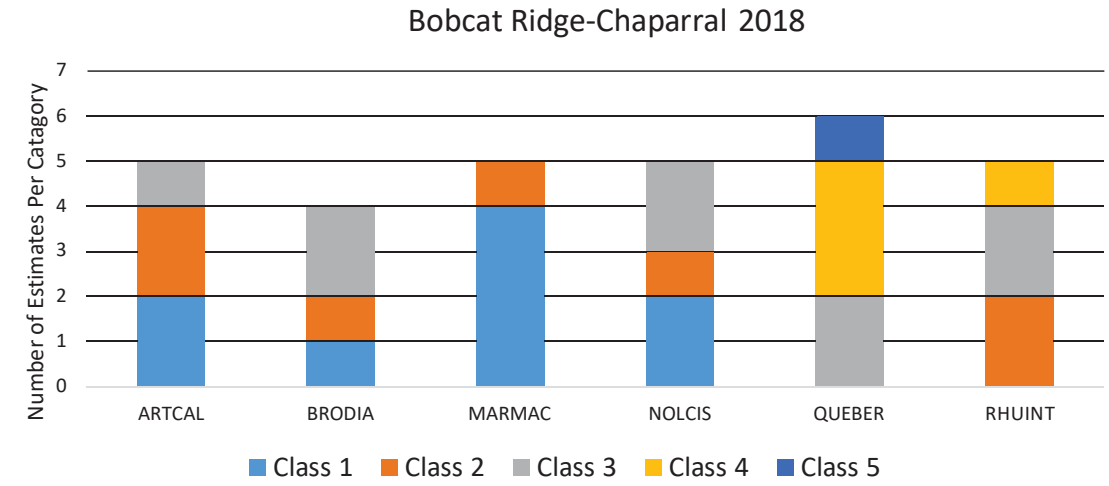
Chaparral

Chaparral on the three preserves is typically tall (> 6 ') with very dense shrubs. There are typically fewer canopy openings in chaparral than in coastal sage scrub and those openings are characterized by a lack of herbaceous vegetation (Swank and Oechel 1991). The chaparral in 2019 at all three preserves remained stable relative to 2016 -2018 sampling. As in the previous season, in our 2018 observations, chaparral understory at Wren's View preserve was unique among the three sites with relatively high cover of the annual grass species *Bromus diandrus* but concentrated in one area adjacent to a cattle

disturbed oak woodland. For 2019, we've included more rigorous observations of two abiotic factors, bare ground and litter,

In the 30.6 acres of scrub oak chaparral on the 47.9 acre Bobcat Ridge preserve, the dominant canopy species continued to be *Quercus berberidifolia* (Figs. 3 - 4). Only one species of non-native grass (*Bromus diandrus*) was observed in lower cover classes (< 40%). The diversity of shrubs and understory herbaceous species was back up to 2017 levels, presumably related to the higher than average rainfall of both seasons (2016-17 precipitation was 17 inches, 432 mm at Starr Ranch). Other native species in 2019 observations and similar to 2016 - 2018 were shrubs typical of pristine chaparral understories: *Rhus integrifolia, Mimulus aurantiacus, Salvia apiana, S. mellifera*, and *Artemisia californica* but not *Eriogonum fasciculatum*. Also present at low cover were the natives *Nolina cismontana , Claytonia perfoliata, Euchrypta chrysanthemifolia,* and *Marah macrocarpus* paralleling observations in the wetter 2017 spring. Bare ground was at low (<10%) cover, typical of Southern CA chaparral (Fig. 5).





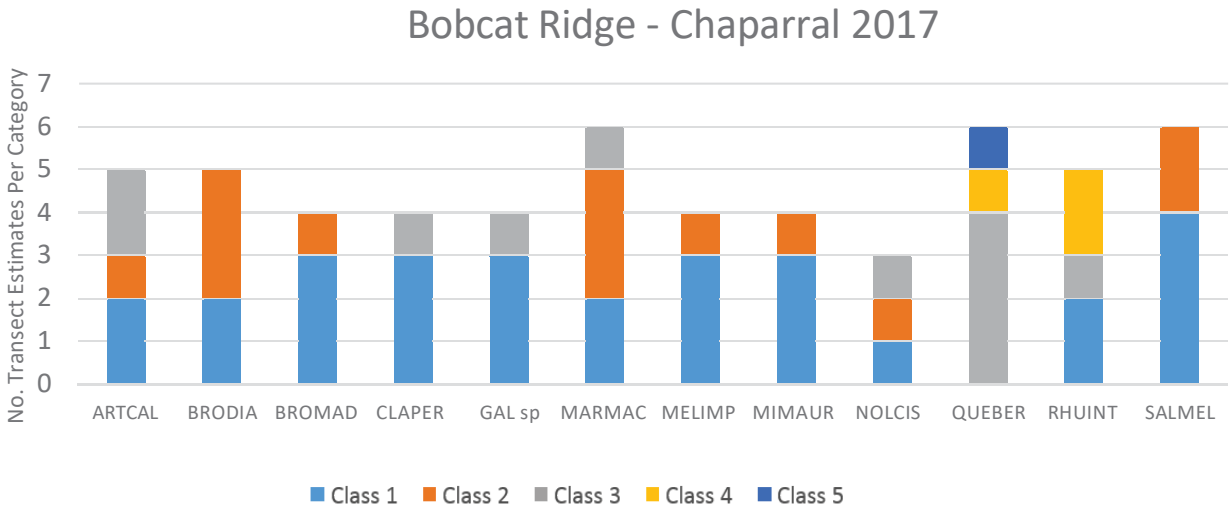


Fig. 3. Number of transect estimates (see methods) per cover category for chaparral vegetation at the Bobcat Ridge preserve (cover classes or categories 1 through 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = >40 - 70%; 5 = >70 - >100%). All species in 2019 are native except for BRODIA (*Bromus diandrus*).

Fig. 4. Photos taken in April 2016-19 of the same transect (T12West) on the Bobcat Ridge preserve. The 2019 photo sign should read BRP – T12W.

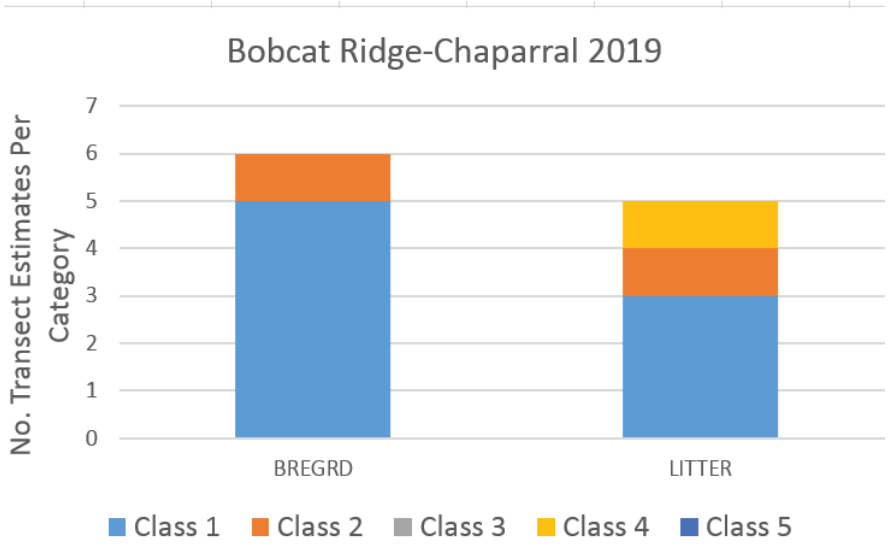
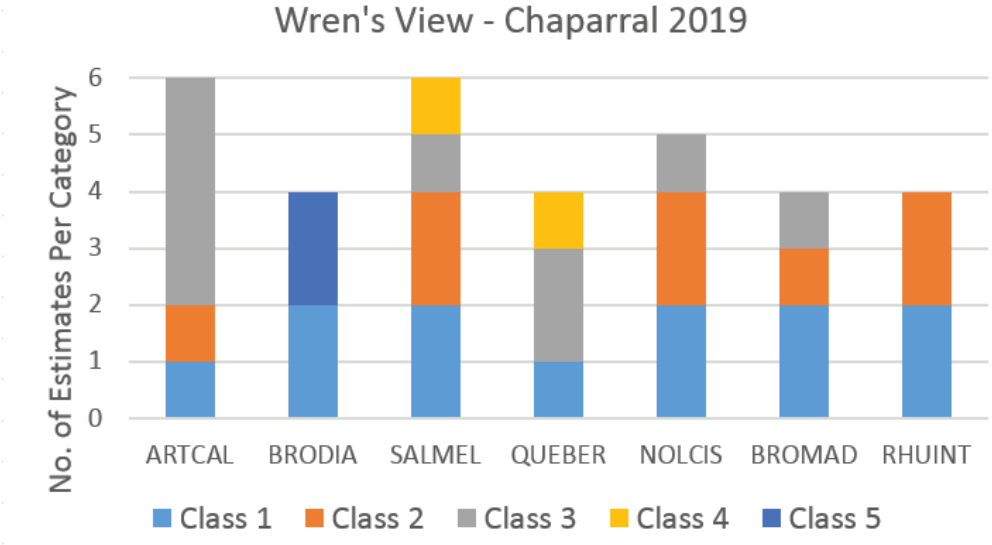
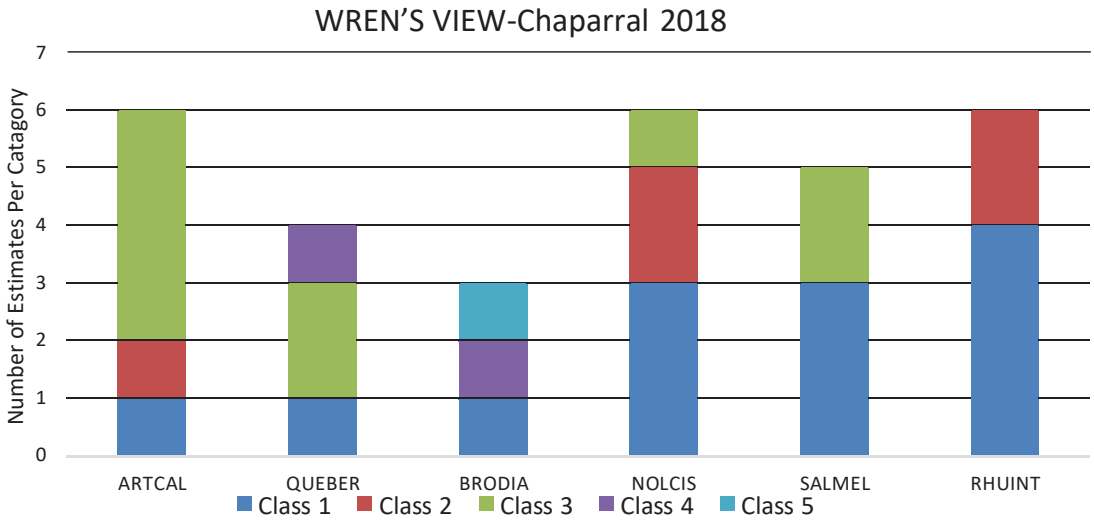


Fig. 5. Number of transect estimates (see methods) per cover category for abiotic factors in chaparral vegetation at the Bobcat Ridge preserve (cover classes or categories 1 through 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5 = >70 - >100%)

In the 61.5 acres of chaparral on the 119 acre Wren's View preserve, two non-native annual grass species , *Bromus diandrus* and *B. madritensis* were concentrated in high cover in 2019 in a relatively limited number of transect areas that were adjacent to the (formerly)cattle disturbed oak woodland (Figs. 6,7). As in 2016 - 2018, this area near the cattle disturbed woodland appeared more open and disturbed as evidenced by the relatively high cover of especially *Bromus diandrus (*Fig. 6). More common native species (> 10 – 70%) similar to 2016 and 2017 observations were the evergreen shrubs (*Adenostoma fasciculatum* (not in the 2018 graph since average cover class was close to but less than one), *Quercus berberidifolia,* and *Rhus integrifola* and drought deciduous shrubs *Artemisia californica* and *Salvia mellifera*. Also present was the native *Nolina cismontane*. Abiotic factors such as low cover of bare ground (Fig. 8) were typical of chaparral (low).





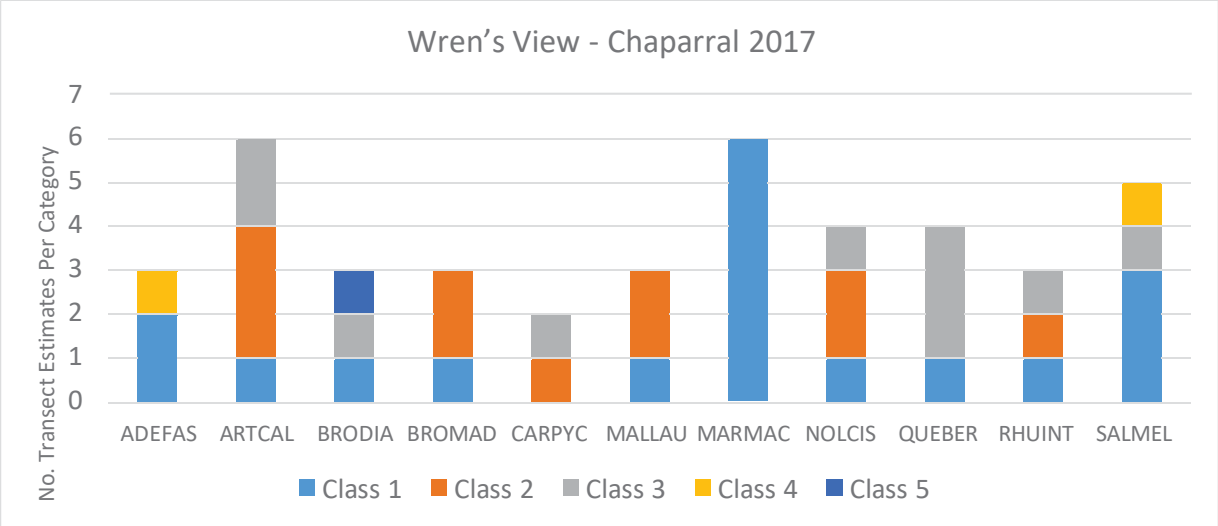


Fig. 6. Number of transect estimates (see methods) per cover category for chaparral vegetation at the Wren's View preserve (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5 = >70 - >100%). All species are native except for annual grasses, BRODIA and BROMAD (*Bromus diandrus* and *B. madritensis*) and Italian thistle (CARPYC, *Carduus pycnocephalus*).

Fig.7. Photos taken in April 2016-19 of scrub oak (*Quercus berberidifolia)* chaparral on the Wren's View preserve in the same transect (T12)

