APPENDIX C

Quino Checkerspot Butterfly Management/Enhancement Plan

APPENDIX K

QUINO CHECKERSPOT BUTTERFLY MANAGEMENT/ENHANCEMENT PLAN
For ALTERNATIVE H
for the
OTAY RANCH RESORT VILLAGE
GPA 04-003; SPA 04-002; R04-009; TM 5361RPL; S08-028;
ER#04-19-005; KIVA#03-1004387

Prepared for the County of San Diego

On behalf of:

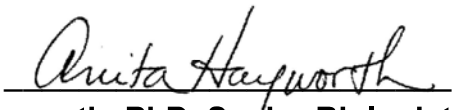
Baldwin & Sons LLC
610 West Ash Street, Suite 1500
San Diego, California 92101
Contact: Mr. Stephen Haase
619.515.9109

and

Moller Otay Lakes Investments, LLC
6591 Collins Drive, Suite E-11
Moorpark, California 93021
Contact: Mr. Chuck Miller
805.299.8214

Prepared by:

Dudek
605 Third Street
Encinitas, California 92024
760.942.5147



Anita M. Hayworth, PhD, Senior Biologist

MARCH 2019

Printed on 30% post-consumer recycled material.

TABLE OF CONTENTS

Section **Page No.**

TABLE OF CONTENTS (CONTINUED)

Section **Page No.**

FIGURES

TABLES

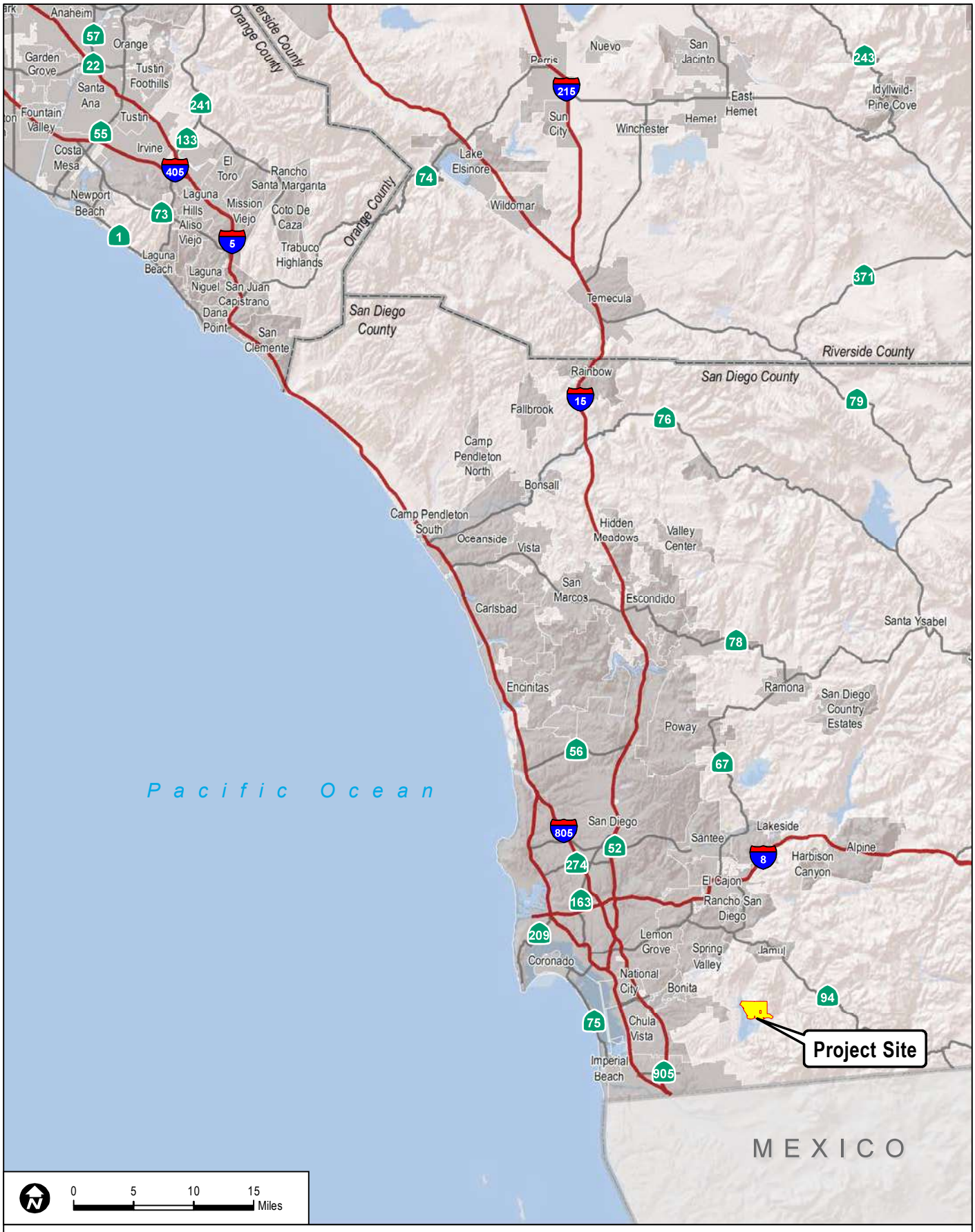
Quino Checkerspot Butterfly Management/Enhancement Plan for the Otay Ranch Resort Village – Alternative H

INTRODUCTION

The Otay Ranch Resort Village Alternative H Specific Plan area (i.e., project area) is located in southwestern San Diego County, approximately 13 miles east of the Pacific Ocean and 6 miles north of the international border with Mexico (Figure 1). The site comprises approximately 1,869 acres and is designated for residential and resort development and open space by the Otay Subregional Plan (SRP; Otay Ranch 1993). The site is located in the Proctor Valley Parcel of Otay Ranch, approximately one-quarter mile east of the City of Chula Vista (Figure 2). As part of the planning of Otay Ranch, several villages and planning areas were designated for various types of development while other areas were reserved for preservation of multiple species and habitats. An effort was undertaken to plan development of the Otay Ranch so as to conserve sensitive/protected species and habitats in the region, connect important wildlife corridors and set up a fully funded and managed preserve system.

The County of San Diego, in conjunction with the wildlife agencies (U.S. Fish and Wildlife Service [USFWS] and California Department of Fish and Wildlife [CDFW]), are in the process of developing a regional mitigation strategy for the Quino checkerspot butterfly (*Euphydryas editha quino*). In anticipation of this, a proposed amendment to the County's Multiple Species Conservation Plan (MSCP) Subarea Plan 10(a)(1)(B) permit and Natural Community Conservation Planning (NCCP) approvals in being developed to add Quino checkerspot butterfly to the covered species list and exempt incidental take of this species under ESA for County authorized projects (i.e. Quino Addition). Since the County of San Diego Quino Amendment (Quino Addition) (County of San Diego 2010) is in draft form, and the contents of the "regional strategy" are unknown, this document has been developed as a project specific mitigation and monitoring strategy to ensure the continued occupation of the project site by the federally listed endangered Quino checkerspot butterfly. Implementation of this plan provides mitigation for on-site impacts associated with the construction of Alternative H and, when combined with an adopted Quino Addition and subsequent regional mitigation strategy, will assist in the recovery of Quino checkerspot butterfly throughout the County. This management plan describes the on-site preserve complex and history, biological resources, the management and monitoring strategy, area-specific management directives, including restoration, methods for conducting pre- and post- development surveys for the Quino checkerspot butterfly and associated habitat, coordination between land owners and agencies, property stewardship, and fire management. Costs and associated funding for the plan are also discussed.

INTENTIONALLY LEFT BLANK



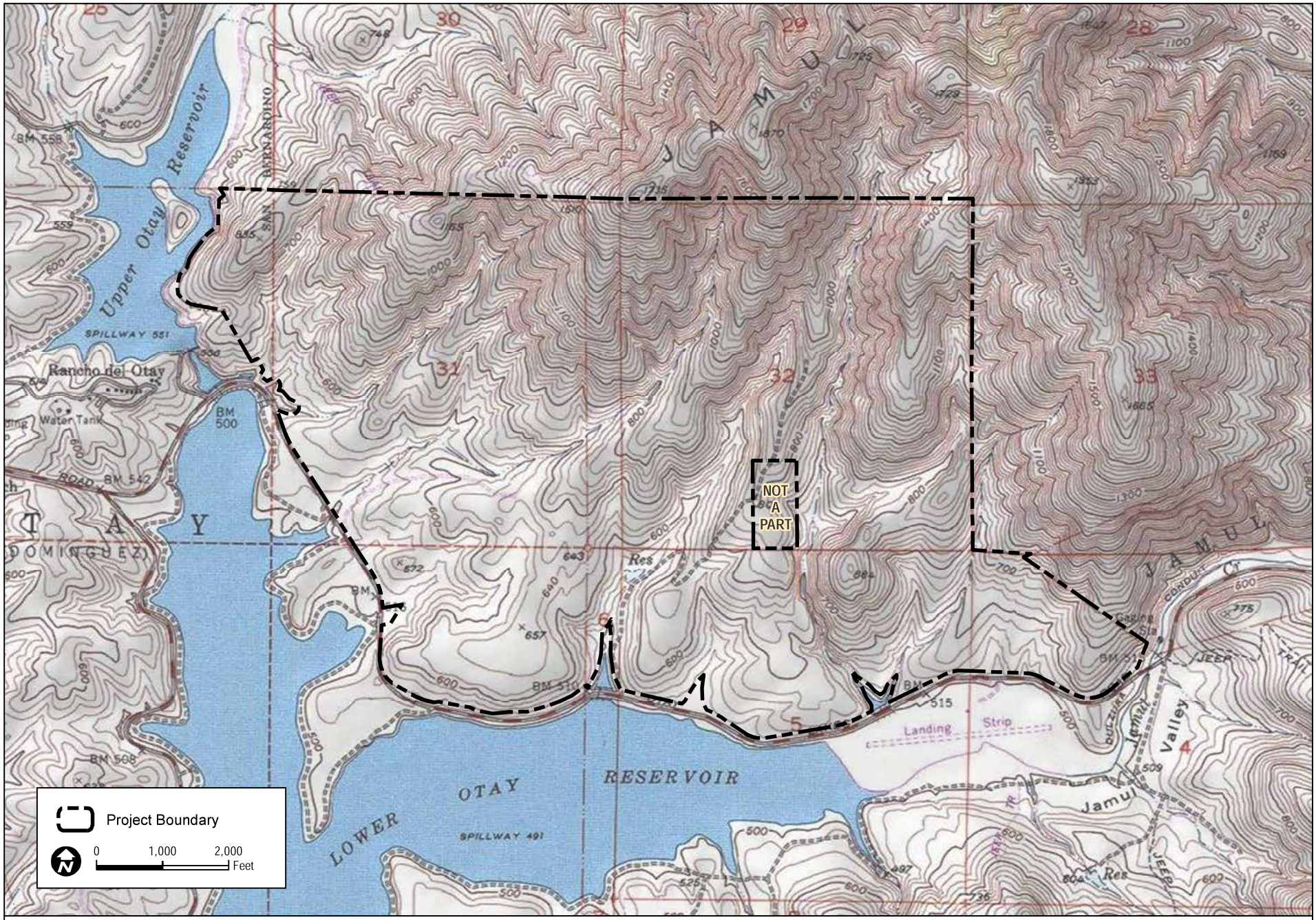
Document Path: Z:\Projects\j652401\MAPDOC\MAPS\QCB Enhancement\QCB Fig1 Regional.mxd

DUDEK

FIGURE 1
Regional Map

Otay Ranch Resort Village Site - Quino Checkerspot Butterfly Management/Enhancement Plan

INTENTIONALLY LEFT BLANK



SOURCE: USGS 7.5 Minute Series, Jamul Mountains Quadrangle

DUDEK

FIGURE 2
Vicinity Map

Otay Ranch Resort Village Site - Quino Checkerspot Butterfly Management/Enhancement Plan

Document Path: Z:\Projects\jl652401\MAPDOC\MAPS\QCB Enhancement\QCB Fig2_Vicinity.mxd

INTENTIONALLY LEFT BLANK

1 PRESERVE COMPLEX DESCRIPTION AND HISTORY

1.1 Geographic and Functional Setting and Regional Ecological Significance

1.1.1 NCCP Name, Name of Preserve Complex, and MU

Alternative H is located within the San Diego County MSCP Subarea Plan South County Segment (South County MSCP). The site includes an approximately 1,177 acre Otay Ranch RMP Preserve plus Conserved Open Space generally in the northern and north-eastern portions of the project site. A total of 787 acres will be conveyed as part of the approval of Alternative H and the entire onsite Otay Ranch RMP Preserve will be protected by a biological open space easement. The Conserved Open Space will be provided a conservation easement to protect in perpetuity. More specifically, the proposed Otay Ranch RMP Preserve plus Conserved Open Space is located within the Janal Management Unit 3 (MU3) as described in the Management Strategic Plan for Conserved Lands in Western San Diego County (SDMMP 2013a). MU3 encompasses the largest area of conserved lands within the Management Specific Plan Area (MSPA) and spans 126,253 acres over the eastern portion of San Diego County (See Figure 3-1, Map of MUs with corresponding numbers and names; SDMMP 2013a). The proposed preserve contained within the project area is not related to any existing preserve complex or Natural Community Conservation Plan (NCCP).