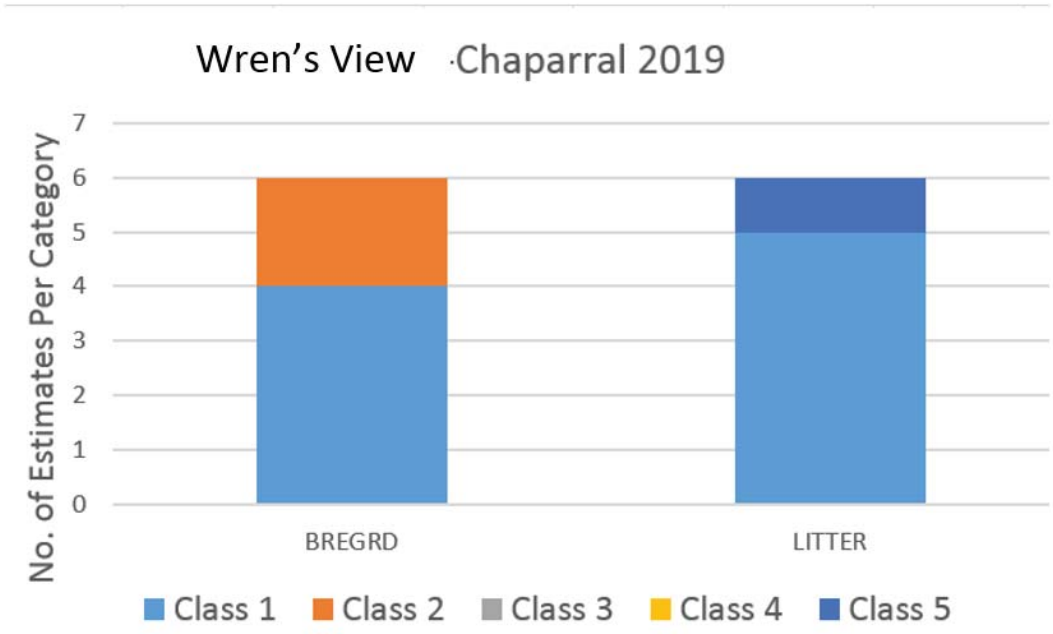
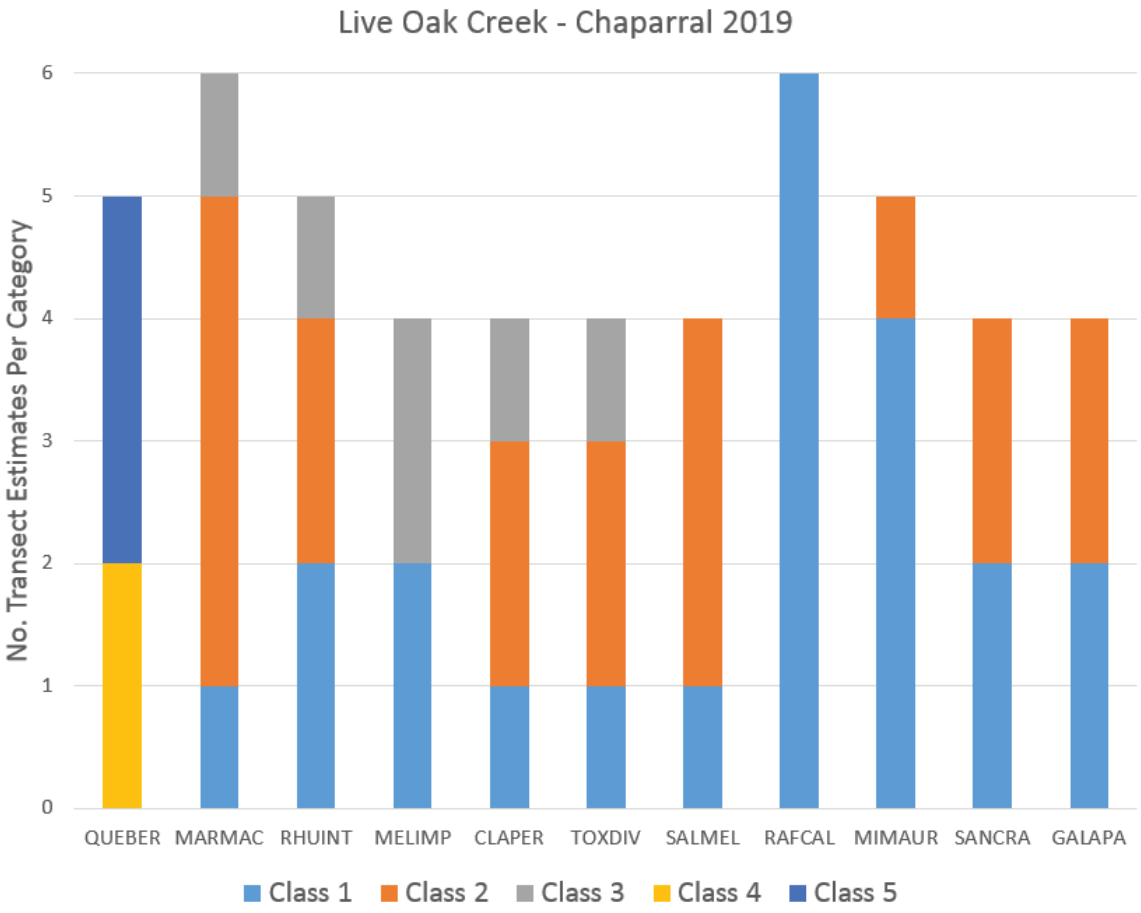
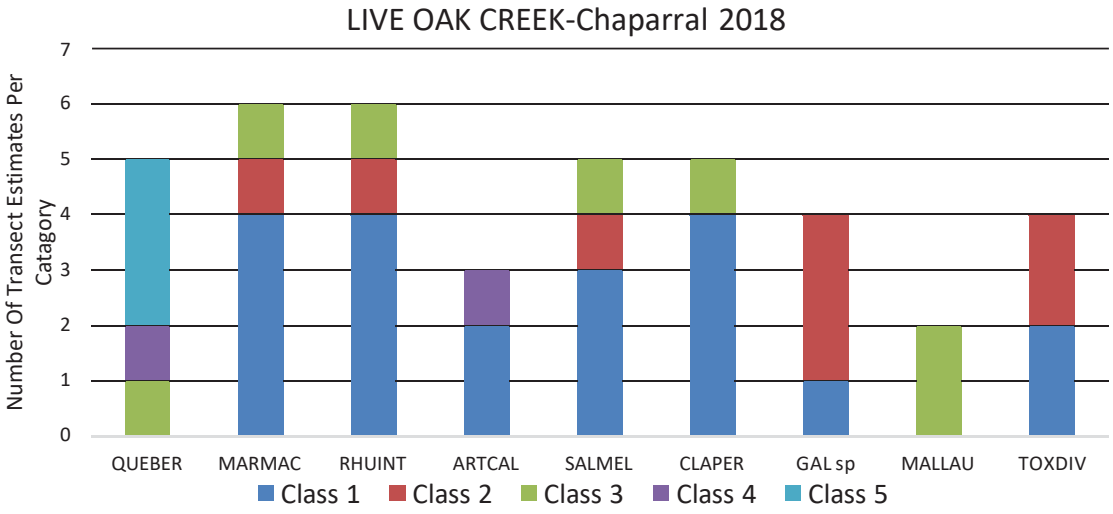


Fig. 8. Number of transect estimates (see methods) per cover category for abiotic factors in chaparral vegetation at the Wren's View preserve (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5= >70 >100%).

Quercus berberidifolia dominated the 36 acres of tall, dense chaparral on 83 acre Live Oak Creek preserve (Figs. 9 -10). *Marah macrocarpus* and *Rhus ingetrifolia* were observed at low cover in the area around most transects. No non-native grasses and forbs were present in the understory but natives (*N. cismontana* and coastal sage scrub (CSS) shrubs *Salvia apiana, S.. mellifera*, and *Mimulus aurantiacus* were observed at low to moderate (10-40%) cover throughout. Also present in the herbaceous understory were natives *Claytonia perfoliata* (a native forb) and *Marah macrocarpa* (a native vine). Life forms on all three preserves generally reflect species discussed but with single individuals of the non-native shrub, *Nicotiana glauca*, observed in Wren's View and Live Oak Creek (Figs. 11). Bare ground cover, typical of chaparral, was low (Fig. 12).





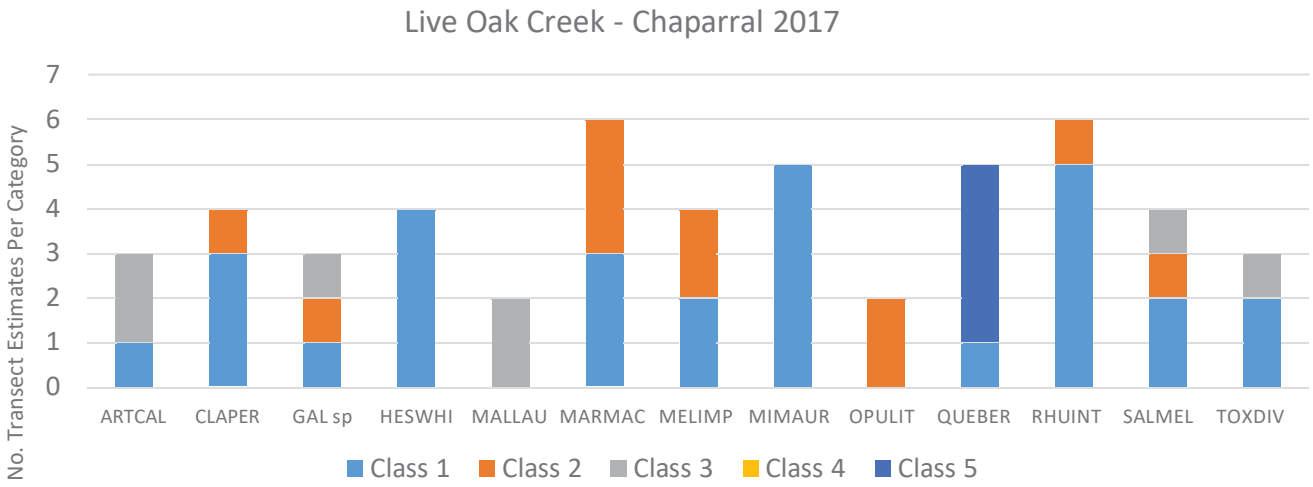


Fig. 9. Number of transect estimates (see methods) per cover category for chaparral vegetation at the Live Oak Creek preserve (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5 = >70 - >100%). All species are native.

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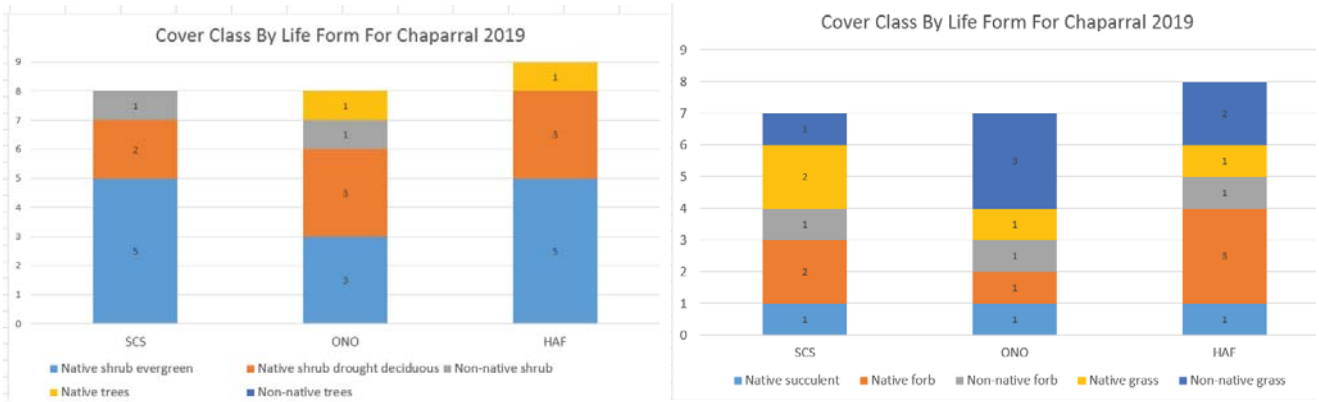
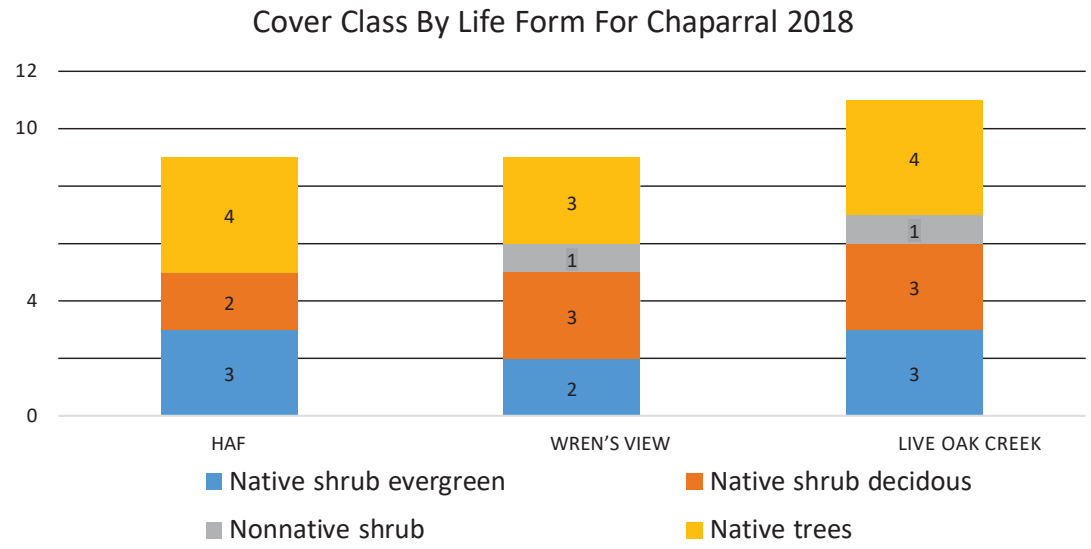
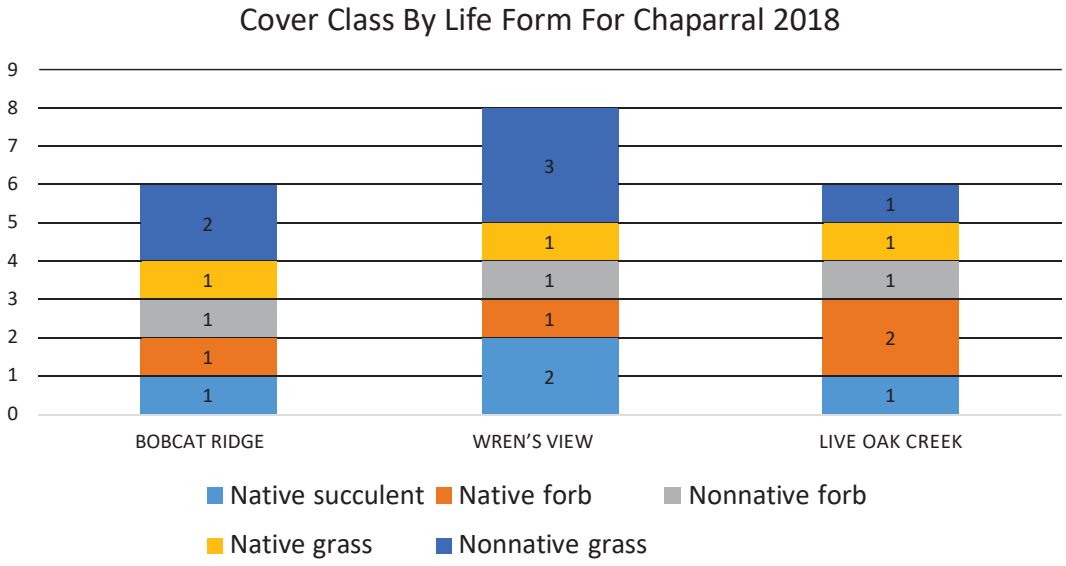
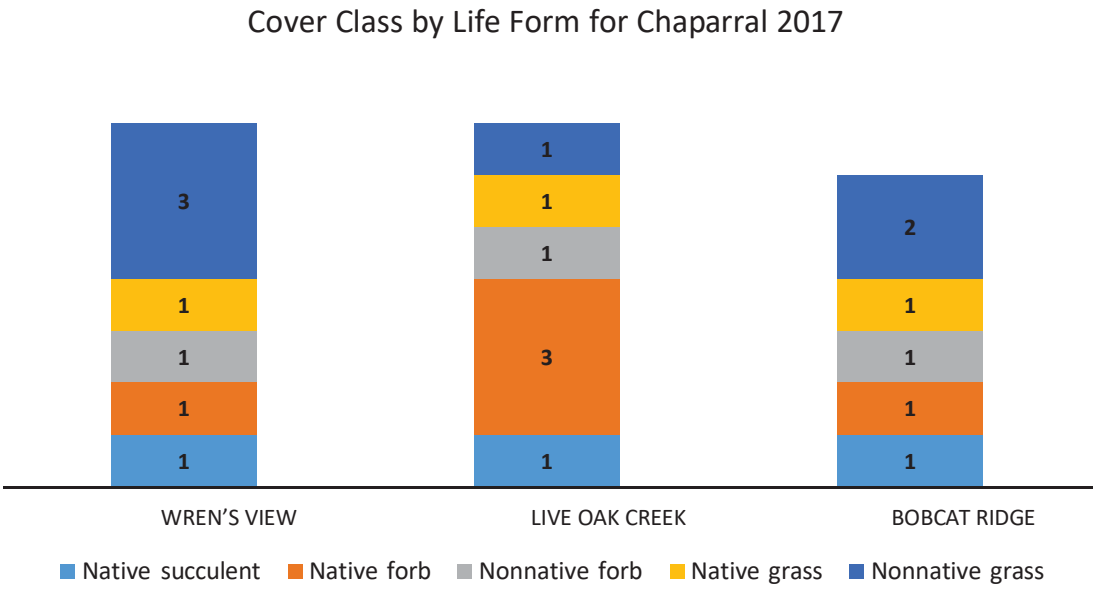
Fig. 10. Photos taken in April 2016-19 of scrub oak (*Quercus berberidifolia)* chaparral on the Live Oak Creek preserve and in the same transect (T11 North).




Cover Class By Life Form For Chaparral 2018
12
10
4
0
4
2
3
3
1
3
2
4
1
3
3
HAF
WREN'S VIEW
LIVE OAK CREEK
Native shrub evergreen
Native shrub decidous
Nonnative shrub
Native trees


Cover Class By Life Form For Chaparral 2018
9
8
7
6
5
4
3
2
1
0
2
1
1
1
1
3
1
1
2
1
1
1
2
1
BOBCAT RIDGE
WREN'S VIEW
LIVE OAK CREEK
Native succulent
Native forb
Nonnative forb
Native grass
Nonnative grass



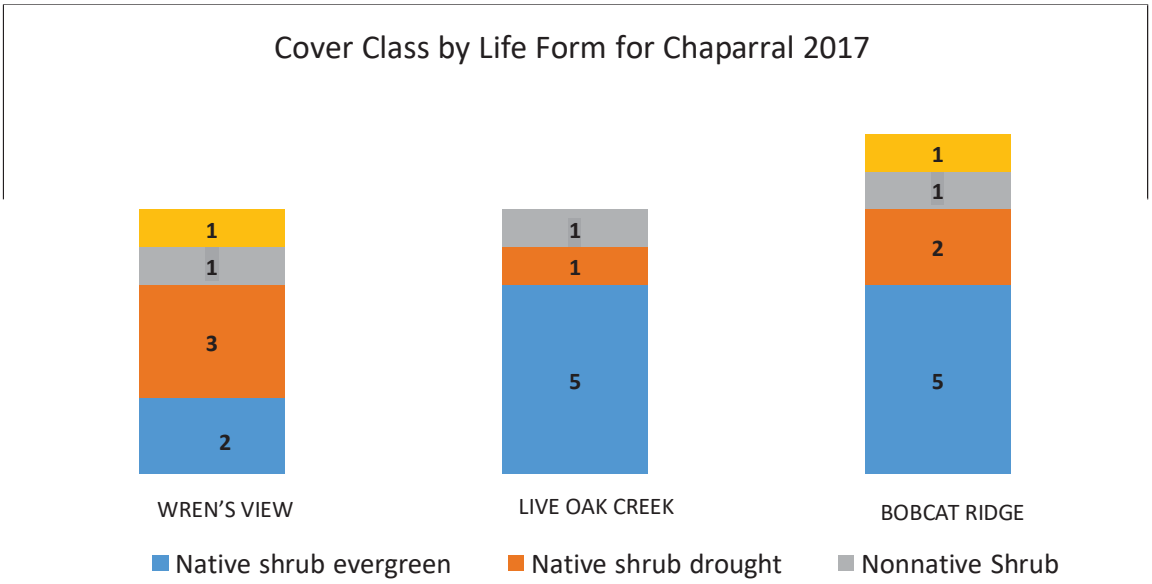


Fig. 11 Cover class by chaparral life form (woody and non woody) for each site in 2017 - 2019. Numbers in bars signify numbers cover class per life form (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5 = >70 - >100%).

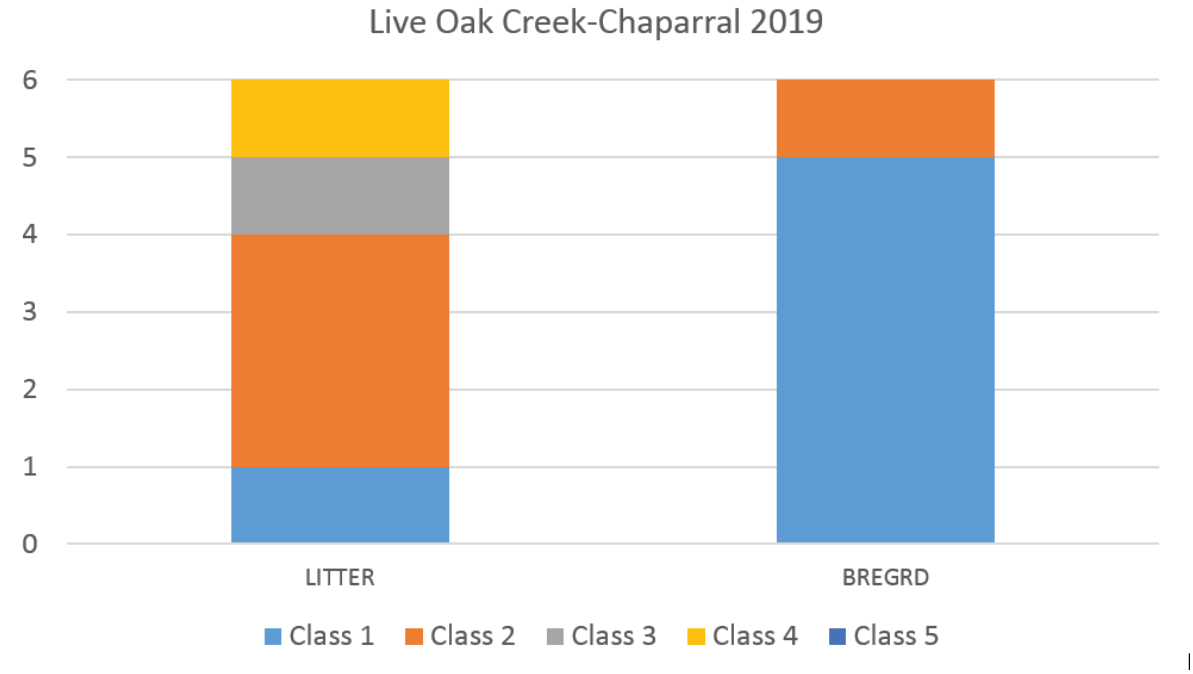
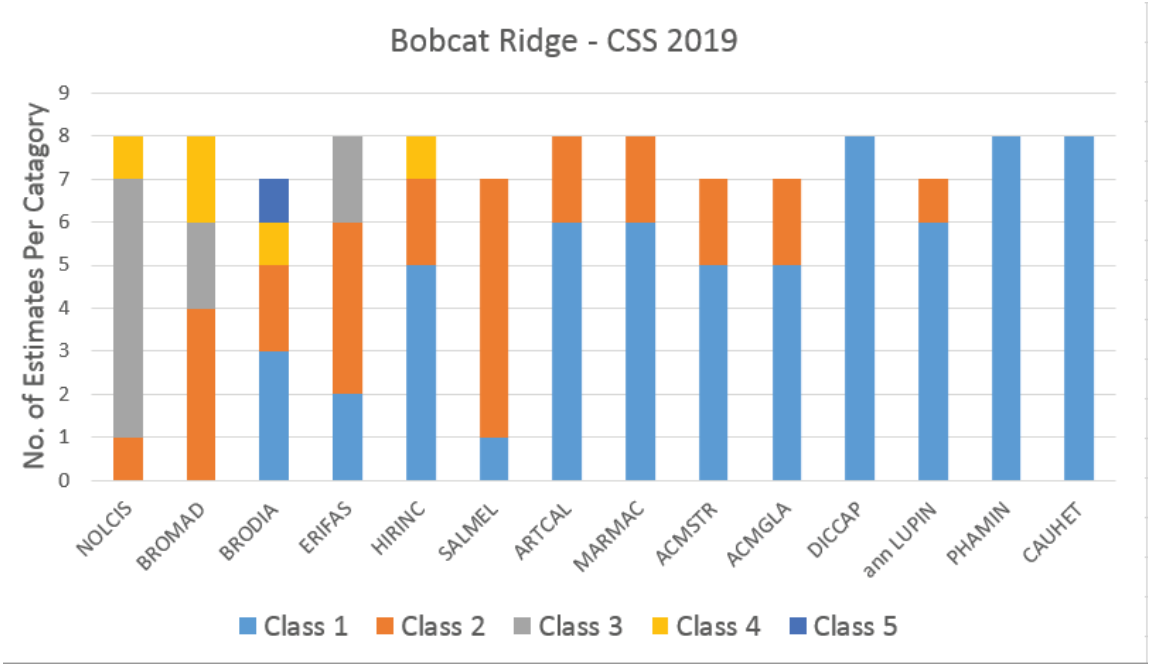


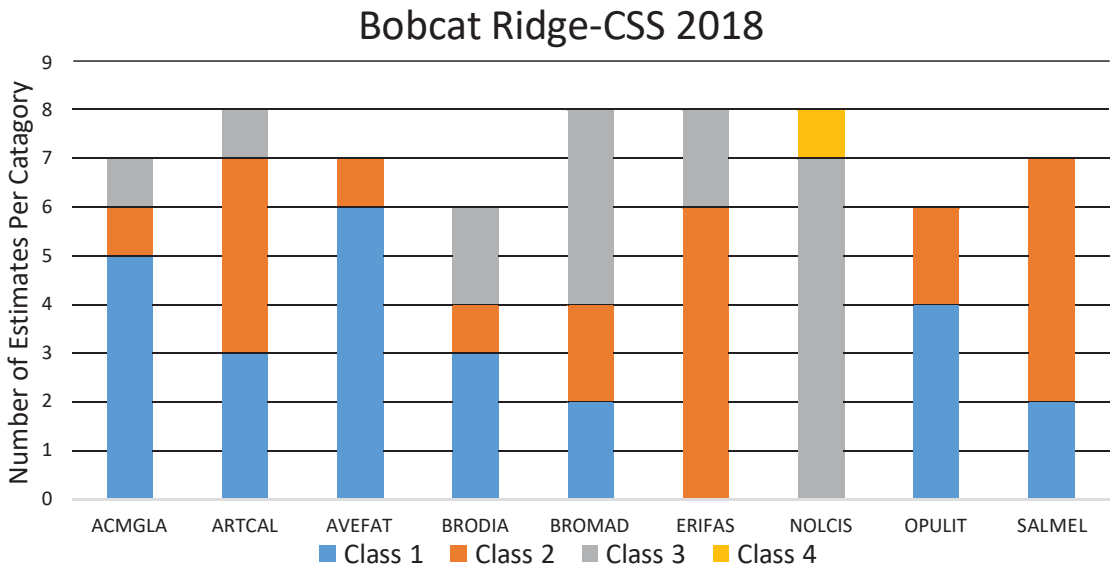
Fig. 12. Number of transect estimates (see methods) per cover category for abiotic factors in chaparral vegetation at the Live Oak Creek preserve (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5 = >70 - >100%).

Coastal Sage Scrub

Coastal sage scrub (CSS) is typically a more open canopy community than chaparral in long unburned areas of coastal Southern California, with patches of bare ground often created by grazing rodents and rabbits (DeSimone and Zedler 1999, 2001). Although much of the CSS on the three OCTA preserves continues to appear healthy and typical of long unburned CSS in Orange County, in April 2019 areas between shrubs formerly bare ground had non-native annual grass cover, particularly *Bromus* species and sparser mustards (*Hirschfeldia incana*, some *Brassica nigra*). Annual grass and mustard biomass exploded in preserves around Southern California in 2019, hypothetically affected by heavy rains during the cooler winter months.

In the 11.6 acres of coastal sage scrub on the 47.9 acre Bobcat Ridge preserve in 2019, although overall the CSS appeared in good condition (Fig. 14), non-native species occurred in relatively higher cover: two non-native grass species in the *Bromus* genus and the forb, *Hirschfeldia incana* (Fig. 13). This was in contrast to much lower annual grass cover in the dry 2018 spring (Fig.13). Commensurately, bare ground was lower in 2019 (1-10%) (Fig. 15) than in the much drier 2018 spring (5-40% range). The native shrub *Nolina cismontana* was commonly observed in all four seasons, 2016-19. Cover of the most abundant species of Southern California coastal sage scrub, *Artemisia californica*, as in previous seasons was widespread as were other native species typical of CSS (shrubs *Salvia mellifera*, *Acmispon glaber*, *Eriogonum fasciculatum* (Figs. 13-14). The wet winter brought higher cover of understory natives such as *Dichelostemma capitatum, Caulanthus heterophyllus,* and *Phacelia minor* (Fig. 13).


Bobcat Ridge - CSS 2019
No. of Estimates Per Catagory
0
1
2
3
4
5
6
7
8
9
NOLCIS
BROMAD
BRODIA
ERIFAS
HIRINC
SALMEL
ARTCAL
MARMAC
ACMSTR
ACMGLA
DICCAP
ann LUPIN
PHAMIN
CAUHET
Class 1
Class 2
Class 3
Class 4
Class 5


Bobcat Ridge-CSS 2018
Number of Estimates Per Catagory
0
1
2
3
4
5
6
7
8
9
ACMGLA
ARTCAL
AVEFAT
BRODIA
BROMAD
ERIFAS
NOLCIS
OPULIT
SALMEL
Class 1
Class 2
Class 3
Class 4

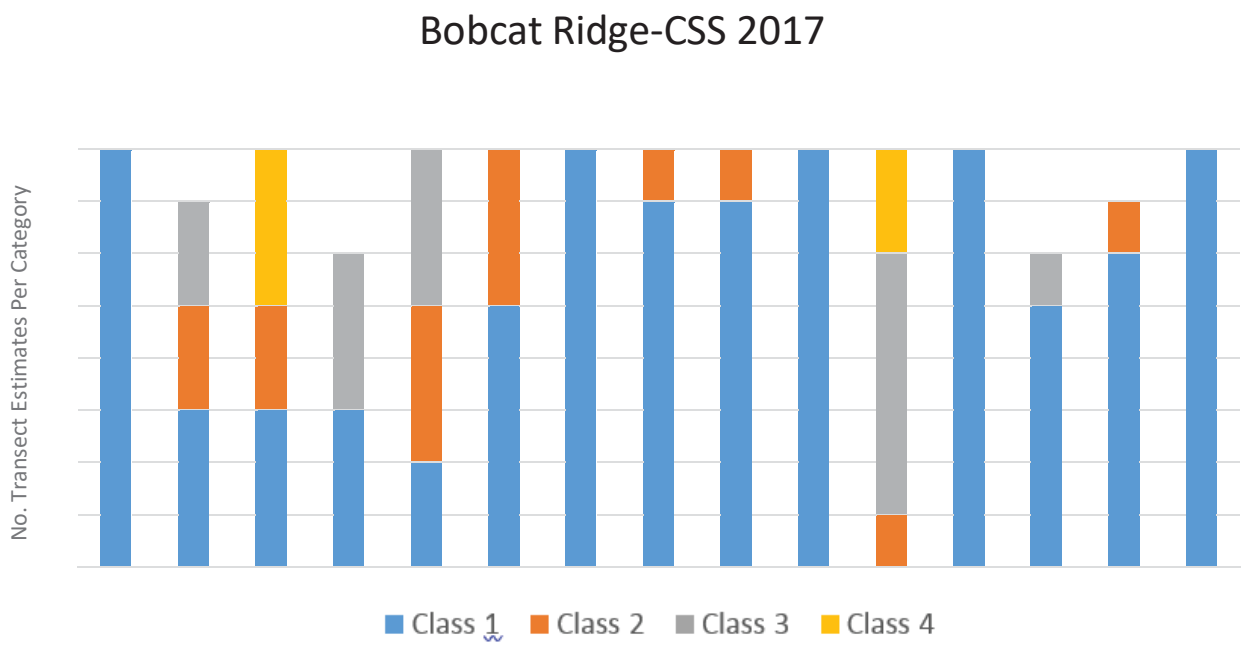


Fig. 13. Number of transect estimates (see methods) per cover category for coastal sage scrub vegetation at the Bobcat Ridge preserve (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5 = >70 - >100%). All species are native except for annual grasses, AVEFAT (*Avena fatua*), BRODIA and BROMAD (*Bromus diandrus* and *B. madritensis*) and shortpodded mustard (HIRINC, *Hirschfeldia incana*).

Fig. 14. Coastal sage scrub on the Bobcat Ridge preserve in 2016-2019 (T2 East).

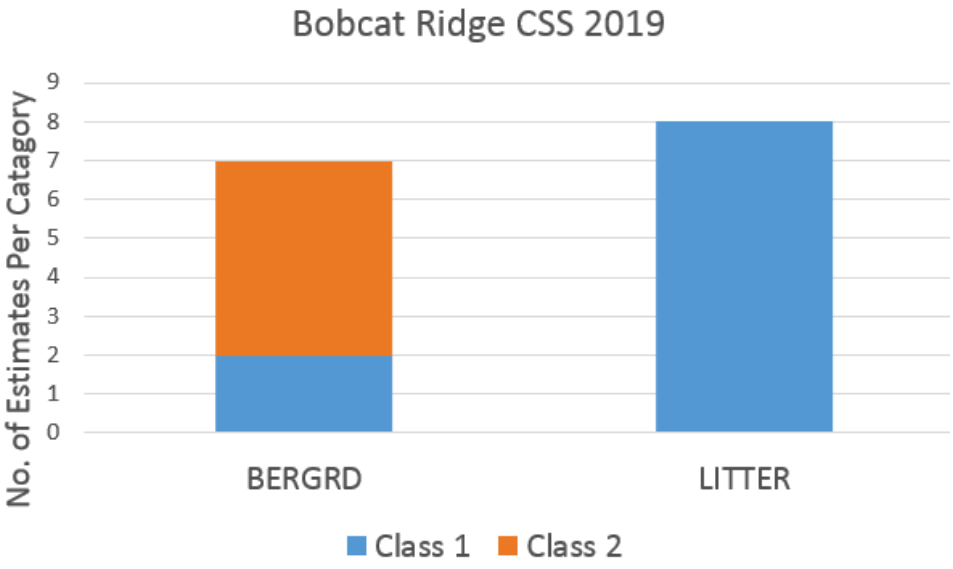
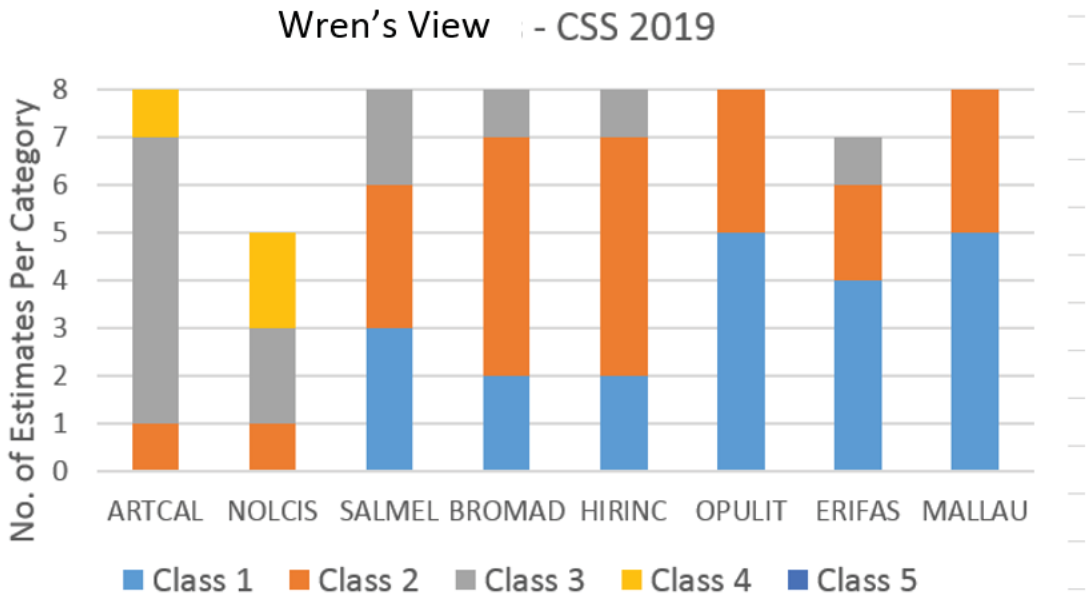
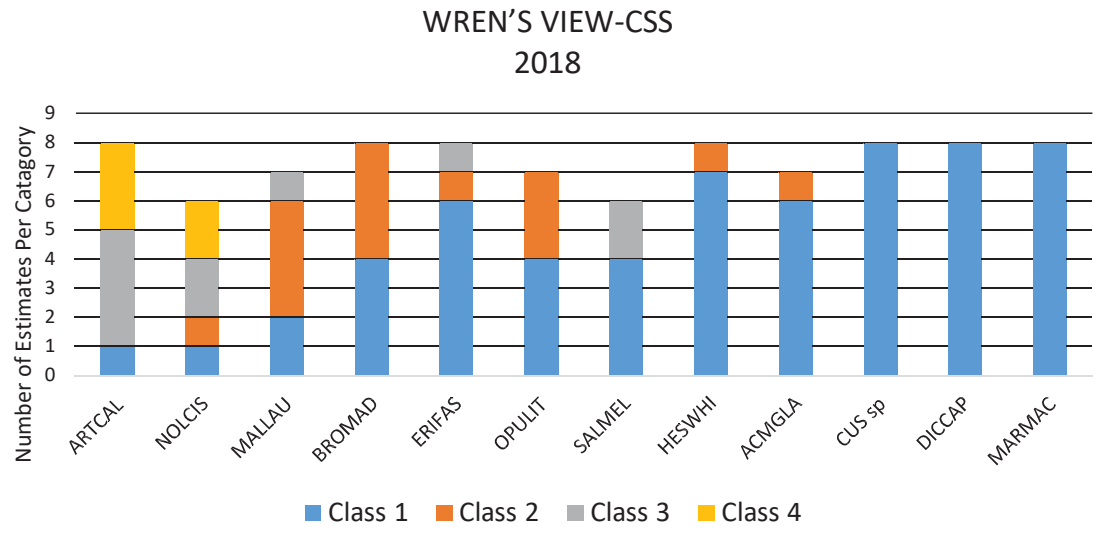


Fig. 15. Number of transect estimates (see methods) per cover category for abiotic factors in coastal sage scrub vegetation at the Bobcat Ridge preserve (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = >10 - 40% 4 = > 40 - 70%; 5 = >70 - >100%).