According to the Draft Quino Checkerspot Butterfly Amendment to the County of San Diego Multiple Species Conservation Program Subarea Plan (October 2010), Alternative H is located within the South County Quino Management Unit.

1.1.2 Relationship to Core Areas and Linkages and Management Strategic Plan

On-Site Cores and Linkages

The site currently functions as part of a large habitat block and would not be considered a habitat linkage or wildlife corridor. However, a portion of the project site was previously identified as a habitat linkage or movement corridor (Ogden 1992). This linkage is situated in a north–south direction through the eastern portion of the site and is identified as the R2 linkage. As shown in Figure 3, this linkage connects the open space areas of the Jamul Mountains to the north with Lower Otay Lake. This "north-south" connection to the lake should be considered a general guideline within the context of the property and surrounding land uses. Because Alternative H is consistent with the MSCP, there is no change to the analysis for the wildlife movement and the alternative complies with what the study has recommended.

Regardless, the goal is to allow the focal species to cross Otay Lakes Road; maintain suitable dimensions for the movement of these species; and enable movement of Quino checkerspot butterfly to resources

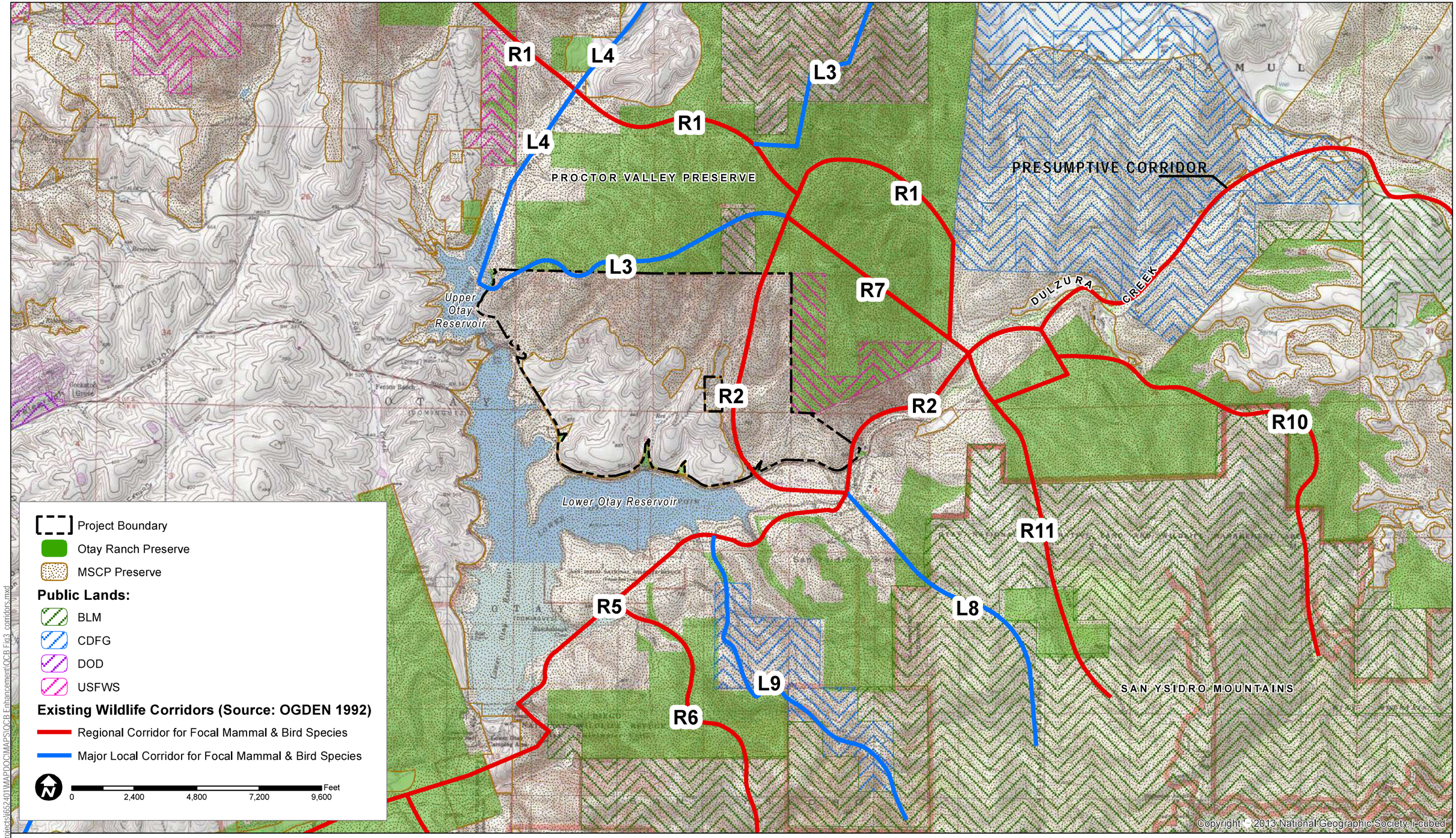
within the project site and to off-site areas. The project applicant has proposed to provide a wildlife culvert to encourage safe crossing of Otay Lakes Road.

Project Relationship to Management Strategic Plan

The Management Strategic Plan for Conserved Lands in Western San Diego County (MSP) identifies Quino checkerspot butterfly as a species management focus group within MU3 and considers the movement corridor in the Otay Lakes/Rancho Jamul occurrence complex areas (located southwest and northeast of the project area) as critical for the dispersal of the species (SDMMP 2013a). The site has been identified as a Quino checkerspot butterflyoccurrence complex and preservation of Quino checkerspot butterfly within the site is on par with the goals outlined in the MSP.

1.1.3 Relationship to Conserved Lands

As shown in Figure 3, the site is surrounded by a variety of public lands: at least 22,000 acres of the Otay Ranch RMP Preserve, U.S. Bureau of Land Management (BLM), and USFWS lands to the north; at least 9,000 acres of the Otay Ranch RMP Preserve, USFWS, Multiple Species Conservation Program (MSCP) Preserve, BLM, and California Department of Fish and Wildlife (CDFW) lands to the east; and at least 31,000 acres including the Otay Ranch RMP Preserve, CDFW, and BLM lands to the south. Combined, this is a total of 62,000 acres of open space in the form of preserves and public lands.



Document Path: Z:\Projects\j662401\MAPDOC\MAPS\OCB Enhancement\OCB Fig3_corridors.mxd

DUDEK

FIGURE 3

Existing Habitat Linkages/Movement Corridors

Otay Ranch Resort Village Site - Quino Checkerspot Butterfly Management/Enhancement Plan

INTENTIONALLY LEFT BLANK

The Resort Village Alternative H is part of the Otay Subregional Plan (SRP; Otay Ranch 1993). The Otay SRP established the overall development program for Otay Ranch, including the Otay Ranch Preserve. The Otay Ranch Preserve was identified as an 11,375-acre preserve which set aside the most important biological resources in a fully funded and managed system. As part of the development of the County of San Diego MSCP, the Otay Ranch RMP Preserve boundaries were incorporated; thus, the Otay Ranch RMP Preserve is generally contiguous with the County MSCP.

1.1.4 Preserve Complex Location within Watershed and Hydrologic Processes

MU3 contains the headwaters of the Otay River and mid-regions of the Sweetwater and Tijuana Rivers (SDMMP 2013a). The site lies within the watershed of the Otay River, a westerly flowing stream which drains an area of approximately 145 square miles. The site is upstream of Savage Dam, which creates Lower Otay Lake. Drainages bisect the mesas and generally run north to south, with the exception of one drainage which runs east to west from the center to the western edge of the property. Several stock ponds have been intentionally created along the drainages on the property.

1.1.5 Level of Fragmentation within Management Unit

MU3 is comprised primarily of undeveloped lands, of which 41% is either conserved lands in preservation or open space parks (SDMMP 2013a). With the largest area of conserved lands within the MSPA, MU3 consist of large blocks of open space with little to no fragmentation. As described above in Section 1.1.3, and shown in Figure 3, large contiguous areas of preserved lands abound the site. These include the Otay Ranch RMP Preserve and portions of the San Diego National Wildlife Refuge.

1.1.6 Jurisdiction, Land Owners, and Management Agencies for Preserve Complex

The site is currently owned by Baldwin & Sons LLC and Moller Otay Lakes, LLC and is wholly within the County of San Diego. On a region-wide basis, the site is within the boundaries of the County MSCP Subarea Plan South County Segment. More specifically, the site is within the Otay SRP. As part of the Otay SRP, Alternative H is subject to the requirements of the Otay Ranch Resource Management Plan (RMP), which establishes the Otay Ranch RMP Preserve, goals and policies for Preserve management and requirements for implementation of the Otay Ranch RMP Preserve.

Through the RMP requirement for preserve conveyance, Alternative H will convey the designated Preserve land at the required amount to the Otay Ranch Preserve Owner Manager (POM), which is currently made up of the County of San Diego and City of Chula Vista. A biological open space easement will be designated for the entire onsite Otay Ranch RMP Preserve as well as the Conserved Open Space. In addition, Alternative H is required to participate in preserve management funding, which provides that a Communities Facilities District (CFD) will be established on the developed

portions of the project area. This CFD charges a special tax against the developed portions of the site to perpetually fund the management and maintenance of the Otay Ranch Preserve.

These requirements have resulted in offers for conveyance of preserve land of approximately 3,200 acres (as of October 2014) within Otay Ranch and the establishment of the POM to monitor, manage and maintain these preserve areas. The conveyance and management of the preserve is being actively coordinated between the City of Chula Vista and the County of San Diego (as the POM) in consultation with the resource agencies. Relative to other portions of MU3, the other management agencies include Bureau of Land Management, California Department of Fish and Wildlife, and U.S. Fish and Wildlife Service National Wildlife Refuge lands as shown in Figure 3.

1.1.7 Role of MU and Contributions of Preserve Complex to this MU – Relationship to Regional Goals and Objectives

MU3 has several plant and wildlife species that are targeted for management focus, one of which is the Quino checkerspot butterfly. The SDMMP regional and unit management goal for this species states: "Within the identified USFWS Recovery Units (USFWS 2003) or 'Possible Future' Recovery Units in the MSPA, protect, restore, and enhance Quino checkerspot butterflyhabitat within currently occupied and historically occupied sites and the landscape connections between them to create resilient occurrences and to allow for potential reintroduction to ensure persistence over the long-term (>100 years)" (SDMMP 20113b). Specific goals related to MU3 include the following:

- Prepare five year implementation plan for management of multiple sites in MU3 that have diverse array of microclimates and are within 1 km of areas with larval host plants and that enhance connectivity between the Otay Lakes/Rancho Jamul occurrence and occurrences to the north in MU3;
- Support South County Grassland project development and testing of best management techniques to restore Quino checkerspot butterfly habitat;
- Establish seed bank for host and larval food plants and bulk as necessary for occurrence enhancement;
- Implement applicable pre-fire strategic plan actions;
- Implement high priority actions in implementation plan to maintain landscape connectivity between Otay Lakes/Rancho Jamul occurrence and complexes to the north in MU3 (SDMMP 2013b).