In the 39 acres of coastal sage scrub on the 119 acre Wren's View preserve non-native cover was relatively higher in 2019 than in the previous year. In 2018, the non-native annual grass *Bromus madritensis* and non-native forb *Hirschfeldia incana* were widespread but observed mostly in lower cover classes; whereas in 2019, cover ranged 1-40%. As observed in 2016 -18, species typical of Southern California coastal sage scrub dominated the canopy in higher cover classes: *Artemisia californica*, *Salvia mellifera*, and *Eriogonum fasciculatum* at mostly > 10%. The sage scrub appears in excellent condition, with only the previously mentioned nonnative annual grass and mustard at relatively higher cover. *Nolina cismontane* and succulent *Opuntia littoralis* were also present and in good condition (note that it is difficult to identify cactus species in Orange County since several native species hybridize in the Southern California region (Mark Dodero, RECON senior biologist personal communication) (Figs. 16-17). Bare ground was at relatively lower cover in 2019 than in the drier previous season, presumably due to non-natives' response to winter rains (Fig. 18).





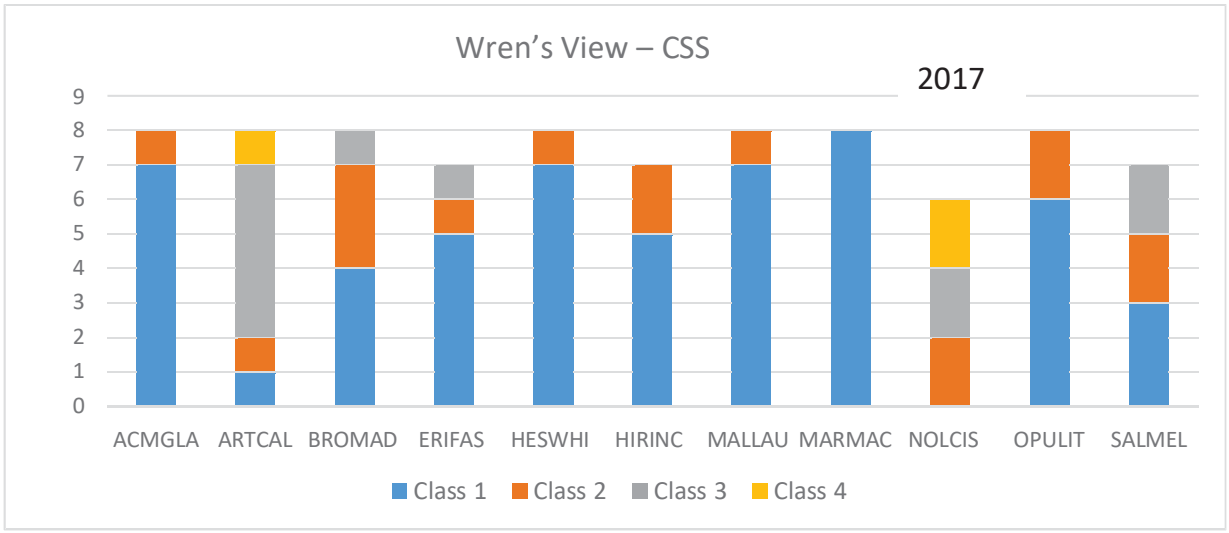


Fig. 16. Number of transect estimates (see methods) per cover category for coastal sage scrub vegetation at the Wren's View preserve (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5 = >70 - >100%). All species are native except for annual grass, BROMAD (*Bromus madritensis*) and shortpodded mustard (HIRINC, *Hirschfeldia incana*).

Fig. 17. Photo taken in April 2016-19 of coastal sage scrub on the Wren's View preserve (T3 East)

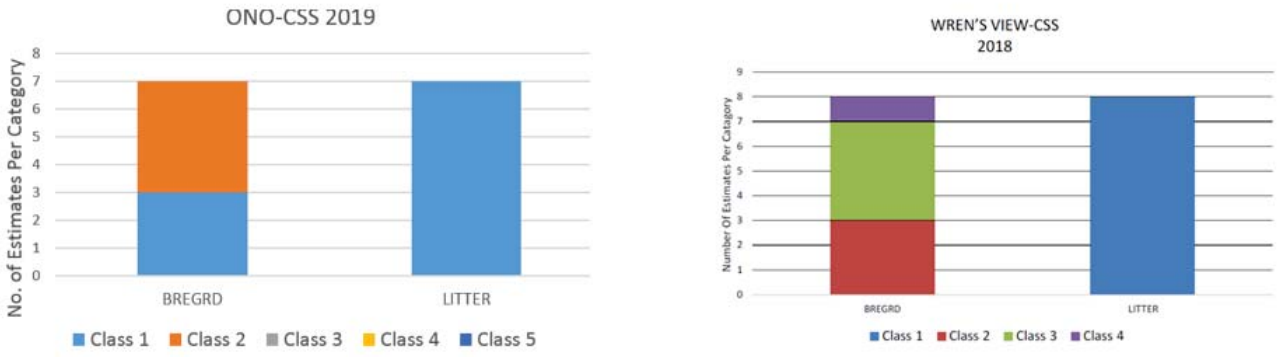
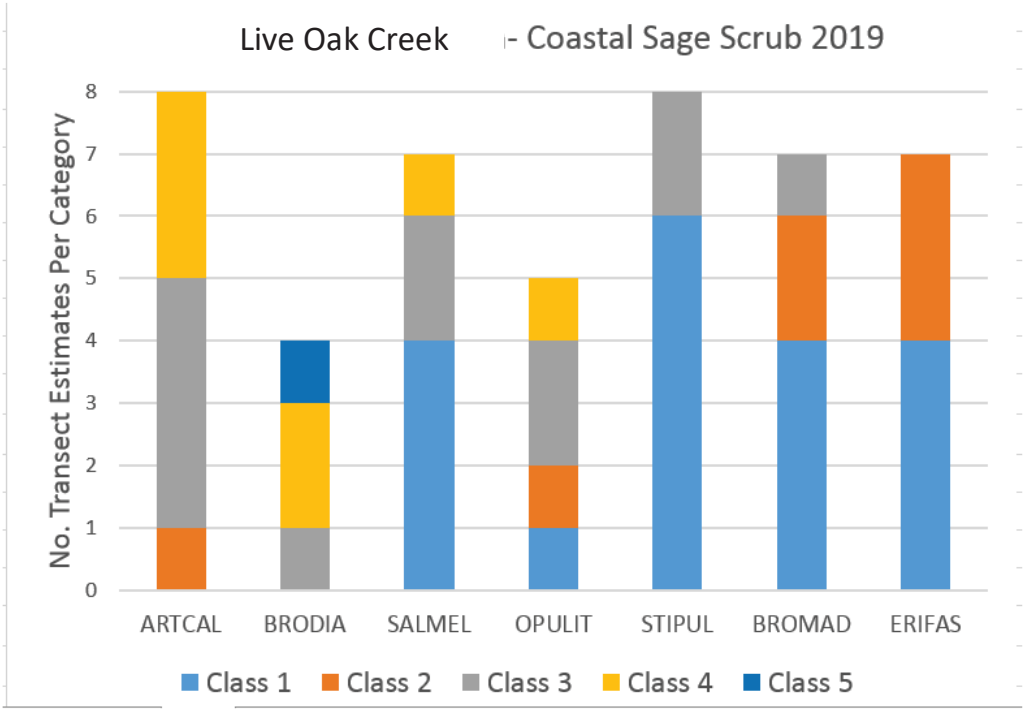
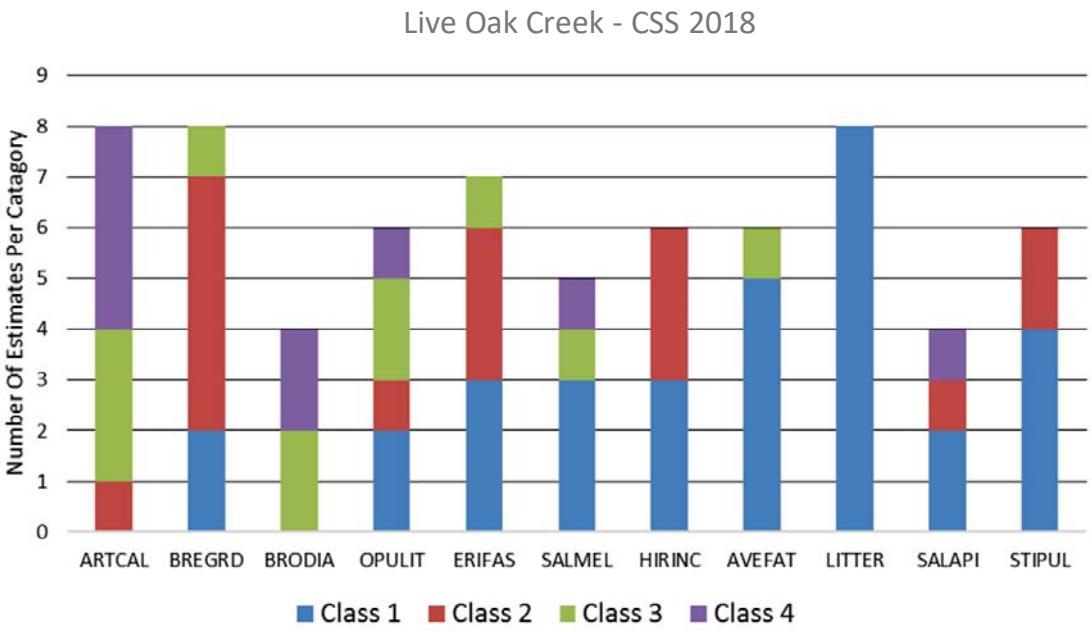


Fig. 18. Number of transect estimates (see methods) per cover category for abiotic factors in coastal sage scrub vegetation at the Wren's View preserve (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40-70%; 5 = >70 - >100%).

In the approximately 10 acres of coastal sage scrub on 83 acre Live Oak Creek preserve *A. californica* continued to dominate the canopy (present in all transects and in most transects at the highest two cover classes). The crew again observed distinct differences in non-native annual grass cover between the two subtypes of CSS on the preserve. The non-native annual grass *Bromus diandrus* was again, as in 2018, in higher cover classes but almost exclusively in the white sage subtype polygons and not in the singular California sagebrush subtype polygon (Fig. 19, 20). In the CA sagebrush prickly pear subtype, there was very low cover of non-native annual grasses in 2018. Bare ground was at relatively higher cover classes in the drier 2018 spring than in 2019 (Fig. 21).The non-native annual grass *Bromus diandrus* was at similar cover in 2019 as in 2017-18 in the understory in open areas in the white sage subtype shrub canopy. Other subshrubs in 2019 remained stable at lower cover (*E. fasciculatum, S. apiana*, and *S. mellifera*). As in previous years, *Opuntia littoralis*, a common native cactus that provides habitat for species such as the San Diego Cactus Wren, was most commonly observed in extensive patches in the California Sagebrush polygon in the north of the preserve (Figs. 19-20).





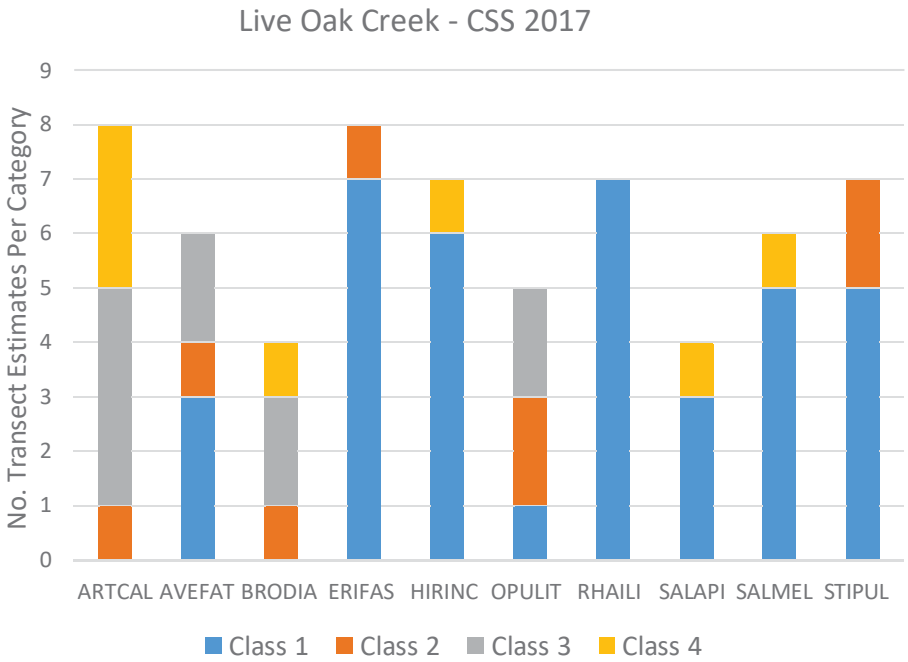


Fig. 19. Number of transect estimates (see methods) per cover category for coastal sage scrub vegetation at the Live Oak Creek preserve (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5 = >70 - >100%). All species are native except for annual grasses AVEFAT (*Avena fatua*), and BRODIA (*Bromus diandrus*) and shortpodded mustard (HIRINC, *Hirschfeldia incana*).

Fig. 20. Photos taken in April 2016-19 of coastal sage scrub on the Live Oak Creek preserve and in the same transect (T8 West).

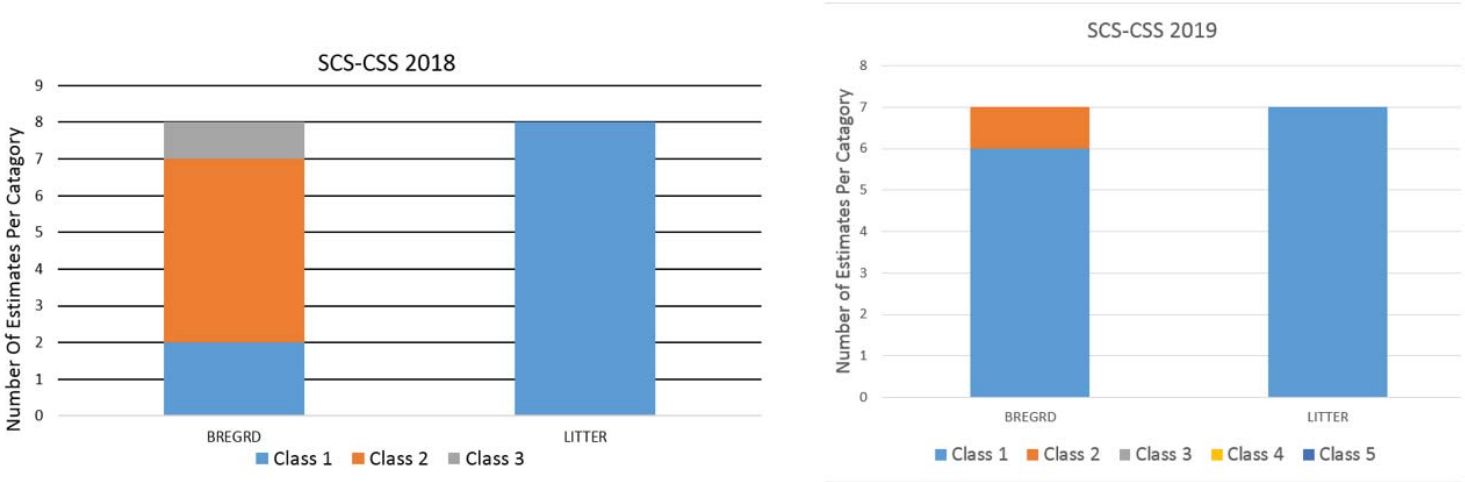
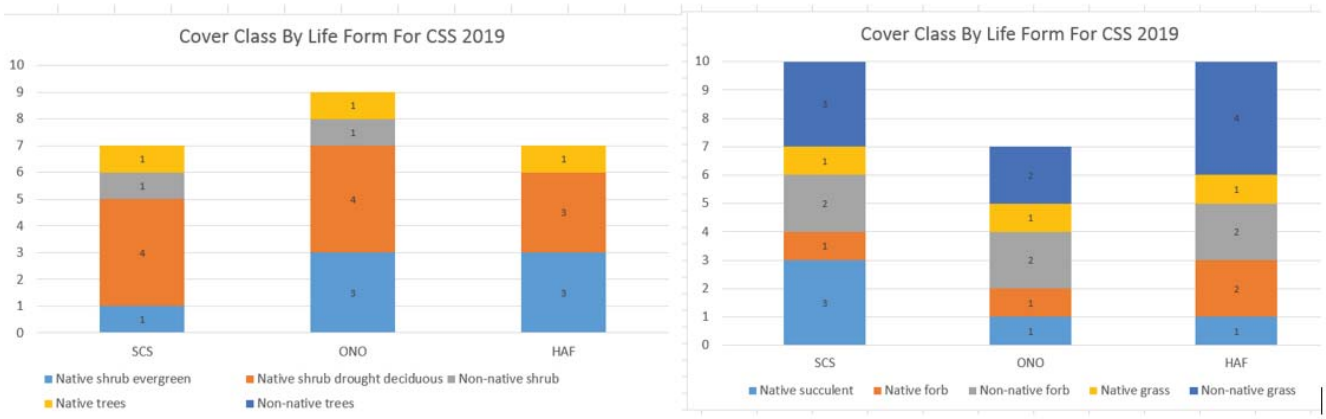
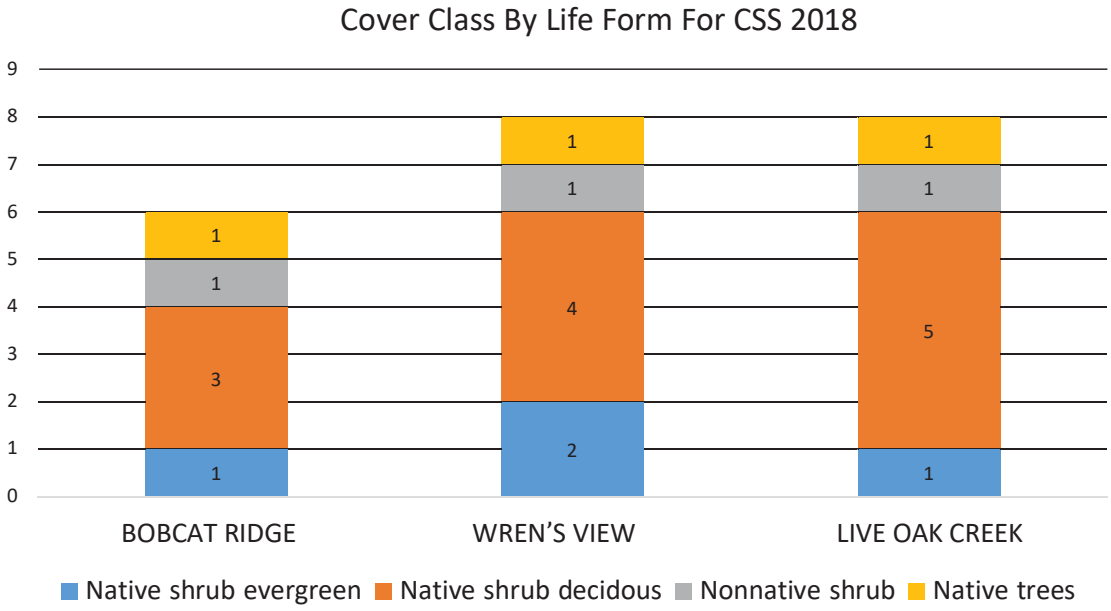


Fig. 21. Number of transect estimates (see methods) per cover category for abiotic factors in coastal sage scrub vegetation at the Live Oak Creek preserve (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 -70%; 5 = >70 - >100%).

Life forms (Fig. 22), as expected were dominated by drought deciduous shrubs
We observed scattered individuals of the non-native shrub *Nicotiana glauca*.





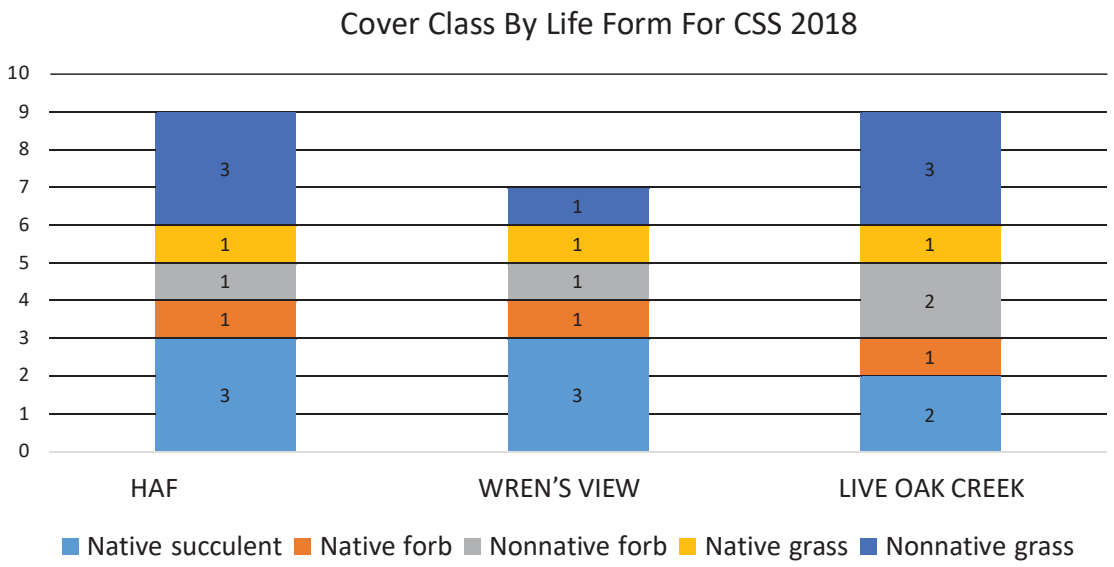
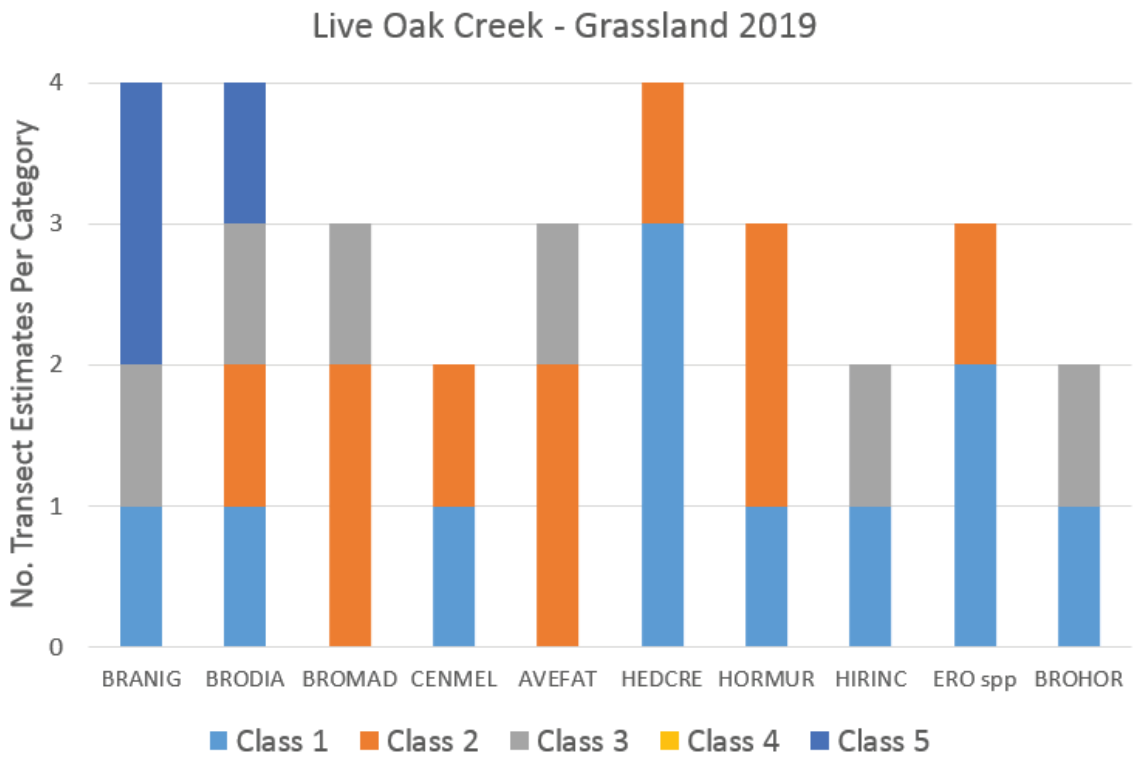


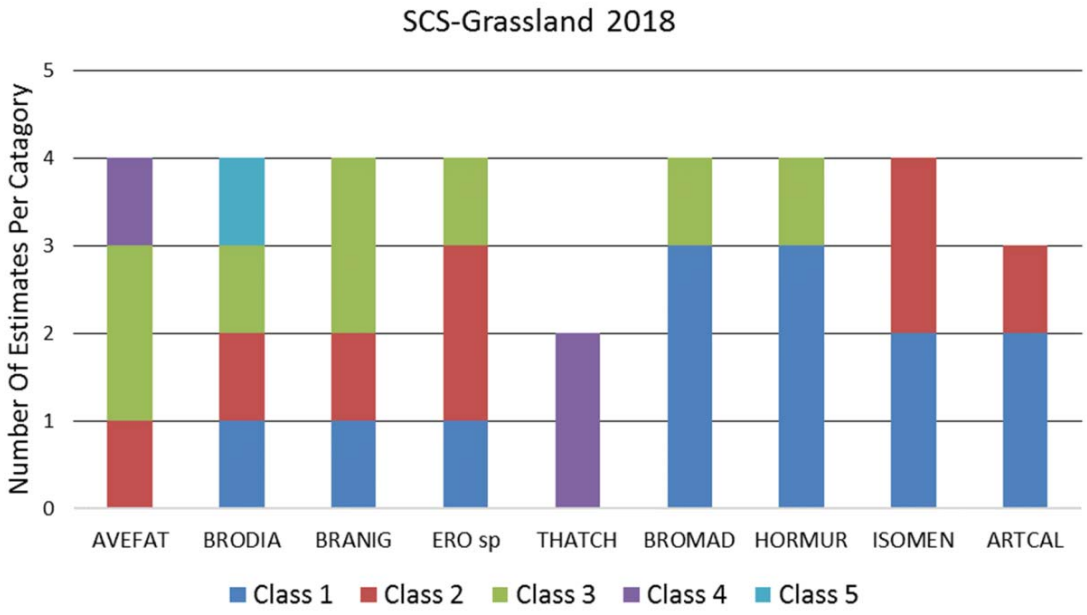
Fig. 22. Cover class by coastal sage scrub life form (woody in top graph, succulent and herbaceous in bottom graph) for each site. Numbers in bars signify numbers cover class per life form (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5 = >70 - >100%). "Native shrub drought" = native drought deciduous shrubs

Grasslands

Grasslands are present at only the Live Oak Creek preserve. In the higher rainfall seasons, 2017 and 2019, the Starr Ranch crew observed eruptions in grasslands of mustard species (*Brassica nigra* and *Hirschfeldia incana*) and high non-native annual grass biomass similar to other preserves in Orange County and elsewhere in Southern California. In contrast, in relatively drier 2018, we observed much lower cover of *H. incana* and 40-70% cover of thatch, standing dry biomass composed mostly of the mustards from 2017.

As in 2016 -18, large areas of the 15.3 acres of grasslands on the 83 acre preserve in 2019 were dominated by non-native annual grasses and forbs (Figs. 23-24), The nonnative biomass was so high that, in this qualitative survey, very low cover (< 10%) of the native bunchgrass, *Stipa pulchra,* was observed, even in the small patch identified as a native perennial grassland. Annual grasses dominating in 2016-19 were *B. diandrus*, *B. hordeaceous. B. madritensis,* and *A. fatua.* The forb *Brassica nigra*, up to10 feet tall, dominated the canopy. (Figs. 23, 24). As in previous years, in April 2019 there was low cover of bare ground (Fig. 25).




SCS-Grassland 2018
Number Of Estimates Per Catagory
0
1
2
3
4
5
AVEFAT
BRODIA
BRANIG
ERO sp
THATCH
BROMAD
HORMUR
ISOMEN
ARTCAL
Class 1
Class 2
Class 3
Class 4
Class 5

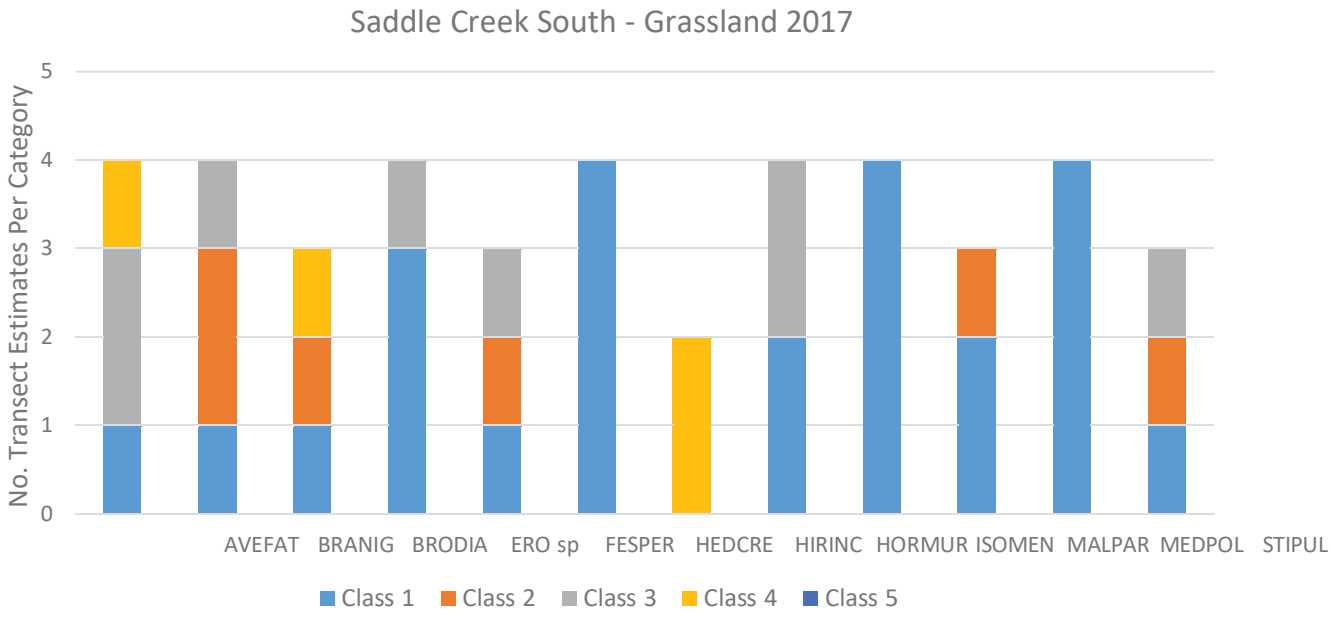
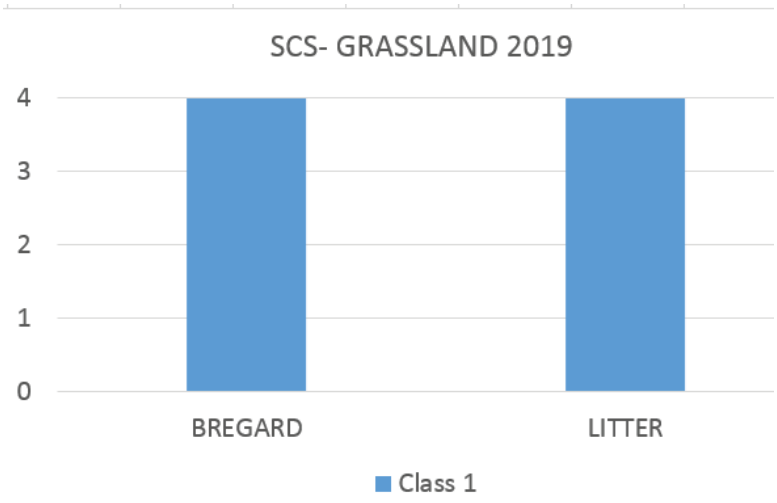


Fig. 23. Number of transect estimates (see methods) per cover category for grassland vegetation at the Live Oak Creek preserve (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5 = >70 - >100%). All species are herbaceous non-natives grasses and forbs except for *Stipa pulchra* (STIPUL, native bunchgrass), the shrub *Artemisia californic*a ARTCAL, and the low subshrub, *Isocoma menziesii*, ISOMEN).

Fig. 24. Photo taken in April 2016-19 of a native perennial grassland on the Live Oak Creek preserve (T15 West).