Preservation of habitat within the project area will conserve important habitat values within the region, and enhance connectivity to other preserves and open space areas within the vicinity (Figure 4).

The MSCP Subarea Plan identifies a "hard line" preserve/development boundary for the Otay Ranch Resort Village that reflects an agreement reached among the wildlife agencies and the Baldwin Company (the applicants' predecessor in interest) at the time that the MSCP Subarea Plan was approved. That hard line preserve/development boundary is closely followed with the design of Alternative H. In addition, the area that includes San Diego thornmint (*Acanthomintha ilicifolia*) and fairy shrimp occupied vernal pools have been included as Conserved Open Space. An area designated as development that is a narrow "finger" of development in the northwestern portion has been eliminated since it results in edge effects into the preserve, and the previously designated roadway that is an allowable use in the preserve has been eliminated. These areas are also Conserved Open Space. Overall, the development is consolidated to be consistent with the MSCP hardline and compared to the proposed project, will reduce edge effects. For the Quino checkerspot butterfly, the Otay Ranch RMP Preserve including Conserved Open Space contains hilltops and ridgelines for the male butterflies to do "hill-topping" to seek mates, contains populations of the larval hostplant and nectar source, vegetation with relatively open areas, and is a large unfragmented area that is adjacent to other areas occupied by the species.

1.2 Biological Resources

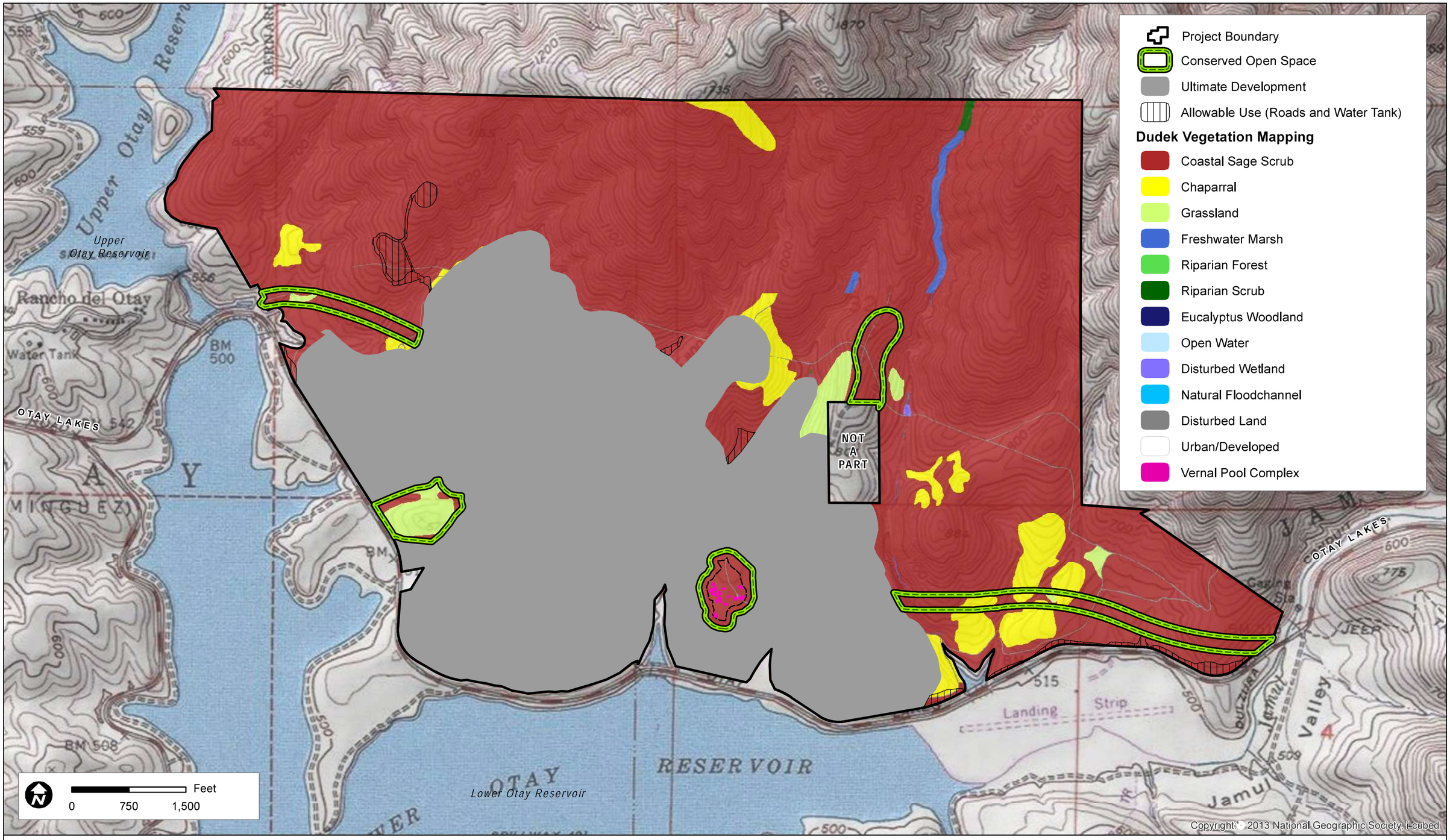
The Otay Ranch Resort Village consists of a broad mesa sloping to the south, broken by several steep canyons draining from north to south. Portions of the relatively flat mesa extend north into the Jamul Mountains, becoming part of steeper slopes. Site elevations range from approximately 500 feet above mean sea level (AMSL) at the southern end of the property to approximately 1,500 feet AMSL in the northeastern portions. The southern half of the site contains three large mesas (K6, K8, and K9 from west to east), an expansive relatively flat area in the west, and increasing elevations with steep canyons to the north

Prior to 2001, the southern half of the project area was used for ranching, specifically cattle grazing, and possibly crop cultivation purposes. In addition, crop cultivation likely occurred on the southwestern corner of the property decades ago. The site is bounded on the west and south by Otay Lakes Road; Jamul Creek intersects the site in the eastern portion. Lower Otay Lake (which is owned by the City of San Diego) is located south of the site; open space in the Jamul Mountains is adjacent to the site in the north and east (which is owned by the UBLM and private parties).

1.2.1 Summary of Rapid Ecological Assessment

Biological surveys of the project site have been conducted by Dudek biologists from spring 1998 to spring 2016 to assess the existing conditions of biological resources on site and quantify the impacts that are proposed based on the current development plan. Surveys included vegetation mapping, plant and wildlife inventories, focused surveys, and a jurisdictional wetland delineation,

which was updated in 2014. Additionally, a focused survey was conducted for the Quino checkerspot butterfly in 2016 to provide more population information and provide detailed density mapping of the host plant (Dudek 2016). This description of existing conditions summarizes the results of these surveys, which are described in greater detail in the Otay Ranch Resort Village Biological Resources Technical Report (Dudek 2015) and the focused survey report (Dudek 2016).



Document Path: Z:\Projects\lj652401\MAPDOC\MAPS\QCB Enhancement\QCB Fig4_UltimatePreserveVeg.mxd

DUDEK

FIGURE 4

Ultimate Preserve Vegetation

Otay Ranch Resort Village Site - Quino Checkerspot Butterfly Management/Enhancement Plan

INTENTIONALLY LEFT BLANK

Based on previous visits and surveys of the site and to be conservative with the focused surveys, the entire 1,869-acre site was considered to be potentially suitable for Quino checkerspot butterfly and no exclusion areas were drawn; thus, the entire site was surveyed for Quino checkerspot butterfly during each survey effort. Based on the results of these surveys, it has been determined that there are areas that are not suitable including non-native grasslands that are fully closed canopy dense grass or are mapped as non-native grassland but are fully closed canopy with species of *Erodium*. A habitat assessment for Quino checkerspot butterfly was conducted in spring 1998 and 1999 by biologists at Dudek. These assessments were the basis for where the Phase II adult flight surveys were conducted on the site for the first time in spring 1999. The entire site was covered over a 2-year period in spring 1999 and 2000. A modified protocol survey of the Otay Ranch RMP Preserve area was conducted in 2004 and was defined as "treasure hunt" survey with the goal of maximizing survey time within areas of highest potential for Quino checkerspot butterfly detection. The entire site was surveyed again in 2008 to refresh the surveys and because the conditions seemed ideal for the species. In addition, in 2008, Dudek conducted surveys for a total of 30 points selected by the USFWS as part of the Quino checkerspot butterfly range-wide study. The results for both the focused presence/absence survey and the range-wide study were included in the 2008 focused survey report (Dudek 2008).

Focused surveys of the entire site in 1999 and 2000 resulted in the observation of 48 individuals. The 2004 surveys of the proposed Preserve resulted in observation of 1 individual in the northwestern corner. This resulting number of observations was low and was not surprising because the conditions were very poor for development of the host plant due to a low rainfall year.

In 2008, when environmental conditions were ideal for development of host plant and the ensuing development of the Quino checkerspot butterfly, focused protocol surveys were conducted for the entire site. The survey area again included the entire approximately 1,869 acres of the property including those areas currently proposed for development. This 2008 survey provides the baseline survey information for the pre-construction analysis of the Quino checkerspot butterfly population as well as the suitable habitat for the species. The USFWS also located range-wide survey points outside of the property. The results from these points provide information on adjacent use of the off-site areas by the species.

The focused survey for the Quino checkerspot butterfly was conducted on the site from March 12 through April 18, 2008, by Dudek biologists Anita M. Hayworth, Ph.D. (TE-781084), Brock A. Ortega (TE-813545-5), Dave W. Flietner (TE-008031-1), Jeff D. Priest (TE-840619-2), Kam J. Muri (TE-051250-0), Jun Rong Powell (TE-006559-3), Tricia Wotipka (TE-840619-2), Paul M. Lemons (TE-051248-2), and Vipul R. Joshi (TE-019949-0).

The site was divided into 23 survey polygons, each representing a single day survey effort (i.e., 4 to 6 survey hours to be in accordance with USFWS protocol) (Table 1). These survey areas were

numbered and assigned to Dudek's permitted biologists. The biologists were provided with 300-scale aerial photographs for mapping Quino checkerspot butterfly and 200-scale aerial photographs for mapping host plant populations. The survey maps included previous vegetation mapping, topography lines, and survey area boundaries. Binoculars were used to aid in detecting and identifying butterfly and other wildlife species. Global Positioning System (GPS) units also were available for recording locations of Quino checkerspot butterfly and host plant populations.

Table 1
2008 Quino Checkerspot Butterfly Survey Polygons

Survey Area Number	Acreage of Survey Area
1	85.7
2	82.7
3	81.6
4	68.4
5	80.8
6	85.0
7	95.8
8	89.0
9	81.6
10	83.7
11	84.7
12	81.4
13	88.3
14	70.3
15	57.8
16	90.6
17	93.6
18	88.0
19	85.7
20	86.3
21	75.3
22	71.7
23	81.5

The survey methodology consisted of slowly walking a meandering transect throughout all Quino checkerspot butterfly potential habitat areas within the survey assignment. The adult surveys were conducted under generally favorable weather conditions: typically between the hours of 0900–1600, variable skies, 60°F–80°F, and light breezes. For each survey visit, the biologist recorded the survey conditions.

Aerial photographs of each survey area were provided to each biologist and the locations of host plants were recorded directly onto the 200-scale map. Locations were also recorded using GPS. For each location recorded as a point, attributes also were recorded that indicated if the population was dense (plants touching) or sparse (plants not touching). For patches larger than 1 acre, a polygon was drawn on the map or recorded using GPS and the same attribute was recorded.