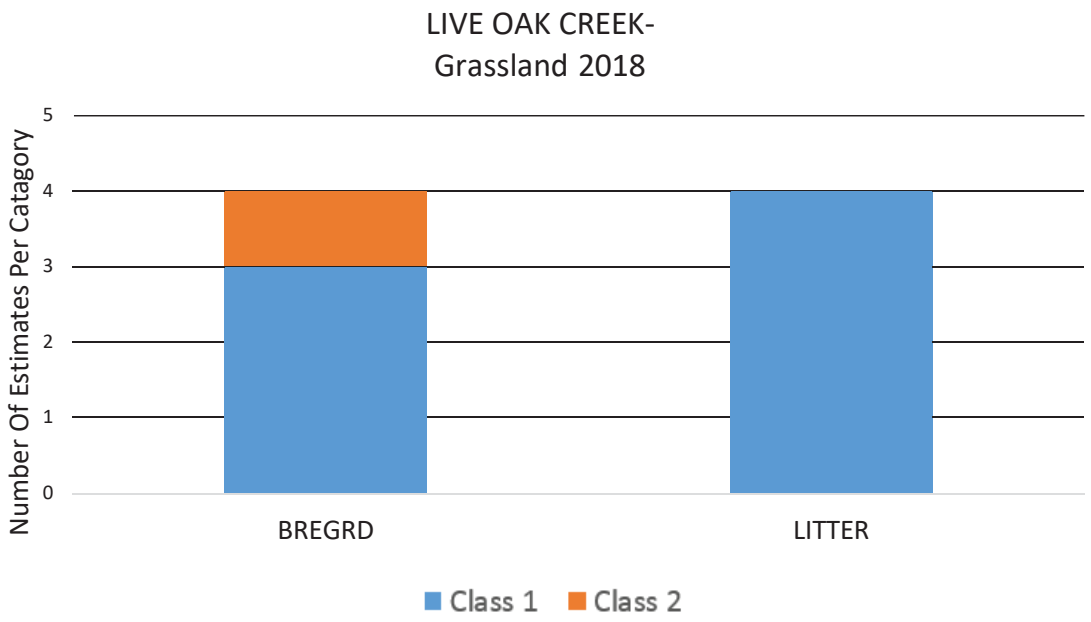
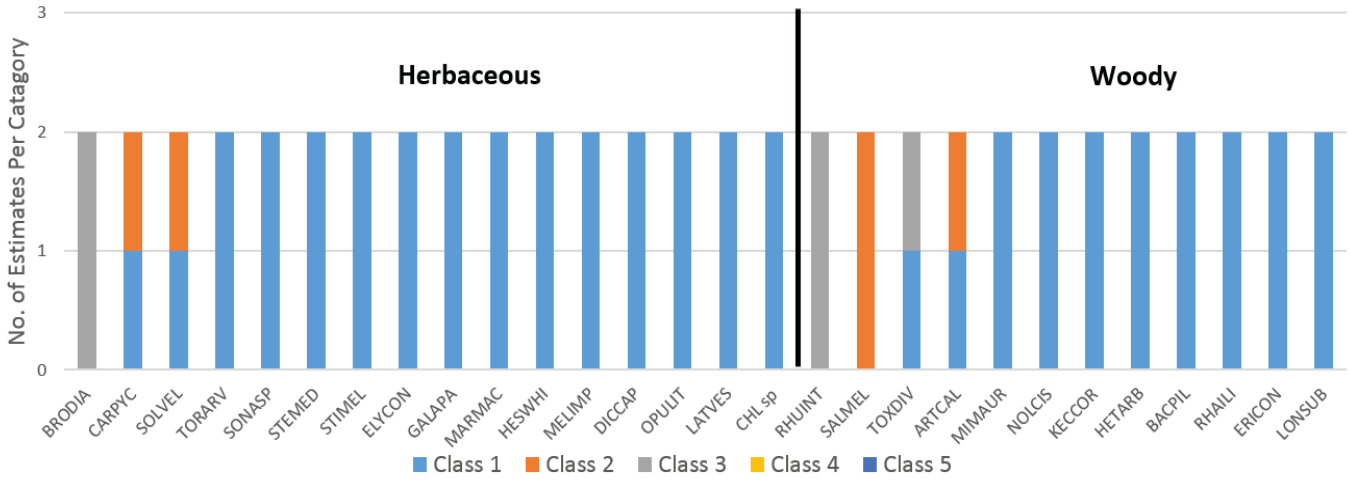


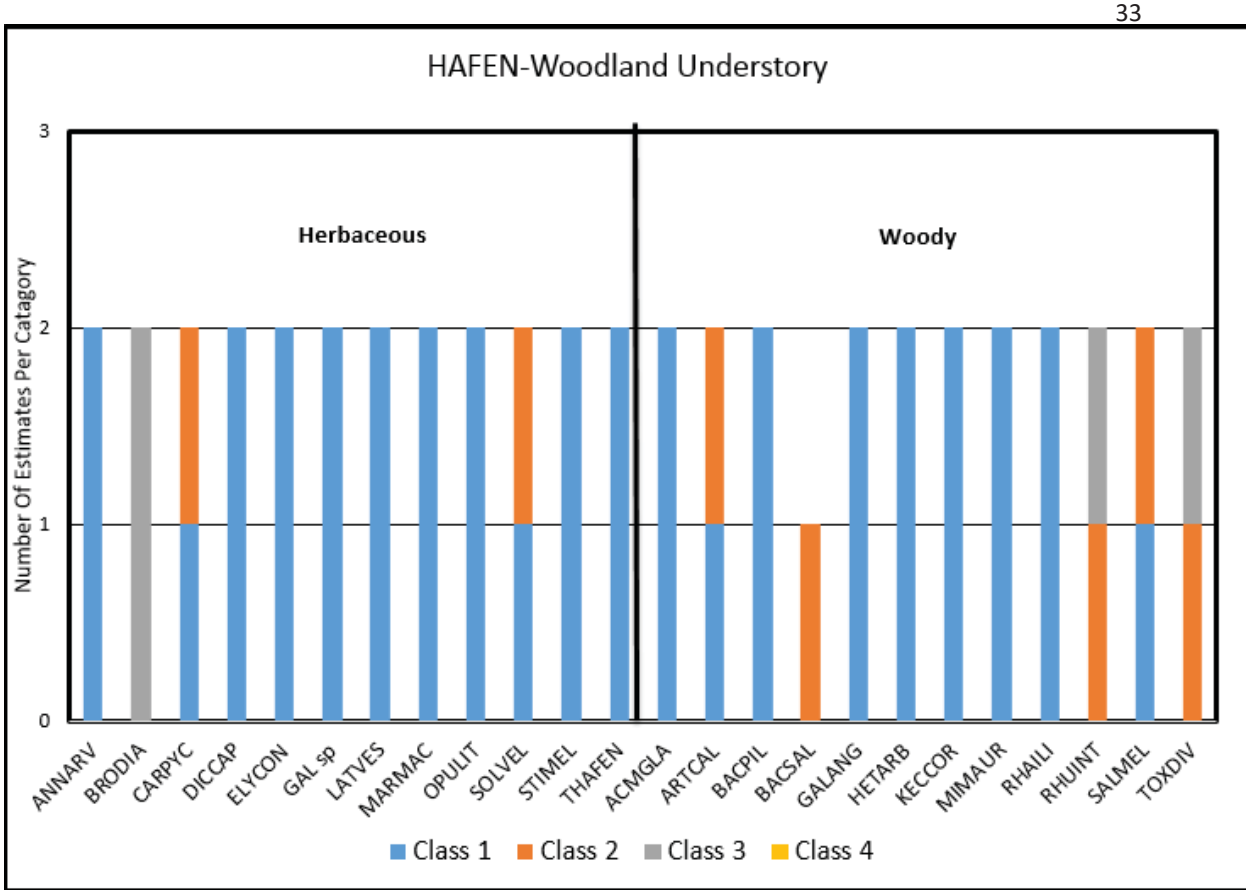
Fig. 25. Number of transect estimates (see methods) per cover category for abiotic factors in grassland vegetation at the Live Oak Creek preserve (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5 = >70 - >100%).

Woodlands

In 2019 we observed a decline in woodlands on Bobcat Ridge (i.e thinning sycamore canopies) and Wren's View but not on Live Oak Creek preserve. For the first time since 2016 the crew observed signs of tree disease (i.e. *Fusarium* dieback staining) and crown, limb and tree dieback on Wren's View property. Woodlands cover only 12.5% of Bobcat Ridge and 11% of Wren's View preserves; whereas 23% of the Live Oak Creek preserve supports woodlands which appear relatively healthy. The crew did again observe many olive trees in one larger Live Oak Creek woodland that were not evident from the 2016 quantitative Y-cluster sampling (Matt Skarie, Starr Ranch Field Supervisor *personal communication*). This quantitative method requires four oak trees in a cluster, thus olive trees were not included in sampling in 2016. Additionally, the polygon designated "coast live oak woodland" in mapping (ICF International 2015) at the northwest edge of the Live Oak Creek preserve includes an old home site with many ornamentals, including oleander, succulents, fruit trees, and pines as well as non-natives such as *Foeniculum vulgare* (fennel).

Woodlands at the Bobcat Ridge preserve are not extensive and include one riparian woodland polygon and a coast live oak woodland polygon. With the exception of thinning sycamore canopies, both woodlands otherwise continue to appear intact and healthy (Fig. 26-29). As is often observed in Southern Californian oak woodland understories, there was moderate cover of the non-native annual grass *B. diandrus* and low cover of Italian thistle, *C. pycnocephalus* (Fig. 26). Native evergreen and drought deciduous shrubs were at low to moderate cover in the understory (top Bobcat Ridge figure from 2019 data Fig. 26).





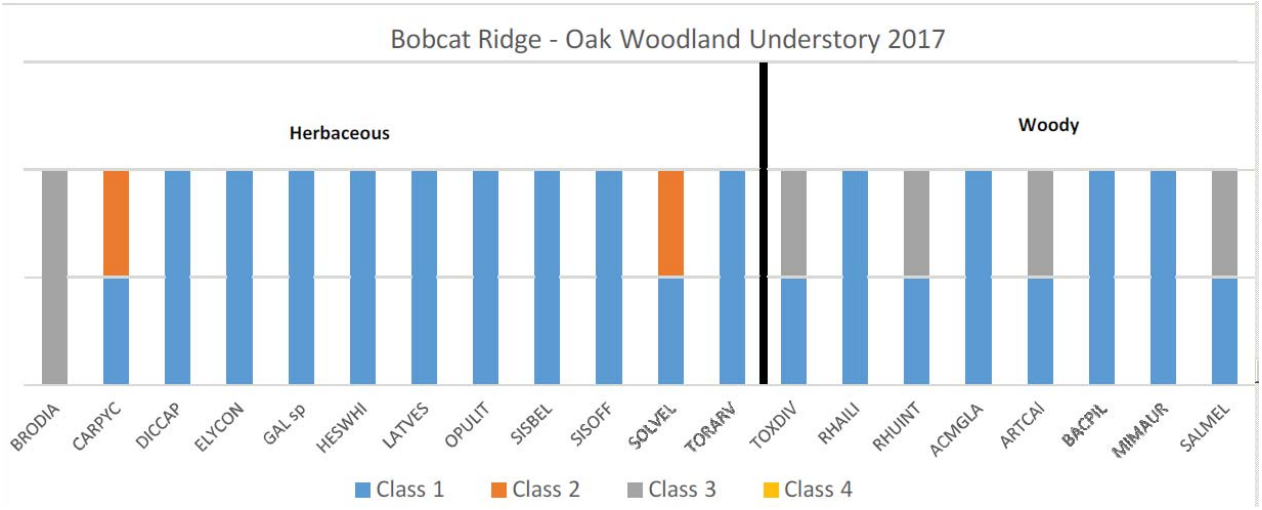
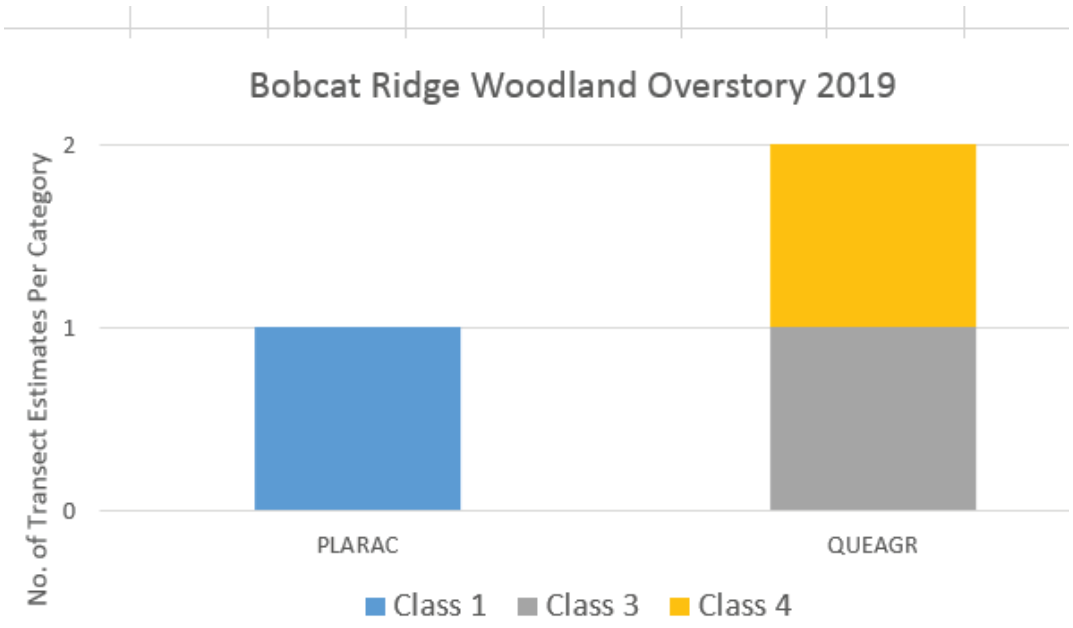
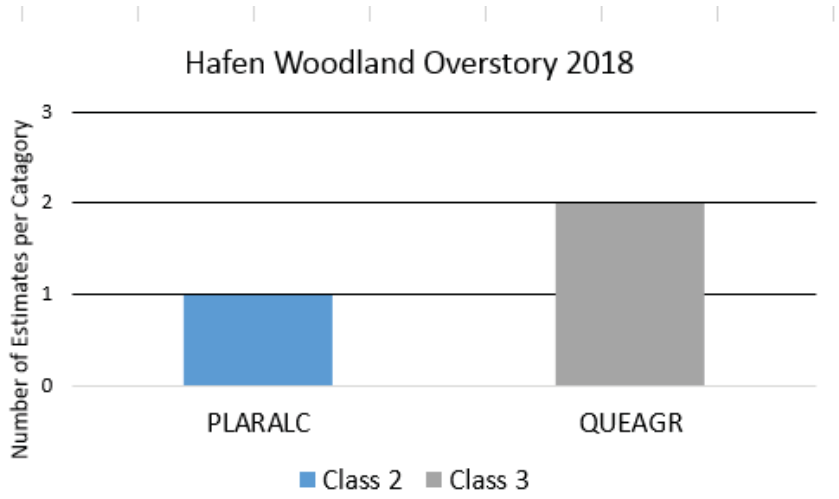


Fig. 26. Woodland understory story cover estimates (see methods) per cover category at the Bobcat Ridge South preserve (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5 = >70 - >100%). All species are native except for *Bromus diandrus* (BRODIA, non-native annual grass), *Carduus pycnocephalus* (CARPYC, Italian thistle), *Sisymbruim officinal*e (SISOFF, hedge mustard), and *Torilis arvensis* (TORARV, hedgeparsley). Top graph from 2019, middle 2018, bottom 2017.

The woodland canopy at Bobcat Ridge was dominated by *Q. agrifolia* (Figs. 27-29) and, in the riparian woodland, lower canopy cover of Western sycamore, *Platanus racemosa* (Figs. 27-29). As in past years in the oak woodland next to Live Oak Canyon Road, the crew saw human disturbance (trash). *Schinus molle* was again observed in 2019 (one tree) as in other years.





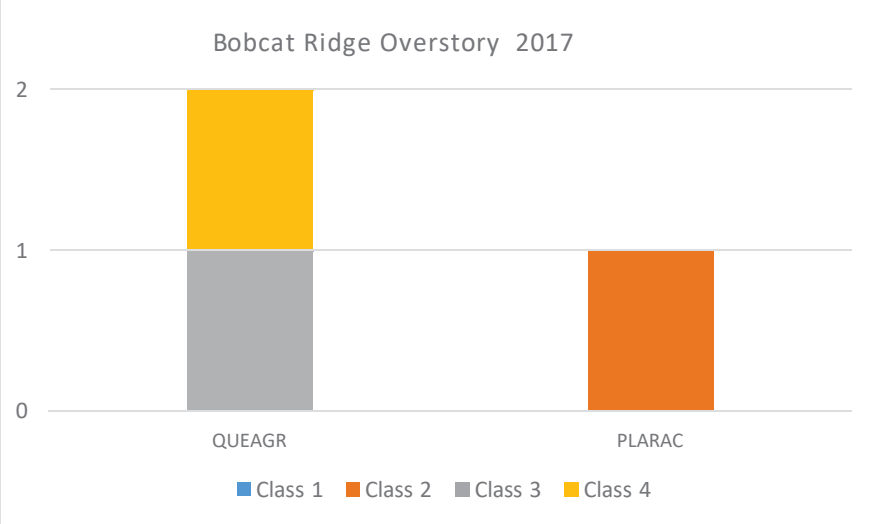


Fig. 27. Woodland native overstory cover estimates (see methods) per cover category at the Bobcat Ridge preserve (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5 = >70 ->100%).

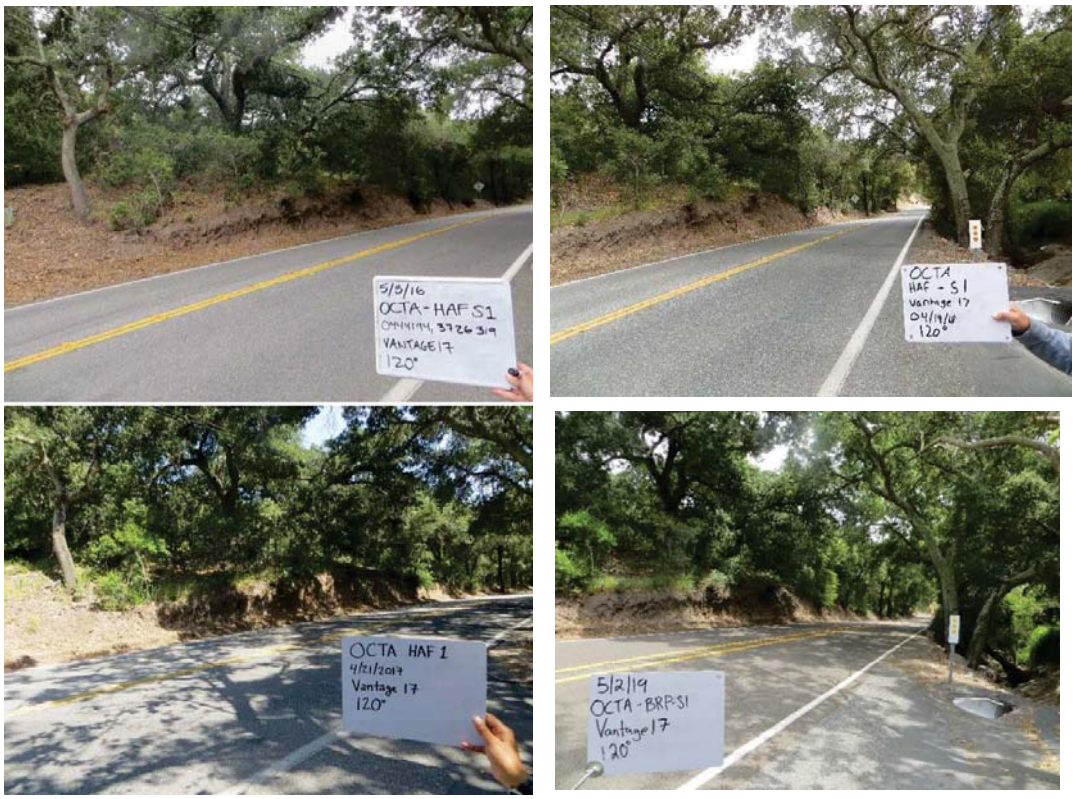
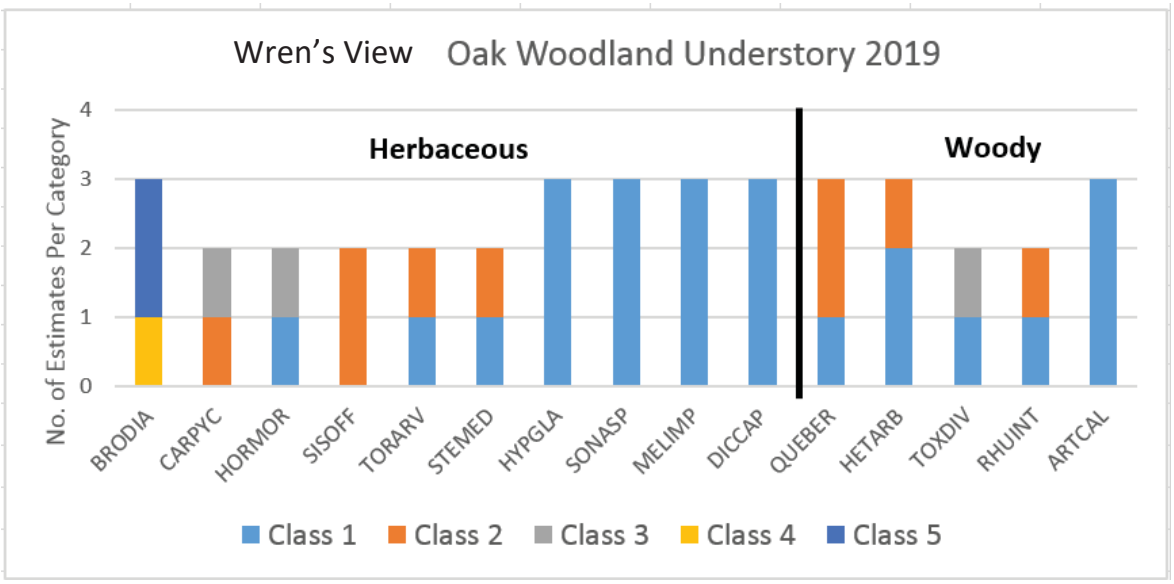
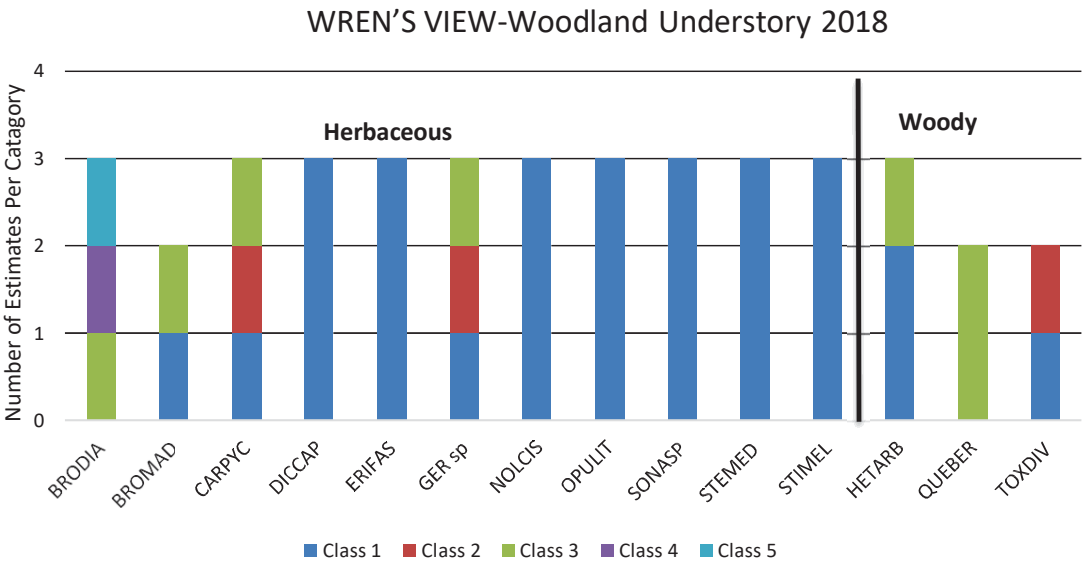


Fig. 28. Vantage point 17 photo of coast live oak woodland from 2017 on Bobcat Ridge preserve (V 17)

Fig. 29. Vantage point 9 photo of riparian woodland (in the wash at the base of two slopes near the photo center) from 2016 on Bobcat Ridge preserve (V9C).

Woodlands cover only about 11% of the Wren's View preserve. In 2016 there were marked differences between the cattle-disturbed woodland at the west edge of the preserve and the other relatively pristine woodland polygons. In the understory in 2016, Wren's View woodlands had the highest numbers of non-native species. Similar trends continue in the woodland understories in 2017 - 2019: non-native annual grasses were observed in the cattle-disturbed (and other) woodlands and overall relatively higher cover (10-40%) of the native evergreen shrub *Q. berberidifolia* than at other preserves (Fig. 30). The woodland canopies appear sparser and the crew observed more dead trees as has been the case in the past only in the cattle-disturbed woodland. (Figs. 31 – 33). In the (formerly) cattle disturbed woodland, oak canopies continue to appear sparse and, additionally, one oak near an OCTA dirt road had signs of tree pest and disease, i.e. staining with exit holes (Figs. 34 - 35). Human disturbance was detected in 2019 only in the woodland adjacent to Live Oak Canyon Road.





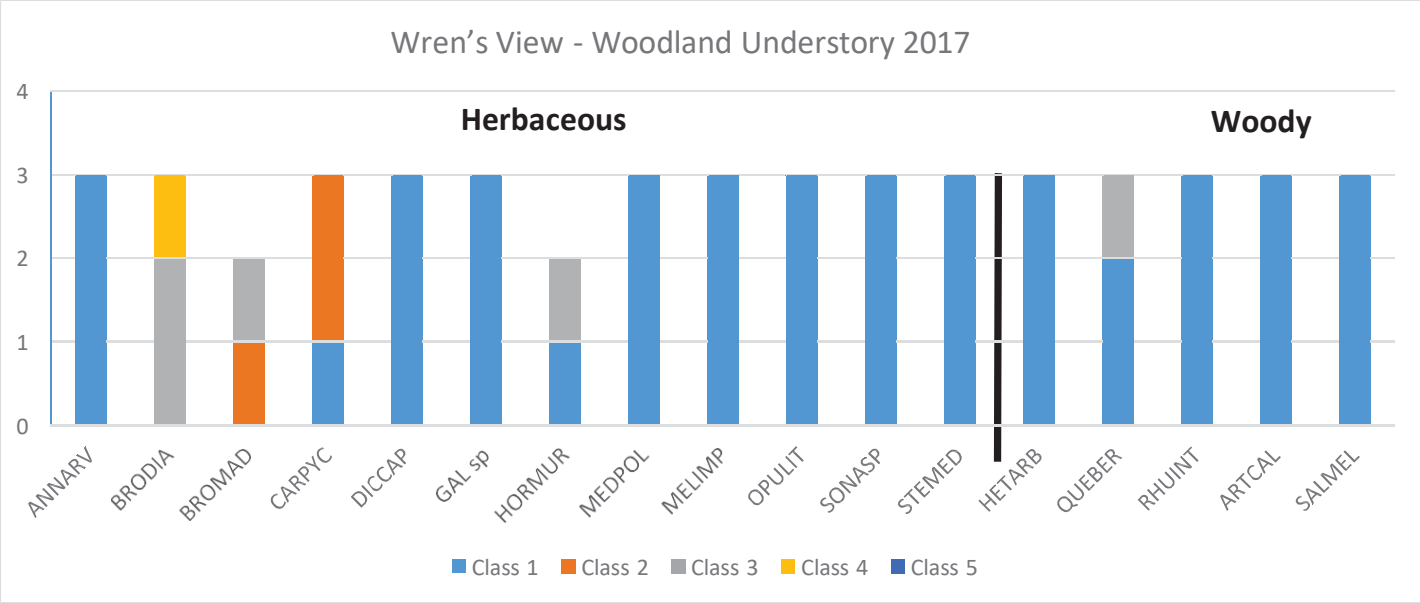
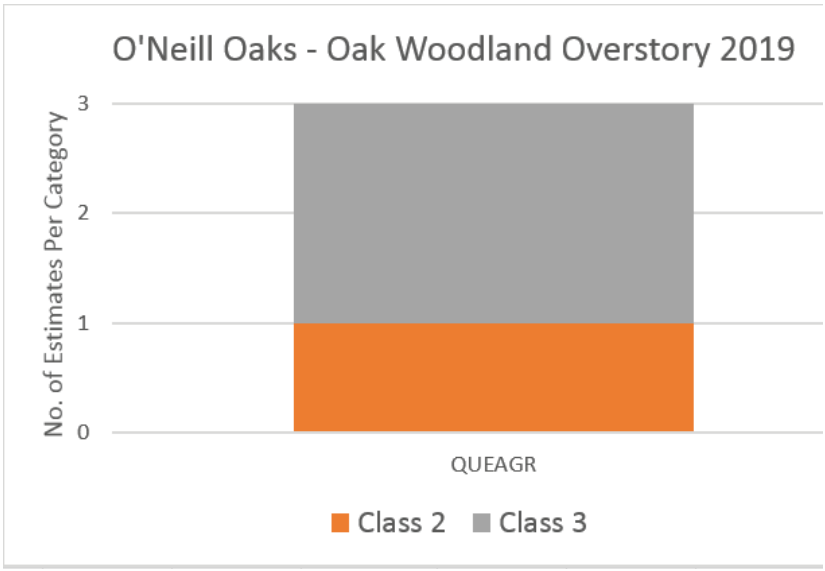
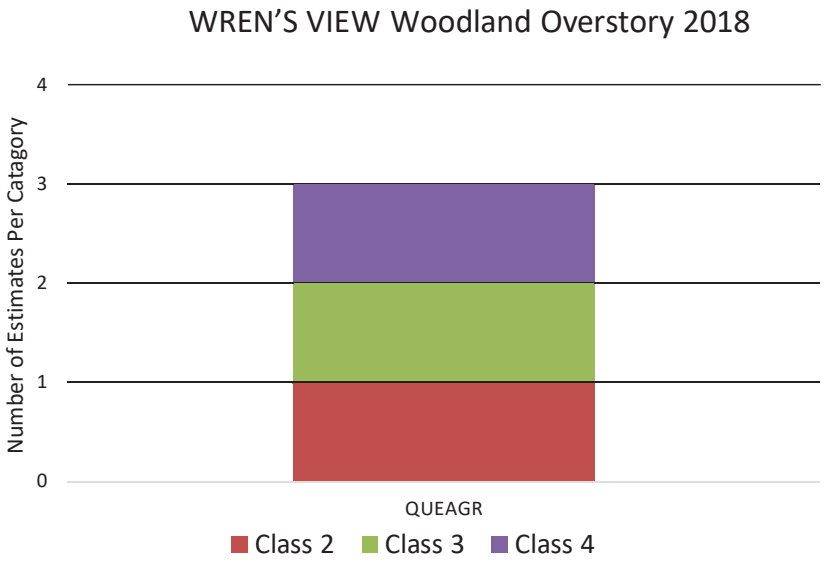


Fig. 30. Woodland understory cover estimates (see methods) per cover category at the Wren's View preserve (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5 = >70 - >100%). A cattle-disturbed woodland at the western edge of the preserve is included in the summary. All species are native except for forbs *Lysimachia arvensis* ("ANNARV" scarlet pimpernel) *Medicago polymorpha* (MEDPOL, bur clover), *Carduus pycnocephalus* (CARPYC), *Sonchus asper* (SONASP, spiny sowthistle), and *Stellaria media* (STEMED, chickweed) as well as non-native annual grasses BRODIA, BROMAD and HORMUR (*Hordeum murinum*, foxtail barley).





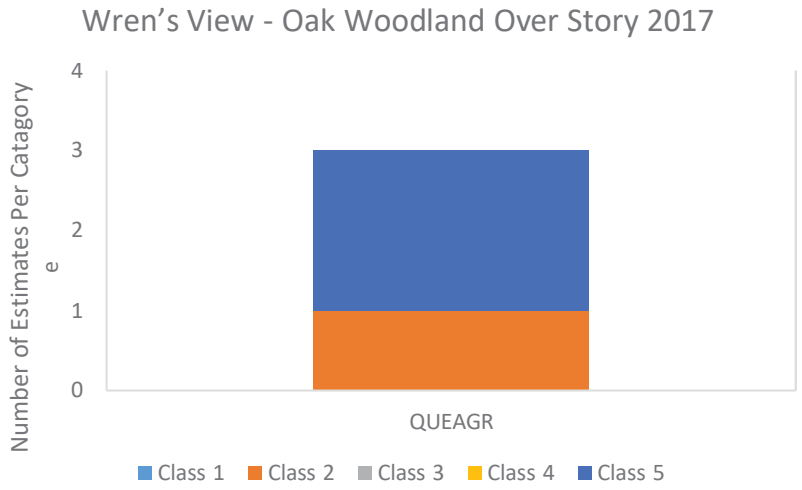


Fig. 31. Woodland overstory cover estimates (see methods) per cover category at the Wren's View preserve (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5 = >70 - >100%). A cattle-disturbed woodland at the western edge of the preserve is included in the summary.

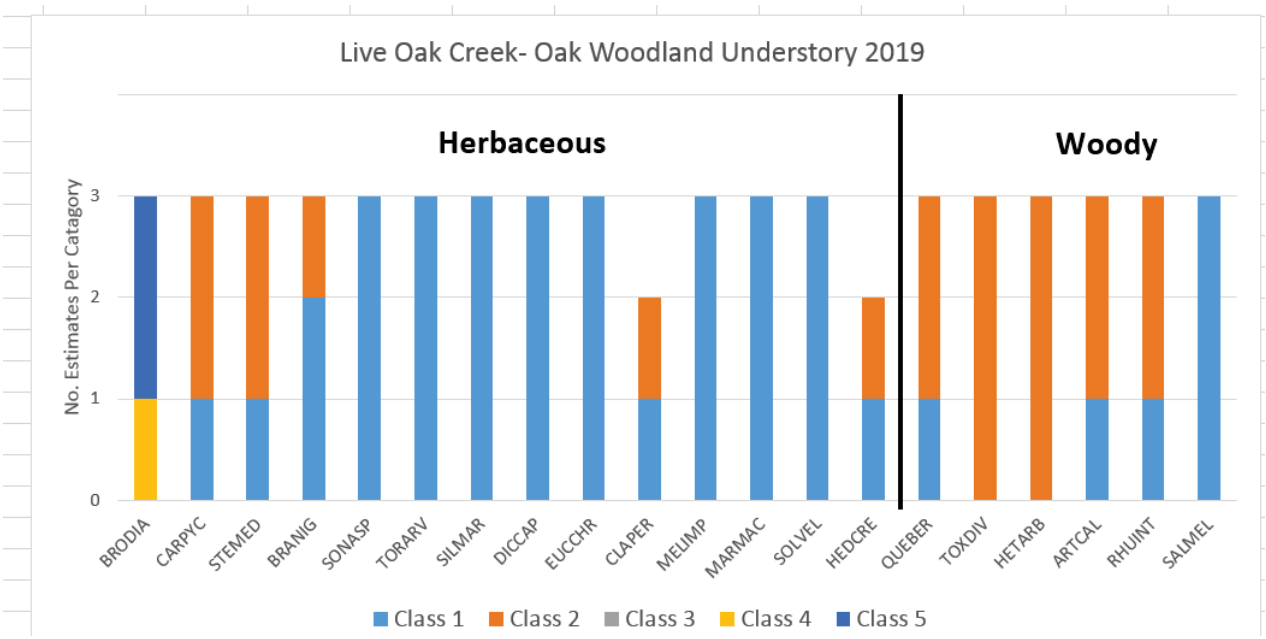
Fig. 32. Vantage point photo of coast live oak woodland in 2016-18 on Wren's View preserve (V1 T14, 180 degrees).