A total of 87 Quino checkerspot butterfly were observed and recorded during the Quino checkerspot butterfly focused survey on the property (Figure 5). A number of these observations took place in the same location from one week to the next, and photographs documented that the individuals were likely the same based on review of wing damage and coloration, thus a number of these observations were considered duplicate counts and the total number of unique observations was determined to be 71.

Quino checkerspot butterfly were especially observed on hilltops and along the ridgelines in the eastern and central portions of the site. Numerous observations of Quino checkerspot butterfly were recorded in weeks 1 through 3 of the focused survey. No Quino checkerspot butterfly were observed during surveys conducted in the fourth week, from April 6 through April 12, 2008. The presence/absence survey was stopped after four full survey weeks. However, the survey of the range-wide Quino checkerspot butterfly survey points was continued into the fifth week. No observations of Quino checkerspot butterfly were made in either week 4 or week 5 of the survey. Stopping the presence/absence survey after four weeks was discussed extensively with Alison Anderson, USFWS. Based on the reduced numbers observed with each succeeding week, the lack of any observations within Week 4, and the overall drying of the host plant, the USFWS concurred that stopping the survey was acceptable.

Host plant locations were recorded over much of the site as illustrated on Figure 5. Large polygons of dot-seed plantain were observed within survey areas 12, 13, 16, and 17. Smaller patches of plantain, recorded as a point location, were observed scattered throughout much of the site and were especially noted in survey areas 5, 7, 9, 10, 16, 18, and 19. The other host plant species that was recorded for the site, owl's clover, was observed in areas 11, 16, and 17 as sparse large polygons. Smaller patches of owl's clover were recorded as point locations and were observed in survey areas 11, 16, 17, 18, and 23.

In 2016, focused surveys were conducted on the entire site in accordance with the description in the most recent Quino checkerspot butterfly survey guidelines (December 15, 2014) as modified by the 2016 Building Industry Association (BIA) deviation with the additional deviation of conducting three weeks of surveys. So the methods for the survey included much of the 2014 protocol, as modified by the 2016 BIA deviation, with an added deviation specific for Otay Ranch Resort Site.

According to the December 15, 2014 USFWS protocol, the first weekly survey shall begin during the third week of February and the survey season will end the second Saturday in May. Surveys shall be conducted weekly and spaced no closer than 4 days apart. To avoid starting the survey effort prior to the onset of the flight of the butterfly, Dudek conducted the 2016 surveys in accordance with the protocol outlined in the negotiated *Proposed 2016 Quino Checkerspot Survey Protocol* (BIA 2016). This proposed protocol was prepared in conjunction with the USFWS. The proposed protocol combines elements of the 2002 and 2014 (early and late) protocols with key modifications to the 2014 FWS Quino survey guidelines (December 15, 2014) including:

- A reference site was surveyed to determine the life stage of Quino and define the flight season.
- Surveys were initiated within one week of observed Quino flight at the reference site(s).
- Host plant were mapped as a separate effort following the methods used in 2014 by Helix Environmental for the Village 14 project with the exception that density was mapped rather than absolute number: host plant species will be mapped in patches of low density (11 - 100 plants), medium density (100 – 1,000 plants), and high density (1,000 –10,000 plants) with the addition of a very low category (1-10 plants) which can be collapsed into the low density category per the BIA protocol if warranted. In addition, the units for mapping will be based on plants per square meter and *Castilleja exserta* will be included. High density patches of host plant were mapped as polygons if they are in areas larger than approximately 250 square feet. If observed, Quino larvae will be recorded and a permitted biologist will be present to document the observation.

Dudek submitted a notification asking for permission to deviate from the 2014 USFWS protocol and the 2016 BIA protocol. Dudek was approved by USFWS to follow the deviation for the Otay Ranch Resort Site on February 10, 2016. From the 2016 Revised Notification of Survey, Quino checkerspot butterfly surveys at Village 13 were conducted for three weeks following the initial observed Quino checkerspot butterfly flight at the reference site as discussed in the notification.

Focused Quino checkerspot butterfly surveys were conducted over 103 surveys within a 3-week period between February 29, 2016 and March 16, 2016 per the Quino Checkerspot butterfly Survey Guidelines published on January 11, 2016, including an additional survey on March 31, 2016 and April 4, 2016 to confirm Quino checkerspot butterfly was no longer in flight.

Surveys were conducted by Quino-permitted biologists Anita Hayworth (TE781084-8), Paul Lemons (TE051248-5), Erin Bergman (TE813545-5), Tricia Wotipka (TE840619-2), Vipul Joshi (TE019949-3), Travis Cooper (TE170389-5), Alicia Hill (TE06145B-0), Garrett Huffman (TE20186A-1), Antonette Gutierrez (TE-50992B-0), Brian Lohstroh (TE-063608-5), Crysta Dickson (TE-067347-5), Darin Busby (TE-115373-3), David King (TE-785148-11), Erika

Eidson (TE-051236), Erik LaCoste (TE-027736-5), Greg Chatman (TE-075112-2), Gretchen Cummings (TE-031850-4), Nicole Kimball (TE-053598), Monica Alfaro (TE-051242-2), and Diana Saucedo (TE-811615-6.1). Dudek biologists Patricia Schuyler (TE-27502B-0), Callie Ford (TE-36118B-0), Marshall Paymard, and Janice Wondolleck, and biological consultants, Emily Mastrelli accompanied Quino-permitted biologists during some visits. County Biologist Korey Klutz accompanied Dr. Hayworth for a final visit to the site.

The site was divided into 32 survey polygons for weeks 1 through 3, each representing a single-day survey effort at a rate no greater than 5 to 10 acres per hour (i.e., in accordance with USFWS 2014 protocol) (Table 2). One closed canopy chamise chaparral area totaling 19.9 acres within the site was excluded during the 2016 survey in order to avoid damaging habitat during surveys. These survey areas were numbered and assigned to Dudek's permitted biologists and independent investigators. The biologists were provided with 200-scale (1 inch = 200 feet) aerial photographs of each survey polygon. These photographs were used for mapping additional host plant populations and Quino checkerspot butterfly, if observed, although the task of the host plant mapping was separate from the adult surveys. Plant species also were recorded and potential nectar plants were included. Binoculars were used to aid in detecting and identifying butterfly and other wildlife species. GPS units also were available for recording locations.

Table 2
2016 Quino Checkerspot Butterfly Survey Polygons

Survey Area	Acreage of Survey Area
1	59.7
2	57.6
3	58.8
4	58.1
5	59.7
6	60.0
7	58.1
8	57.9
9	57.8
10	58.7
11	55.6
12	60.2
13	58.6
14	60.0
15	59.5
16	59.2
17	59.8

Table 2
2016 Quino Checkerspot Butterfly Survey Polygons

Survey Area	Acreage of Survey Area
18	55.8
19	42.0
20	56.1
21	59.4
22	56.6
23	60.3
24	60.1
25	59.7
26	59.8
27	59.8
28	60.4
29	58.8
30	53.6
31	50.5
32	56.9

The survey methods consisted of slowly walking roughly parallel transects spaced approximately 30 feet (10 meters) apart throughout all habitats within the approximately 1,826-acre survey area (excluding the 19.9 closed canopy chamise chaparral area). Survey routes were arranged to thoroughly cover the survey area at a rate of approximately 5-10 acres per person hour.

Surveys were conducted only during acceptable weather conditions (i.e., surveys were not conducted during fog, drizzle, or rain; winds greater than 15 miles per hour measured 4–6 feet above ground level for more than 30 seconds; temperature in the shade at ground level less than 60°F on a clear, sunny day with less than 50% cloud cover; or temperature in the shade at ground level less than 70°F on an overcast or cloudy day with 50% or more cloud cover. Survey times, personnel, and conditions during the Quino checkerspot butterfly survey can be provided under separate cover.

1.2.2 Covered Species in Preserve Complex

As indicated in Table 3, several covered species are present within the Otay Ranch RMP preserve. However, most of these species are covered species under the County MSCP Subarea Plan and long term management strategies exist to ensure their continued survival. The focal point of the Village 13 Otay Ranch RMP Preserve plus the Conserved Open Space is the preservation and management of existing Quino checkerspot butterfly locations and habitat, and the restoration of additional Quino checkerspot butterfly habitat. Although Quino checkerspot butterfly (and San

Diego fairy shrimp) is not a covered species, it is a federally listed species and therefore included within Table 3. For the San Diego fairy shrimp, although the MSCP County Subarea Plan identifies San Diego fairy shrimp as a Covered Species, the County has taken the position that, based on a 2006 federal court decision, the plan's protections for this species are inadequate for purposes of providing FESA take coverage. Therefore, impacts to San Diego fairy shrimp or its habitat must be assessed and mitigated on a project-specific basis. Since the focus of this plan is preservation and management of Quino checkerspot butterfly within the on-site preserve, Table 3 is only provided for context and these species will not be discussed further within this plan. The Otay Ranch POM, through the collection of CFD tax revenues, will continue to monitor and manage all species within the Otay Ranch RMP Preserve. Tasks that are provided by the Otay Ranch POM include basic stewardship tasks and conduct the required biological surveys and monitoring for the Preserve. Stewardship tasks include conducting regularly scheduled site visits to document access issues and illegal dumping; performing fence repairs; identifying and treating invasive plant species; conducting endangered species surveys and general surveys for plant and wildlife species; mapping vegetation communities within specific parcels; and restoring sensitive habitats. The Otay Ranch POM is also responsible for ongoing coordination with land managers and agencies such as Caltrans and the California Department of Fish and Wildlife in order to maintain consistency with regional monitoring and management.

Table 3
Alternative H Impacts to Special-Status Plant Species Present on Site

Species Scientific Name	Regulatory Status Federal/State CRPR MSCP Coverage County List	Basis for Impact Evaluation	Number/ Acre(s) impacted	% impacted	Number/ Acre(s) Not Impacted
San Diego thornmint (*Acanthomintha ilicifolia*)	FT/SE 1B.1 Covered Narrow Endemic A	A total of 3.4 acres of the species have been mapped on site.	0.1 acres	3	3.3 acres
California adolphia (*Adolphia californica*)	None/None 2B.1 Not Covered B	A total of <20 individuals present at two locations. For purposes of evaluation, it is assumed that a total of 20 are currently present on site.	20 individuals	100	0
Small-flowered morning-glory (*Convolvulus simulans*)	None/None 4.2 Not Covered D	A total of 120 individuals observed on site.	0 individuals	0	120 individuals
Western dichondra (*Dichondra occidentalis*)	None/None 4.2 Not Covered D	A total of 0.5 acre occupied by this species on site.	0.4 acre	80	0.23 acre
Variegated dudleya (*Dudleya variegata*)	None/None 1B.2 Covered – Narrow Endemic A	A total of 5,833 individuals observed on site.	4145 individuals	71	1688 individuals
San Diego barrel cactus (*Ferocactus viridescens*)	None/None 2.1 Covered B	A total of 217 individuals observed on site.	62 individuals	29	155 individuals

Table 3
Alternative H Impacts to Special-Status Plant Species Present on Site

Species Scientific Name	Regulatory Status Federal/State CRPR MSCP Coverage County List	Basis for Impact Evaluation	Number/ Acre(s) impacted	% impacted	Number/ Acre(s) Not Impacted
Palmer's grapplinghook (*Harpagonella palmeri*)	None/None 4.2 Not Covered D	A total of 298 individuals observed on site.	68 individuals	23	230 individuals
San Diego marsh-elder (*Iva hayesiana*)	None/None 2B.2 Not Covered B	A total of 5.4 acres occupied by this species on site.	2.9 acres	53	2.5 acres
Southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*)	None/None 4.2 Not Covered D	A total of 30 individuals observed on site.	1 individuals	3	29 individuals
Small-flowered microseris *(Microseris douglasii* ssp. *platycarpha)*	None/None 4.2 Not Covered D	A total of 1,270 individuals observed on site.	270 individuals	21	1,000 individuals
San Diego goldenstar (*Bloomeria clevelandii*)	None/None 1B.1 Covered A	A total of 2,546 individuals observed on site.	1,494 individuals	59	1,052 individuals
Little mousetail (*Myosurus minimus* ssp. *apus*)	None/None 3.1 Not Covered C	Although observed in 1990, this species has not been observed recently.	0	0	0

Table 3
Alternative H Impacts to Special-Status Plant Species Present on Site

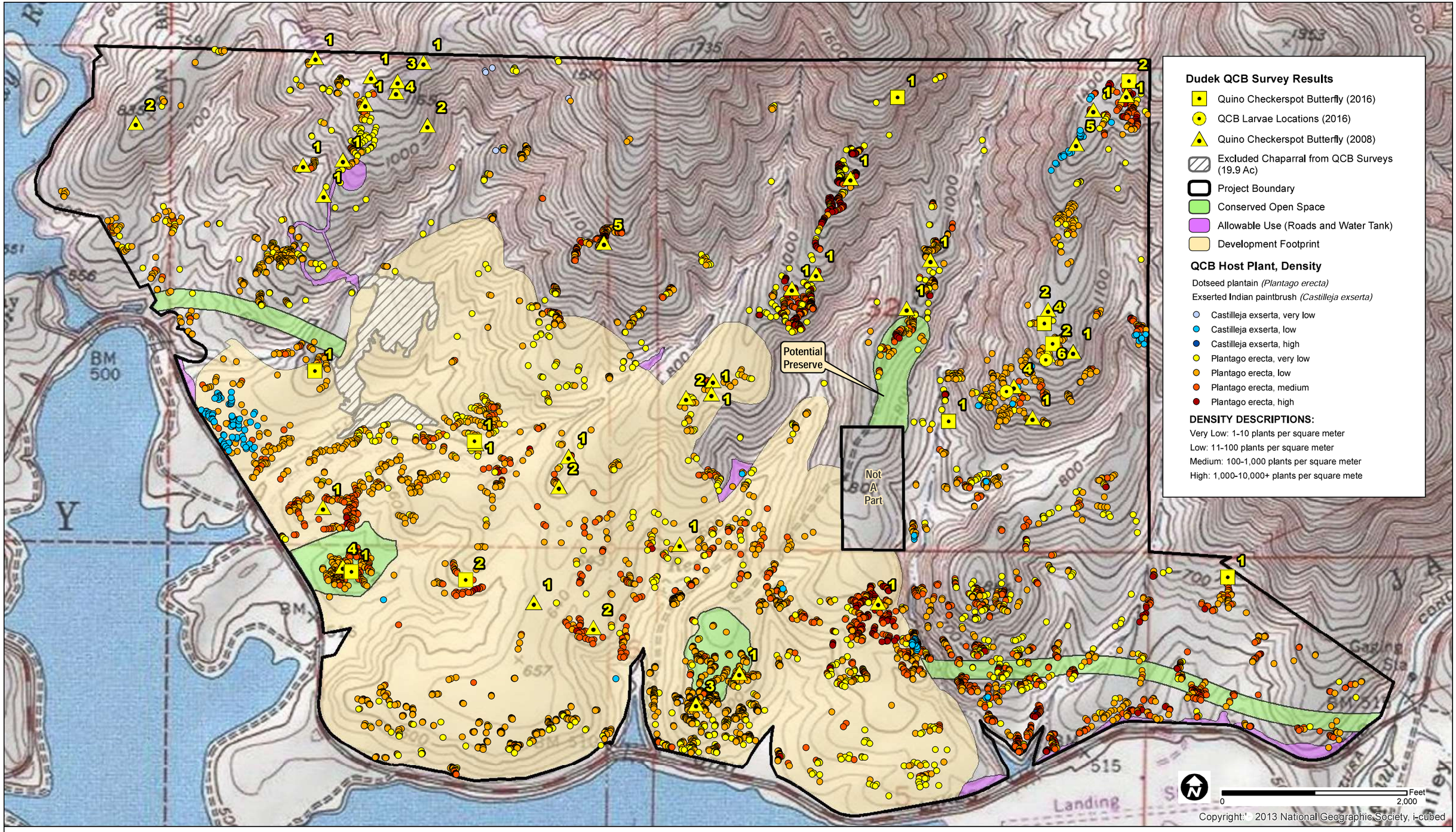
Species Scientific Name	Regulatory Status Federal/State CRPR MSCP Coverage County List	Basis for Impact Evaluation	Number/ Acre(s) impacted	% impacted	Number/ Acre(s) Not Impacted
California adder's-tongue (*Ophioglossum californicum*)	None/None 4.2 Not Covered D	Has not been observed in recent years and likely is not present.	0	0	0
Golden-rayed pentachaeta (*Pentachaeta aurea* ssp. *aurea*)	None/None 4.2 Not Covered D	A total of 91 individuals observed on site.	51 individuals	56	40 individuals
Nuttall's scrub oak (*Quercus dumosa*)	None/None 1B.1 Not Covered A	A total of 6.2 acres are occupied by this species on site.	6.2 acres	100	2 patches acres
Coulter's matilija poppy (*Romneya coulteri*)	None/None 4.2 Not Covered D	Single location observed.	0	0	1 individual
Munz's sage (*Salvia munzii*)	None/None 2B.2 Not Covered B	A total of 295 acres of areas that are occupied by this species on site.	109 acres of areas that include the species. A total of 6.5 acres dominated by the species within coastal sage scrub will be impacted	37	186 acres

Table 3
Alternative H Impacts to Special-Status Plant Species Present on Site

Species Scientific Name	Regulatory Status Federal/State CRPR MSCP Coverage County List	Basis for Impact Evaluation	Number/ Acre(s) impacted	% impacted	Number/ Acre(s) Not Impacted
San Diego County viguiera (*Viguiera laciniata*)	None/None 4.2 Not Covered D	A total of 1,071 acres of coastal sage scrub that include San Diego County viguiera.	174 acres of areas that include the species. A total of 2.5 acres dominated by the species will be impacted.	16	897 acres

Federal Designations:
BCC U.S. Fish and Wildlife Service Bird of Conservation Concern
FE Federally listed Endangered
FT Federally listed as Threatened
State Designations:
CSC California Special Concern Species
P CDFW Protected and Fully Protected Species
SE State-listed as Endangered
ST State-listed as Threatened
WL Watch List.
MSCP Designations:
Covered: Listed as Covered Species in Appendix B of Implementing Agreement between CDFW, USFWS, and County of San Diego (March 1998)
Not Covered: Not Listed as Covered Species in Appendix B of Implementing Agreement between CDFW, USFWS, and County of San Diego (March 1998).
County Designations:
Group 1: High level of sensitivity, either because listed as threatened or endangered or because species has very specific natural history requirements that must be met
Group 2: Species is becoming less common, but is not yet so rare that extirpation or extinction is imminent without immediate action. These species tend to be prolific within their suitable habitat types.

INTENTIONALLY LEFT BLANK



Document Path: Z:\Projects\j652401\MAPDOC\MAPS\QCB Enhancement\QCB Fig5_QCB_Obs_and_Host_Plants.mxd

DUDEK

FIGURE 5

Quino Checkerspot Butterfly Observations and Host Plant Locations

Otay Ranch Resort Village Site - Quino Checkerspot Butterfly Management/Enhancement Plan

INTENTIONALLY LEFT BLANK

Quino Checkerspot Butterfly Context

The Quino checkerspot butterfly is the southernmost subspecies of a widely distributed butterfly (*Euphydryas editha*) that ranges from British Columbia to northern Baja California, Mexico (Bauer 1975). It was formerly widespread in the coastal plains and inland valleys of Southern California, including Los Angeles, Orange, Riverside, San Diego and San Bernardino counties, and northern Baja California, Mexico (Mattoni et al. 1997).

As recently as the 1950s, collectors described the Quino checkerspot butterfly as occurring on every coastal bluff, inland mesa top, and lower mountain slope in San Diego County and coastal northern Baja California (USFWS 2003). Throughout most of Southern California, the native habitats of this butterfly have disappeared incrementally as development has progressed and undeveloped areas have been invaded by non-native plant species. Quino checkerspot butterfly has more recently shifted in distribution from the coast into foothills and mountains and the newly discovered higher elevation populations experience more precipitation and are buffered from drought (Preston et al. 2012).

Quino checkerspot butterfly show a preference for relatively open areas with cryptogamic crust and few vascular plants, surrounded by low-growing vegetation (Osborne and Redak 2000). Appropriate generalized habitat types include early and middle successional grasslands, open scrub communities, broken chaparral, and vernal pools (Murphy 1990). The host plant species for the Quino checkerspot larvae includes: dot-seed plantain, desert plantain (*Plantago patagonica*), thread-leaved bird's beak (*Cordylanthus rigidus*), white snapdragon (*Antirrhinum coulterianum*), owl's clover and Chinese houses (*Collinsia* spp.). In conducting site assessments for the species, areas that should be surveyed for the species included: sage scrub, open chaparral, grasslands, and vernal pools. Within these communities Quino checkerspot butterfly are usually observed in open or sparsely vegetated areas (including trails and dirt roads), and on hilltops and ridgelines. As described in the USFWS survey protocol (USFWS 2002), the following areas are not recommended for butterfly surveys since these areas do not seem to be preferred for use by the species:

- Orchards, developed areas, or small in-fill parcels largely dominated by non-native vegetation
- Active/in-use agricultural fields without natural or remnant inclusions of native vegetation
- Closed-canopy forests or riparian areas, dense chaparral, and small openings completely enclosed within dense chaparral.

Areas of dense chaparral and dense non-native grasslands are present onsite.

Normally, larvae consume the plant on which they hatch, and then migrate in search of new plants. Due to the limited ability of larvae to move among host plants, high local host density is necessary

for larval survival (Osborne and Redak 2000). If larvae have accumulated sufficient reserves by the time their host plants become inedible, they are able to enter diapause (USFWS 2003), a low-metabolic resting state that enables larvae to survive for months during the summer without feeding. While in diapause, larvae are much less sensitive to climatic extremes. Larvae are able to re-enter diapause several times before maturing, which may extend their life cycle for several years (Singer and Ehrlich 1979). Because Quino checkerspot butterfly larvae can re-enter diapause, it is possible that an adult flight period may only include a portion of the original larval population or may not occur at all in some occupied sites under adverse conditions. From the perspective of judging whether a population has been extirpated, it is important to recognize that a robust population may generate no adults at all under poor environmental conditions (USFWS 2003).

Adults are typically active during a 4- to 6-week flight period beginning between late February and May, depending on weather conditions (Emmel and Emmel 1973). Most *Euphydryas editha* subspecies exhibit generally sedentary behavior, with adults frequently remaining in the same habitat patch in which they developed as larvae (Ehrlich 1961, 1965; Boughton 1999, 2000). Data from mark-recapture studies indicate that long distance dispersal (greater than 0.6 mile) in *Euphydryas editha* is rare (USFWS 2003). Quino checkerspot butterfly generally fly close to the ground in a relatively slow, meandering flight pattern, and tend to avoid flying over trees, buildings, or other objects taller than 6 to 8 feet. Their thermodynamic requirements and natural avoidance of shaded areas deters flight in densely wooded areas and other types of closed-canopy vegetation (USFWS 2003).

Murphy (1990) suggested that the human-induced decline in the distribution and abundance of the Quino checkerspot butterfly is exacerbated by the complex "metapopulation dynamics" which affect the persistence of this butterfly. In metapopulation dynamics, butterflies exist in an assemblage of individual demographic units or populations that periodically exchange individuals. Metapopulation dynamics occur when (1) patches of habitat support local breeding populations; (2) no single population is large enough to ensure long-term survival; and (3) habitat patches are not too isolated to preclude simultaneous extinction of all populations. Metapopulation stability requires a minimum number of habitat patches connected by dispersal corridors (landscape connectivity) (USFWS 2003). Some habitat areas that would not be considered essential if geographically isolated are, in fact, essential when situated in locations where they facilitate continued connectivity between surrounding populations or play a significant role in maintaining metapopulation viability (66 FR 9475).