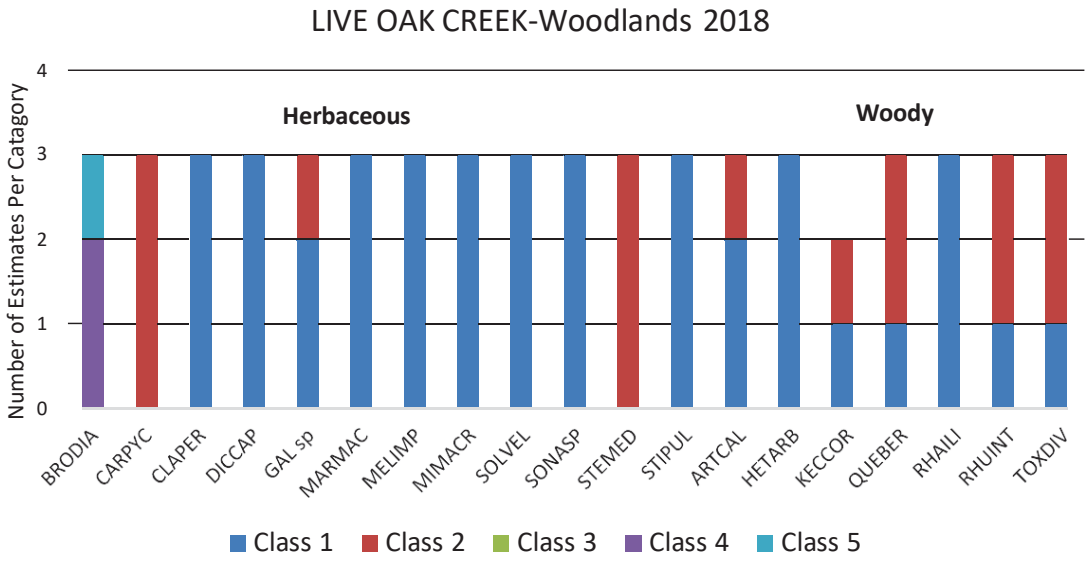
Fig. 33. Vantage point photo 18 taken in 2016-18 of coast live oak woodland on Wren's View preserve(V18, S2, 20 degrees).

Fig. 34. Vantage point photo from 2016-19 (year in top left photo incorrect) of under and overstory of cattle-disturbed coast live oak woodland on Wren's View preserve.

Fig. 35. Vantage point photos from 2016-19 of under and overstory of cattle-disturbed coast live oak woodland on Wren's View preserve.

In 2016 during baseline quantitative monitoring, highest numbers of understory species were observed in the Live Oak Creek preserve and were a mixture of native and non-native species and functional groups (shrubs, vines, native and non-native grasses and forbs). Understories appeared ± stable in 2017 and again in 2018 and 2019 (Fig. 36), with the non-native grass *B. diandrus* dominating. *Q. agrifolia* dominated in the relatively closed canopy woodland and appeared stable relative to 2017-18. *P. racemosa* only occurs in the north edge of the polygon near a stream and also appeared stable (Fig. 37-38). Non-native olive trees (probably *Olea europea*) were at moderate cover in the woodland at the central edge of the preserve. Olive trees were not recorded in 2016 quantitative sampling because Y clusters were located in clusters of four oaks. We again observed trash in the woodland bordering Live Oak Canyon Road.


Live Oak Creek- Oak Woodland Understory 2019
Herbaceous
Woody
No. Estimates Per Catagory
0
1
2
3
BRODIA
CARPYC
STEMED
BRANIG
SONASP
TORARV
SILMAR
DICCAP
EUCCHR
CLAPER
MELIMP
MARMAC
SOLVEL
HEDCRE
QUEBER
TOXDIV
HETARB
ARTCAL
RHUINT
SALMEL
Class 1
Class 2
Class 3
Class 4
Class 5


LIVE OAK CREEK-Woodlands 2018
Herbaceous
Woody
Number of Estimates Per Catagory
0
1
2
3
4
BRODIA
CARPYC
CLAPER
DICCAP
GAL SP
MARMAC
MELIMP
MIMACR
SOLVEL
SONASP
STEMED
STIPUL
ARTCAL
HETARB
KECCOR
QUEBER
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TOXDIV
Class 1
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Class 5

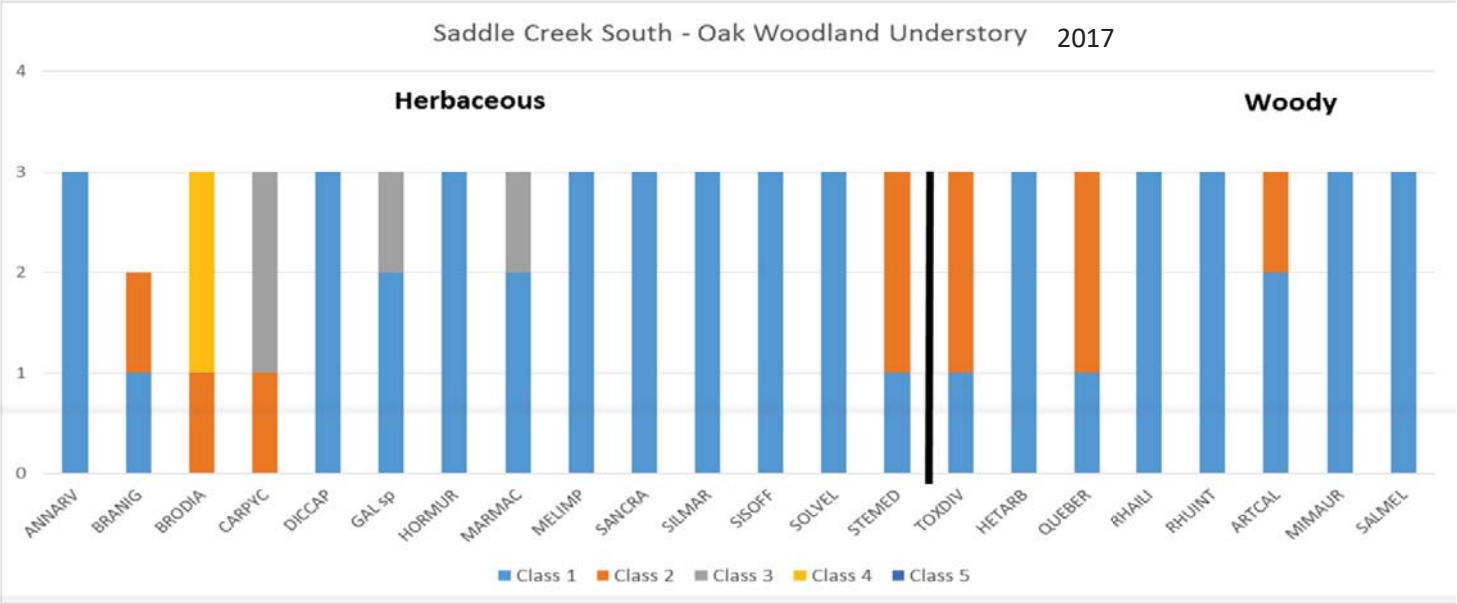
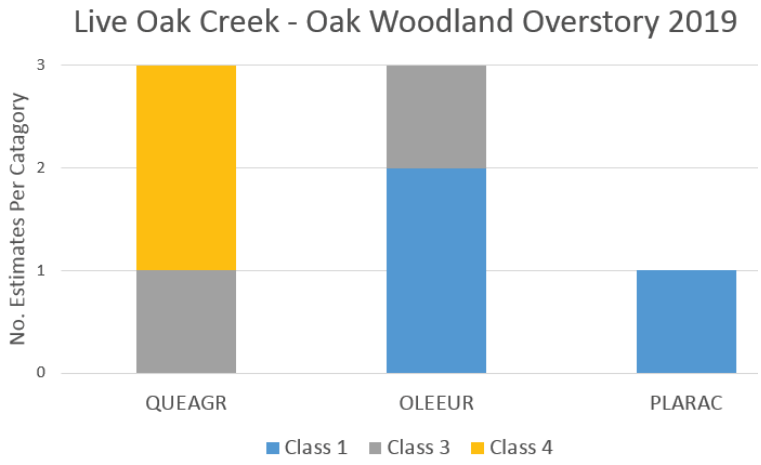
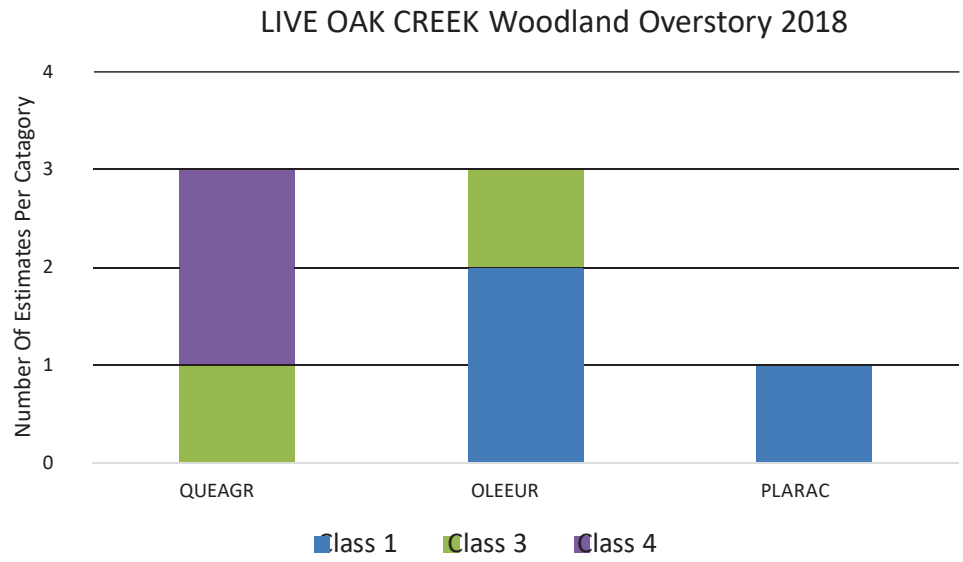


Fig. 36. Woodland understory cover estimates (see methods) per cover category at the Live Oak Creek preserve (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5 = >70 - >100%). A cattle-disturbed woodland at the western edge of the preserve is included in the summary. All woody species are native; whereas over half of the herbaceous species are non-native.





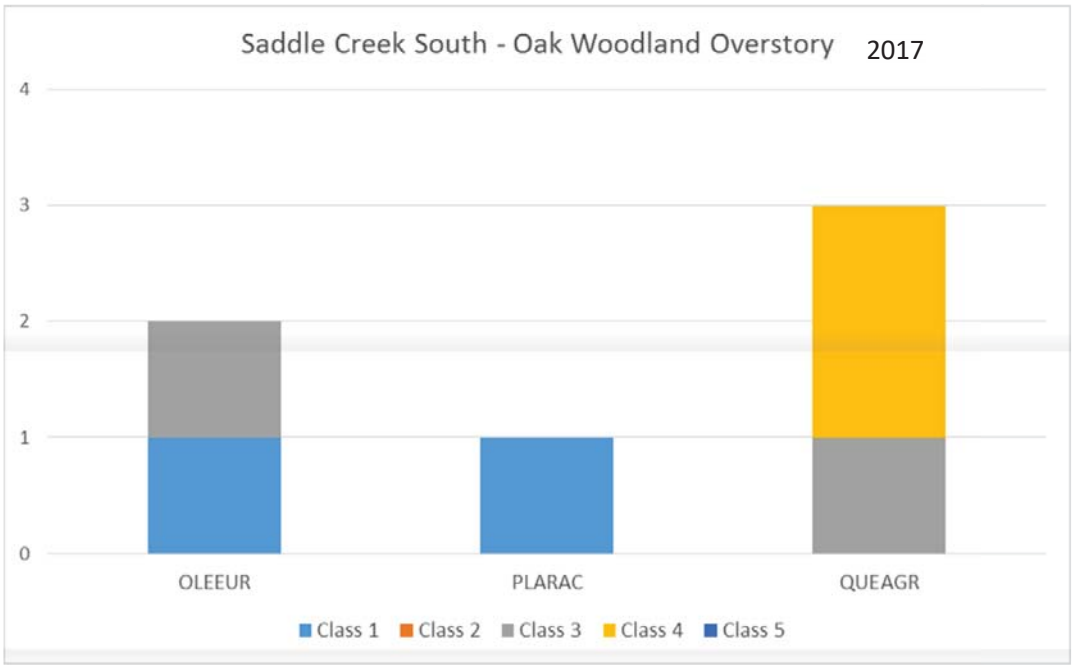


Fig. 37. Woodland overstory cover estimates (see methods) per cover category at the Live Oak Creek preserve (1 - 5 with 1 = 1 - 5%; 2 = > 5 - 10%; 3 = > 10 - 40% 4 = > 40 - 70%; 5 = >70 - >100%). All species are native except for olive, *Olea europea* (OLEEUR).

Fig. 38. Vantage point photo 12 taken in 2016-19 of coast live oak woodland on Live Oak Creek preserve

Discussion and Recommendations

Researchers predict that worldwide human and natural environments will experience extreme weather events related to the changing climate (National Academies of Sciences, Engineering, and Medicine. 2016). After the relatively high rainfall season of 2016-17 during which Southern California experienced intense rainfall events, in the 2017- 18 season temperatures hit record highs during an extended period of hot weather in July

(Boxall 2018). Additionally, the 2017-18 season was the second driest since 2007 (5.6" cumulative annual rain recorded at Audubon Starr Ranch). But our surveys took place in April just after 2.4" rain in March, so the data did not reflect effects of extreme heat or drought. Conversely, rainfall in Southern California was well above average in 2018-19 (24.4" cumulative annual rainfall recorded at Starr Ranch) and we had one of the hardest non-native control seasons in the 20 years of our invasive control and restoration project. But similar to the 2017-18 season, April surveys detected only early season non-natives (e.g. *Brassica nigra*) and not later erupting species such as *Centaurea melitensis* which flowered in June and was observed in unusually high cover in both coastal sage scrub and grasslands at Starr Ranch (S. DeSimone personal observation). We expect that OCTA preserves experienced a similar explosion in shrublands and grasslands.

Vegetation at the Bobcat Ridge, Wren's View, and Live Oak Creek preserves was generally stable in 2019 compared to 2017-18 qualitative observations, but with relatively higher cover of non-native mustards (*H. incana, B. nigra*) and reduced tree canopy cover in two preserves (Bobcat Ridge and Wren's view). Following are major changes or otherwise noteworthy observations in 2019:

- Chaparral at all three preserves remained stable relative to previous seasons. As in the previous seasons, in our 2017 observations, chaparral understory at Wren's View preserve was unique among the three sites with relatively high cover of the annual grass species *Bromus diandrus* but concentrated in one area adjacent to a cattle disturbed oak woodland.
- Bobcat Ridge preserve CSS had especially high cover of the non-native annual grass *B. madritensis* and the forb *Hirschfeldia incana* in 2019. The Live Oak Creek white sage subtype of CSS had high cover of *B. diandrus* in 2019. This polygon is adjacent to a road and might experience higher levels of disturbance than other CSS polygons.
- In coastal sage scrub on the Wren's View preserve, 2019 saw an increase in non-native cover, *H. incana* and *B. madritensis*. The sage scrub shrubs appear otherwise in excellent condition. The succulent *Opuntia littoralis* was also present and in good condition.
- The non-native shrub *Nicotiana glauca* was again observed in the CSS or chaparral at all three sites as scattered individuals. At Wren's View, there is at least one small patch of this species in the road, which we suggest be removed.
- In 2019 as in 2017, both relatively high rainfall seasons, Live Oak Creek grasslands experienced eruptions of mustard species (*Brassica nigra* and *Hirschfeldia incana*) and high non-native annual grass biomass similar to other preserves in Orange County and elsewhere in Southern California. *Stipa pulchra* cover in the native needlegrass grassland was difficult to determine due to low visibility from extremely tall and dense *B. nigra*.
- In 2019 we observed a decline in woodlands in Bobcat Ridge and Wren's View (i.e. thinning canopies) but not on Live Oak Creek preserve. For the first time since 2016 the crew observed signs of tree disease (i.e. *Fusarium* dieback staining) and crown, limb and tree dieback on Wren's View property. Woodland understories were stable with non-native annual grasses and forbs dominating under the

relatively open tree canopy of the (formerly) cattle-disturbed Wren's View woodland. We again reported many olive trees in one larger Live Oak Creek woodland.

- The polygon designated "coast live oak woodland" at the northwest edge of the Live Oak Creek preserve continues to include an old home site with many ornamentals, including oleander, succulents, fruit trees, and pines as well as non-natives such as *Foeniculum vulgare* (fennel).

Following five seasons of drought, 2018-19 was an above average rainfall season. Survey results largely reflect the higher rainfall. The changing climate will likely bring increased shifts in vegetation over the coming years. Southern California is expected to become increasingly warmer and drier with the possibility of periods of intense rainfall during the rainiest months of December through February(Allen and Luptowitz 2017). That pattern, as we have emphasized, was most evident in summer 2018 and early winter 2019. We continue to suggest regular visits to CSS and grassland during spring months to check for and, where possible, control invading grasses in CSS but especially dicot non-natives in both habitats, as well as concentrated non-native removal in the chaparral adjacent to the cattle disturbed woodland at Wren's View.

We further reiterate the importance of continued monitoring of woodland health and the removal of olive trees in Live Oak Creek as well as ornamental and other potentially invasive species (e.g. fennel) from the area mapped as oak woodland in the northwest corner of the Live Oak Creek preserve. The abandoned buildings in this area have the potential to become a hazard. Planting of oaks may help to close the canopy and perhaps reduce the non-native cover in the understory of the formerly cattle-disturbed Wren's View woodland.

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