Quino checkerspot butterfly populations have been reduced in number and size by more than 95% range wide primarily due to direct and indirect human impacts including habitat loss and fragmentation, invasion of non-native plant species, and disrupted fire regimes. Conversion from native vegetation to non-native annual grassland will be the greatest threat to Quino checkerspot butterfly reserves based on observations of the large-scale invasions throughout the range

(Freudenberger et al. 1987, Minnich and Dezzani 1998, Stylinski and Allen 1999). An evaluation of population extinctions determined that precipitation and topographical variability were not important predictors (Preston et al 2012). The increased dominance of non-native species is reducing the abundance of Quino checkerspot butterfly food plants, and habitat fragmentation exacerbates vegetation type conversion. Studies on the changing distribution of the Quino checkerspot butterfly indicate that wildflower host plants and nectar sources have declined across the butterfly's range because of invasive plants and habitat loss. Corridors of human activity through unfragmented natural areas such as unpaved roads, trails, and pipelines are also conduits of non-native seed dispersal (Zink et al. 1995).

Reserves should be designed to provide sufficient numbers of habitat patches such that (1) only a small number of habitat patches will likely be extirpated in a single year and (2) patches are close enough so that natural recolonization can occur at a rate sufficient to maintain a relatively constant number of patches occupied by larvae. Linkage areas must be free of dispersal barriers (artificial structures, dense stands of trees or tall shrubs) and mortality sinks (e.g., high-traffic roads[1]). Habitat networks should also be buffered (i.e., embedded in natural areas as large as possible) to reduce indirect impacts of development and the need for future or ongoing restoration in occupied habitat.

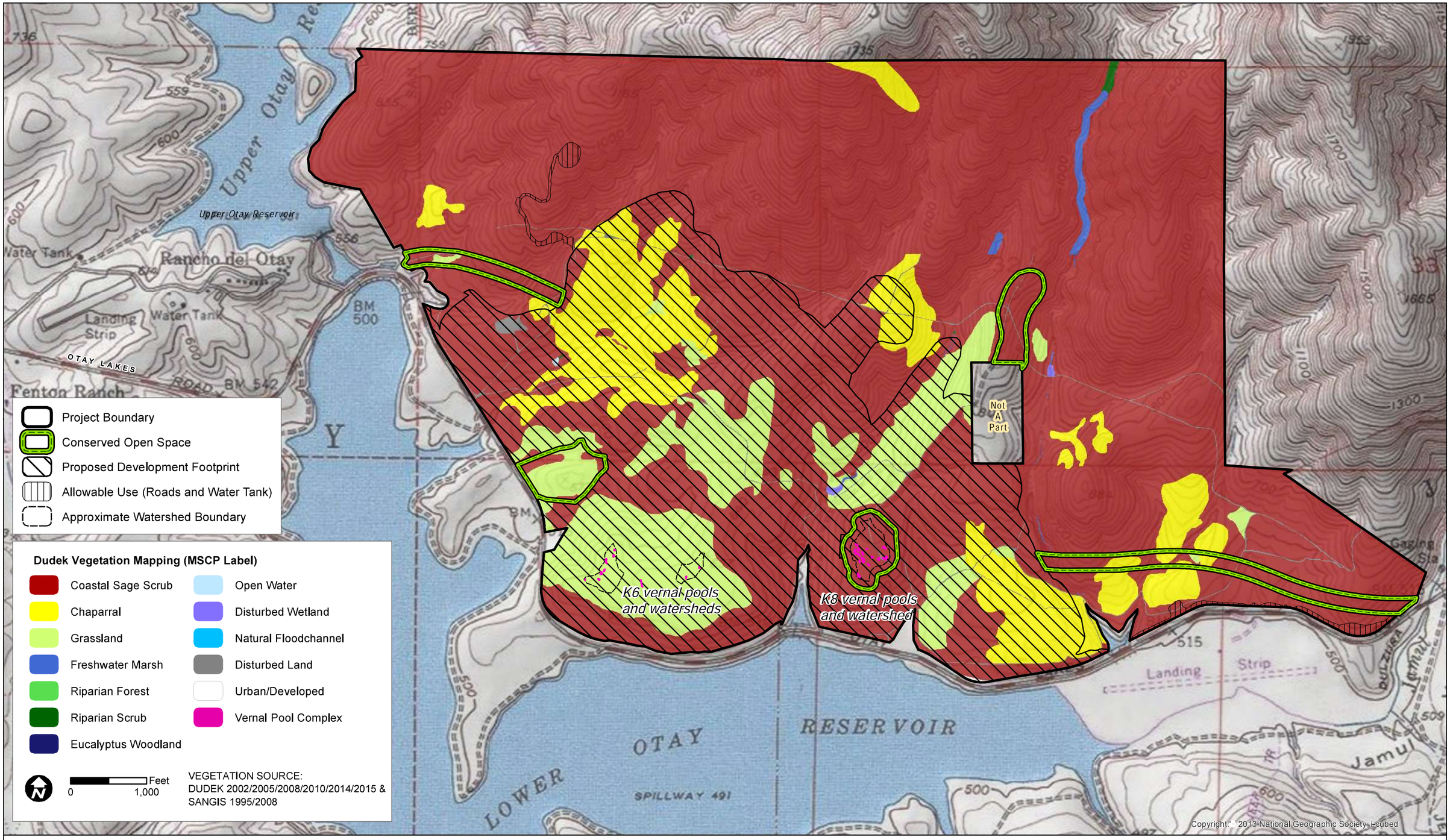
1.2.3 Natural Communities in the Preserve Complex

Proposed Preserve vegetation community acreages are shown in Table 4 and include those areas not impacted by grading or fuel modification zones as well as areas proposed to be restored to native habitat and areas that are allowed uses within the Preserve (i.e. – allowed infrastructure). These land uses include the water tank, and the road that provides access to the water tank, the natural drainage bypass facilities, and the slope grading for Otay Lakes Road. Of the approximately 1,869 acres of the project site, a total of approximately 1,177 acres (63% of the project site) is proposed to be preserved on site with a biological open space easement within the ultimate Otay Ranch RMP Preserve and the Conserved Open Space. Within the Otay Ranch RMP Preserve and Conserved Open Space, a total of approximately 1,107.72 acres of suitable, restored, or occupied coastal sage scrub for Quino checkerspot butterfly will be preserved by a biological open space easement on site. A vegetation map with the proposed development footprint is provided in Figure 6.

[1] High traffic roads are defined as those greater than 10,500 average daily trips

Table 4
Alternative H Development Impacts, Otay Ranch RMP Preserve, and Conserved Open Space Vegetation Communities

Vegetation Community	Total Project Site (Acres)	Development	Preserve and Conserved Open Space		Total
		*Development Impacts (Includes Fuel Modification, Detention Basins, Manufactured slopes)** *(Acres)*	*Total Onsite Otay Ranch RMP Preserve (Acres)*	*Conserved Open Space. (Includes San Diego Thornmint, Vernal Pools, Realigned Otay Lakes Road and Development Area with No Access) (Acres)*	*Total Preserve and Conserved Open Space (Acres)*
Coastal sage scrub	1126.83	115.76	981.70	29.37	1,011.07
Disturbed coastal sage scrub	348.69	273.09	51.24	24.36	75.60
Chamise chaparral	143.14	89.95	49.49	3.70	53.19
Disturbed chamise chaparral	15.67	14.09	1.58		1.58
Scrub oak chaparral	22.45	22.10	0.35		0.35
Southern mixed chaparral	4.95	0.00	4.95		4.95
Disturbed Valley needlegrass grassland	110.46	102.94	7.52		7.52
Non-native grassland	79.02	64.49	3.11	11.42	14.53
Cismontane alkali marsh	1.73	0.06	1.67		1.67
Disturbed cismontane alkali marsh	0.37	0.19	0.18		0.18
Mulefat scrub	0.15	0.06	0.09		0.09
Open water	0.17	0.17	0.00		0.00
Southern willow scrub	0.27	0.01	0.26		0.26
Developed Land	0.87	0.79	0.08		0.08
Disturbed Habitat	13.46	7.79	4.72	0.95	5.67
Stock pond	0.79	0.50	0.29		0.29
Total	**1,869.02**	**691.99**	**1107.23**	**69.80**	**1,177.03**



Document Path: Z:\Projects\j652401\MAPDOC\MAPS\QCB Enhancement\QCB Fig6_veg+impacts.mxd

DUDEK

FIGURE 6

Vegetation Map with Proposed Development Footprint

Otay Ranch Resort Village Site - Quino Checkerspot Butterfly Management/Enhancement Plan

INTENTIONALLY LEFT BLANK

1.2.4 Connectivity with Other Preserve Complexes

The preserve provides connectivity for Quino checkerspot butterfly to off-site occupied areas to the north, east, and south. As described in Section 1.1.2, provisions are included in the project design to provide for connectivity within the site as well as to off-site areas. Adjacent preserve complexes include: Otay Lakes Cornerstone lands immediately to the south, west and northwest; BLM lands, including Otay Mountain Wilderness Area to the southeast; CDFW lands to the north, south and east; USFWS lands immediately to the east; and Otay POM lands to the south in addition to those immediately to the north. Although there are still lands to the northwest which have the potential to be developed, the proposed project preserve will provide corridors which can connect on site Quino checkerspot butterfly habitat and occurrences to future conserved and already conserved areas to the northeast. In addition, the proposed project preserve will extend to the north an already established contiguous block of conserved lands from the Mexico border to Otay Lakes.

1.2.5 Primary Threats and Stressors for Preserve Complex

According to the draft County of San Diego Quino Addition (County of San Diego 2010), conversion from native vegetation to non-native annual grassland is likely the greatest threat to Quino checkerspot butterfly within preserves. Therefore, a primary focus (at least initially) of management for the Otay Ranch Resort Village Preserve will be maintaining native vegetation communities suitable for Quino checkerspot butterfly occupancy. The Otay Ranch RMP provides the guidelines for general preserve management and will continue to be used.

Due to the metapopulation dynamics of Quino checkerspot butterfly, it will be important to maintain the quality and quantity of both occupied and unoccupied Quino checkerspot butterfly habitat. Based on the results of site-specific surveys it is assumed that Quino checkerspot butterfly use nearly the entire Preserve; however, no Quino checkerspot butterfly were observed in grassland and chaparral habitats and there may be some very steep slopes in the northern part of the Preserve that are used strictly for movement of butterflies and that do not contain suitable habitat requirements for the larvae. As such, of the 1,177 acre-Preserve, approximately 1,107.72 acres are considered suitable Quino checkerspot butterfly habitat not including the acreage of non-native grassland that is proposed to be restored to suitable Quino checkerspot butterfly habitat. If the coastal sage scrub on site degrades and becomes dominated by non-native weeds, maintenance may be required. Currently it is not anticipated that any action is required for areas other than the patches shown on Figure 7. Vegetation restoration and monitoring in described further in Section 2.1.

1.3 Management and Monitoring Strategy

1.3.1 Summary and Vision Statement

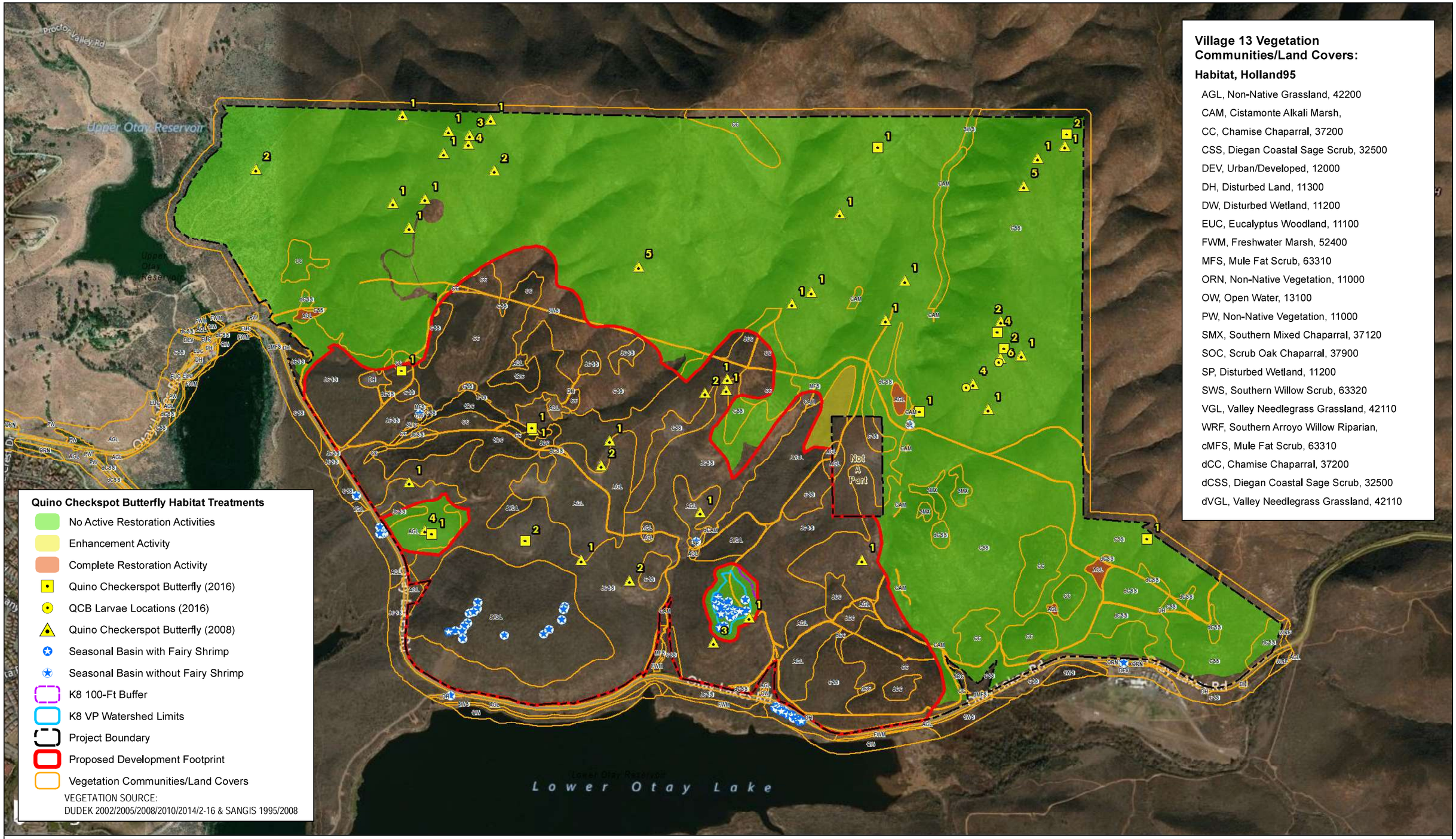
The purpose of this document is to provide guidance for the management and continued occupation of the Otay Ranch Resort Village site by the Quino checkerspot butterfly and to facilitate movement of the species to and from other off-site conserved areas. This plan is required as mitigation for on-site impacts associated with the construction of the Resort Village project area.

1.3.2 Biological Priorities and Priority Management Actions

The goal of this plan is to document the continued persistence and conserve the population of the Quino checkerspot butterfly within the Preserve of the Resort Village through a combination of management, monitoring, and restoration actions. The analysis provided by Longcore et al (2003) on the life history features that describe the relationship between the Quino checkerspot butterfly and its environment in San Diego County was presented as an envirogram. The factors that affect the status of the Quino checkerspot butterfly are categorized as:

- availability of resources;
- direct causes of mortality;
- availability of mates; and
- impacts from predators and parasites.

The "centrum" for Quino checkerspot butterfly encompasses the proximate determinants of population dynamics and while it includes multiple features, management for the species focuses on the habitat conditions or availability of resources since the other features are either not under control of management, or are clearly handled with the designation of the Preserve. For the Resort Village Preserve, the inputs to the resources centrum focus on exotic plants and the native plant community since other inputs such as edge effects, grazing, agricultural activities, trail usage, disturbance are all controlled or curtailed with the proposed development and conditions of approval. Specifically, the project includes a Preserve Edge Plan to reduce and minimize edge effects. Grazing and agricultural activities are not permitted on the project site.



DUDEK

0 Feet 2,000

Document Path: Z:\Projects\lj652401\MAPDOC\MAPS\QCB Enhancement\QCB Fig7_Restoration Treatments.mxd

FIGURE 7

Proposed Restoration Treatment Levels for Habitat Management

Otay Ranch Resort Village Site - Quino Checkerspot Butterfly Management/Enhancement Plan

INTENTIONALLY LEFT BLANK

To determine the management actions and the types of habitat restoration (level of effort), the site was surveyed as described in Section 1.2.1 and the various areas within the proposed preserve were generally categorized as requiring: 1) complete restoration; 2) enhancement; or 3) management (Figure 7). The total acreage of habitat currently present within the proposed Otay Ranch RMP Preserve and Other Conserved Lands is approximately 1,177 acres (Figure 4) of which 1,107.72 acres would be considered to be suitable habitat for Quino checkerspot butterfly composed of coastal sage scrub and disturbed coastal sage scrub. Much of this Preserve and Other Conserved Lands area is high quality habitat for Quino checkerspot butterfly and has been documented to be occupied by the species. Areas that are composed of chaparral, although dense and generally not suitable, are important habitat features. The disturbed grassland areas, however, have become grassland with dense cover and not suitable and provide opportunities for enhancement treatment. Much of the focus of this management plan is on the maintenance of the condition of the coastal sage habitat since it is predominantly already in good condition and occupied.

1.3.3 Authorized Land Uses and Potential Conflicts

Otay Ranch was organized so that several villages and planning areas were designated for various types of development while other areas were reserved for preservation of multiple species and habitats. An effort was undertaken to plan development to conserve species and habitats in the region and maintain wildlife corridors. The Otay Ranch Resort Village is designated for residential and resort development and for open space by the Otay SRP.

Under Alternative H, the 1,869-acre Project site would be developed in accordance with the approved MSCP and hardline boundary while achieving the majority of the Project objectives. Development of the Project site would consist of 1,881 single-family homes and 57 multi-family homes for a total of 1,938 homes for a total residential development footprint of roughly 692 acres. Resort uses would encompass roughly 16.5 acres in the southeast portion of the Project site and includes up to 200 rooms and 20,000 square feet of ancillary retail/commercial uses. A community homeowner facility site of roughly 6 acres, which includes meeting space and fitness center, recreation courts, swimming pool and picnic areas, is located in close proximity to the village core. A total of about 25 acres of public parks is designed around a central park in the village core which is augmented by a series of neighborhood parks within convenient walking distance from all homes. Adjacent to the central park is a 10 acre elementary school site. While no public safety site was included within Village 13 in the Otay SRP, which located a fire station in Village 15, as with the Proposed Project this alternative would include a 2.3 acre Public Safety Site. Other land uses include 32.5 acres for internal circulation and 77 acres of non-preserve open space, comprised primarily of homeowner association maintained manufactured slopes, fuel management zones, and water quality basins. Otay Lakes Road would not be realigned from its existing location on the western and southern edge of the Project site to the approximate middle of the site which is what was originally shown in the MSCP. However, the road would undergo improvements including

a widening from two to four lanes. Alternative H includes a conveyance obligation of 787 acres to the Otay Ranch Preserve, which is part of the MSCP Preserve. All required conveyance will be located within the Otay Ranch Resort Village property; no conveyance land will be offsite. The additional Preserve land (320 acres) within the site would be conveyed in the future as needed for other mitigation and/or future projects or to provide additional mitigation for project impacts. Alternative H would also include 69.8 acres of Conserved Open Space (Table 5) which will be protected by a conservation easement, conveyed to the Otay Ranch RMP Preserve, or transferred to the Otay Ranch RMP Preserve at a later date. The entire onsite Otay Ranch RMP Preserve and Conserved Open Space will be protected by a biological open space easement. No fuel modification zones or privately owned lots are located in the Preserve or on restored areas that are designated as Otay Ranch RMP Preserve.

Table 5.
Summary of Land Use Designations for Alternative H Project Site

Land Use Designation	Acreage
Development	692
Total Otay Ranch RMP Preserve	1,107
Conserved Open Space*	70
Total Preserve including Conserved Open Space	1,177
Total Site Acreage	**1,869**

*To be protected by a conservation easement or by transfer to the Preserve

1.3.4 Preserve-level and Regional-level Monitoring Strategy

To determine if the management for the Quino checkerspot butterfly is providing long-term occupation of the Preserve, surveys should be conducted after the construction of the project. Previous Baseline surveys, as discussed in Section 1.2.2, delineated Quino checkerspot butterfly habitat within the proposed Preserve.

The results of pre-construction surveys have been used to develop a sampling scheme for Quino checkerspot butterfly occupancy and habitat monitoring upon completion of the project. Quino checkerspot butterfly occupancy monitoring will track Quino checkerspot butterfly population trends over time. Quino checkerspot butterfly habitat monitoring will track changes in habitat quality and quantity.

The monitoring program is a science-based program that includes the following features:

- **Population monitoring:** estimate butterfly population densities based on field counts of adults across habitat range within the Preserve;

- **Habitat characterization:** assess biotic factors (host plants, invasive species, etc.) and abiotic factors (microclimate, slope orientation, etc.) of local habitat within the Preserve;
- **Habitat modeling:** simulate population dynamics as influenced by prevailing climate, microclimate (solar exposure, temperature, etc.), slope orientation, host plant availability, and larvae development;
- **Human impacts:** assess and mitigate the impacts of human development on and near butterfly habitat and prohibit or limit these impacts to the extent practical;
- **Adaptive management:** implement site-specific management plans, with periodic review of success based on results of continued monitoring.

INTENTIONALLY LEFT BLANK

2 AREA-SPECIFIC MANAGEMENT DIRECTIVES AND TIMELINE FOR THE PRESERVE COMPLEX

Critical environmental factors that threaten the species include those physical and biological factors that may result in population extirpations. Management and monitoring will benefit from a concrete analysis of the risks to the population and identification of the threats (Longcore et al. 2003). The dominant causes of population declines result from reduction and loss of the resources that are critical for the species. Hence the size, configuration, and distribution of habitat patches are the primary determinants of the likelihood of species persistence (Longcore et al. 2003). The Quino checkerspot butterfly is threatened primarily by urban and agricultural development, invasion by nonnative species, off-road vehicle use, grazing, and fire management practices USFWS 2003). Other factors contributing to the species' population decline likely have been, and will continue to be, enhanced nitrogen deposition, elevated atmospheric carbon dioxide concentrations, and climate change (USFWS 2003). As a result, careful planning that ensures maintenance of existing Quino checkerspot butterfly metapopulations will be the key to long term conservation of the species. Any activity resulting in habitat fragmentation or removal of host or nectar plants from habitat reduces habitat quality and increases the probability of extinction of the Quino checkerspot butterfly.

The methods for the vegetation communities area-specific management directive is derived from the adaptive management program described in the County of San Diego Quino Addition (2010). The success of this area-specific management directive/adaptive management program, both for the Preserve and the County in general, will depend on the development of techniques that can efficiently restore native plant species on a large scale.

2.1 Vegetation Communities

A primary goal of the preserve complex will be maintaining and enhancing vegetation communities suitable for Quino checkerspot butterfly occupancy through habitat restoration and enhancement and especially including weed control and removal as determined by monitoring the vegetation. Preservation and enhancement of on-site habitat will maintain connectivity between the Otay Lake/Jamul occurrences and other occurrences adjacent to the preserve. These efforts will prevent conversion from native vegetation to dense, non-native annual grassland with few host plants, which is one of the greatest threats to Quino checkerspot butterfly.

2.1.1 Vegetation Goals

Goals

- Maintain the existing quality and quantity of occupied and unoccupied Quino checkerspot butterfly habitats.

- Enhance additional vegetation communities suitable for Quino checkerspot butterfly occupancy through habitat restoration.

2.1.2 Vegetation Objectives

Objectives

- Restore 4.2 acres which are devoid of any of the required resources (i.e. suitable coastal sage scrub) for the Quino checkerspot butterfly
- Enhance 7.5 acres where the vegetation is dominated by grasses but otherwise include sparse shrub cover and bare patches of soil
- Monitor for conversion of habitat types

Habitat restoration and enhancement should be done in the most efficient and effective method to allow for long-term implementation. Initial focus should be to enhance existing degraded habitat prior to restoration. This will provide for more immediate results. The specific design of this program will be coordinated with the Wildlife Agencies, the County, and the POM, which will be responsible for implementing this monitoring program.

Coastal sage scrub restoration, in order to provide suitable habitat for Quino checkerspot butterfly, may need to focus on providing more diverse habitat, sparser vegetation with more opening for basking, suitable host and nectar plant species, and the establishment of cryptobiotic crusts. Prior to initiating a restoration program, a conceptual plan should be developed that identifies timing, species composition, site preparation, and methods of implementation. In addition, the results of the quino checkerspot butterfly habitat restoration effort will be reviewed annually to determine which methods are most effective. The design currently includes two methods, the seed ball and hand-broadcast seeding techniques (SDMMP 2013c). The results from these studies will be used to determine methods.

Restoration

Areas within the Resort Village Preserve that require complete restoration are those areas that are completely devoid of any of the required resources for the Quino checkerspot butterfly. The actions may include dethatching, herbicide treatments, mowing and or weeding, and extensive seeding. These areas include the slope grading areas that are proposed for complete restoration (see Conceptual Upland Restoration Plan; Dudek 2018) as well as the areas mapped as non-native grassland with no shrubs or forbs present. These areas are a dense and complete cover of non-native grasses with no soil exposure or potential to all Quino checkerspot butterfly host plant growth. There are a total of 4.2 acres assigned as complete restoration treatment.

Enhancement

Areas within the Resort Village Preserve that require enhancement include areas with vegetation that is dominated by grasses but otherwise include sparse shrub cover and bare patches of soil. Some of these areas are mapped as disturbed valley needlegrass grassland and others are mapped as disturbed coastal sage scrub. The actions for these areas may include some dethatching and no other action or limited application of herbicide. It is important to note that the vernal pool area, while it could be designated as an enhancement area, has its own restoration plan that includes restoration of new vernal pools and enhancement of existing vernal pools and mima mounds as documented in the Conceptual Vernal Pool Mitigation Plan (Dudek 2018). There are a total of 7.5 acres assigned to enhancement treatment.

Monitoring

Areas within the Resort Village Preserve that require monitoring and no other restoration/enhancement activities are those areas currently occupied by butterflies or that are occupied by host plant and nectar sources. These areas are composed of sparse shrub cover and native grasses. In some cases, butterflies have not been observed; however, this may be due to the overall steep topography and not due to the habitat condition since the habitat has not been grazed, farmed or otherwise involved in other human-related land use. No actions are proposed for these areas other than monitoring of populations of butterflies and the host plant populations. Actions to take place in these areas would be potentially triggered by the results of the monitoring (i.e. – adaptive management) and weed control.

2.1.3 Vegetation Implementation Tasks

Three different levels (high, moderate, and low intensity) of restoration/enhancement may occur within the Preserve. High-intensity restoration/enhancement involves de-thatching, weeding and spraying, as well as planting/relocation of native plant species, annually over a 5-year period. The high intensity restoration/enhancement program (described below) is based on the De-thatch and Repeat Spray Method developed by Recon and outlined in Appendix II of the Recovery Plan (USFWS 2003). It would be employed in areas that have significant numbers of native plant species present but contain moderate to high levels of non-native plants. The moderate and low intensity programs would be used for areas that have significant numbers of native plant species present, but contain moderate or low levels of non-native plants.

The moderate and low intensity program costs were developed specifically to address the individual requirements of a Quino checkerspot butterfly program in the City of Chula Vista. The moderate-intensity restoration/enhancement program, if appropriate for adaptive management, would occur annually over a 5-year period with perpetual maintenance

commencing in year six, while the low-intensity restoration/enhancement program would occur annually over a 4-year period with perpetual maintenance commencing in year five.

Appropriate timing of non-native plant removal should result in decreasing effort over a period of years. All areas that have been subject to restoration/enhancement will eventually be included as areas targeted for focused weeding on an appropriate rotating basis (i.e., every 2 to 6 years as needed).

High-Intensity Restoration/Enhancement Program

The following outlines the high-intensity restoration/enhancement program, representing the maximum amount of effort that is expected to be undertaken. This methodology may be modified or scaled back to suit the conditions at the selected site.

Thick thatch associated with dead mustard or annual grasses can prevent native species from germinating and/or competing successfully for light and space with non-natives. In areas with this problem, dethatching will be used to enhance the areas. This will include removal of dead plant thatch using hand tools, and "weed eaters," and return visits for spraying with glyphosate. Timing of non-native plant control efforts is crucial to success. Non-native plants will be killed prior to seed set, so that removal effort and cost will decrease over time.

Another crucial component of the non-native plant removal method described below is that workers must be trained to distinguish between native and non-native plants for restoration/enhancement to be successful.

The high-intensity restoration/enhancement program is as follows:

a. Cut thatch and dead non-native plants with "weed eaters." This cutting can be done during the summer or early fall;

b. Rake up and collect non-native plant thatch;

c. Remove thatch from site and dispose of it in dumpsters, a landfill, or an area where it can be composted nearby to reduce disposal costs;

d. Return to site and spray Roundup (or more selective herbicide, or selective weed-whacking) on non-native plant seedlings after sufficient rains have fallen in winter and spring;

e. Repeat spraying (or selective weed-whacking) as necessary to prevent seed set. Other options include the use of pre-emergent herbicide prior to the first significant rain; and

f. Repeat spraying (or selective weed-whacking) as necessary to maintain non-native plant density to a low level.

Frequent site visits are necessary during the growing season to assess nonnative plant removal efforts and to determine whether changes are needed in the strategy being used or the intensity of non-native plant removal efforts. In particular, the non-native plant removal process must be carefully monitored to ensure that new, non-native plant species do not flourish as the formerly dominant non-native species are removed. Up to five herbicide (or weed eating) applications per season may initially be required. The amount of spray will be reduced as the season progresses and fewer non-native plants are present. After the first two years, weeding requirements decrease each year if the spraying program is timed to kill non-native plants before they set seed. Removal of non-native plants by hand may be required around small populations of herbaceous natives.

Populations of native annuals (larval host plants and nectar resources) may be enhanced or re-established in and between existing habitat patches by hand seeding. According to the Recovery Plan, restoration/enhancement plantings should include nectar-producing plant species with overlapping flowering periods that extend throughout the typical Southern California growing season. Seeds of native plant species used in each restoration/enhancement project should be collected within five miles of the site, or as close as possible within the same general climate zone. To ensure that adequate seed is available, seed bulking (growing seed in cultivation to increase the amount of seeds) of annuals, including host and nectar plants, may be necessary.

To support a diverse assemblage of potential pollinators and native plant species, the Recovery Plan calls for areas of open ground within associated native plant communities to be restored to support ground nesting bees and other invertebrates. The goal of having open ground for pollinators is compatible with Quino checkerspot butterfly restoration/enhancement efforts because Quino checkerspot butterfly larval food and adult nectar plants require open ground for successful reproduction and long-term persistence. Brush piles, scattered sticks, branches, and rock cobbles can be brought to the restoration/enhancement site to increase the available cover for many animals, and will provide potential diapause and pupation sites for Quino checkerspot butterfly.

2.1.4 Performance Standards

Performance standards have been established for the restoration areas based on expected vegetative development within properly functioning habitat. The performance standards listed herein do not apply to the restoration of the off-site temporary impact areas because of their small size and because they will not be part of the Preserve.

Native plant cover criteria are based on the assumption that the greatest contribution to native plant cover will be provided initially by hydroseeded and container plants, but that in later years, natural recruitment and/or seeds from adjacent native areas and the growth of individual container plants will contribute more to plant cover. Lower performance standards for chaparral are based on the

assumption that container plants used will grow more slowly and contribute less to overall vegetation cover. Maximum non-native plant cover criteria for each vegetation type are identical, as listed under "% Maximum Non-native Plant Cover" in Table 6.

Table 6
Performance Standards

Year	% Native Plant Cover			% Maximum Non-native Plant Cover	% Container Plant Survival
	Coastal Sage Scrub	Chaparral	Grassland	All Restoration Areas	All Restoration Areas
Year 1	20	10	30	10	95
Year 2	40	20	50	10	90
Year 3	55	40	60	10	85
Year 4	70	60	70	5	85
Year 5	80	70	80	5	85

Performance standards consist of the "% Native Plant Cover" and "% Maximum Non-native Plant Cover" standards listed in Table 11. Even if overall success criteria are achieved, if any subarea misses any performance criterion by more than 15% (e.g., native plant cover in a coastal sage scrub area in Year 2 is less than 40% in one subarea), specific remedial measures will be developed for that subarea.

Container plant survival performance criteria will be assessed during the final monitoring visit of the calendar year (November), and native and non-native plant cover criteria will be assessed during the latter portion of the growing season (i.e., late spring or summer) through the 5-year maintenance and monitoring program.

These performance criteria shall be used to assess the annual progress of the restoration areas and are regarded as interim project objectives designed to reach the final goals. The Project Biologist will also provide an annual qualitative assessment of the species composition of each subarea to assure that the vegetation is appropriate for the target plant community; for instance, a site dominated by early-successional native plant species and with small surviving container plants may not be considered to meet performance standards even if the criteria listed above were attained.

Fulfillment of these criteria will indicate that the uplands restoration areas on the project site are progressing toward the habitat types and functions that constitute the long-term goals of the plan. If the restoration efforts fail to meet the performance standards in any one year, the Project Biologist may recommend remedial action to be implemented the following year that will enhance the vegetation to a level of conformance with the original standard. These remedial actions may include re-seeding, applying soil amendments, additional weed control measures, erosion control, or adjustments to the irrigation and maintenance practices.

Monitoring Methods

The Project Biologist will conduct qualitative monitoring visits throughout the 5-year monitoring period. Qualitative monitoring will include reviewing the health and vigor of container plants and seed plantings, checking for the presence of pests and disease, reviewing soil moisture content and the effectiveness of the irrigation system, erosion problems, invasion of weeds/invasive species, and the occurrence of trash and/or vandalism. Contractor maintenance will be reviewed as well. Each monitoring visit will be followed by a written summary of observations, recommendations, and conclusions to be forwarded to the landscape maintenance contractor and applicant within 2 weeks of completion of the visit.

Attainment of percent native and non-native cover success criteria in the first year will be measured by visual estimation coupled with photo-documentation. To document overall site conditions, a minimum of one permanent photo point (for the duration of the 5-year monitoring program) will be established in each restoration area that is at least 0.5 acre in size.

Starting in Year 2, quantitative data collection will begin. Quantitative data collection will consist of transect data collection using the point-intercept methodology. Transects will be established in restoration areas that are at least 0.5 acre in size. The transect locations shall be spaced throughout the restoration areas, and their exact locations shall be randomly determined. The transect locations shall be mapped using a global positioning system and shown on a figure in the annual reports. The transects shall be marked with metal t-posts at each end so the same locations can be sampled each year. Transect data shall be collected in late spring or early summer each year to show native cover by species, weed/invasive cover by species, total vegetated cover, and total unvegetated cover. In addition, a comprehensive plant species list shall be compiled for the restoration area.

Quantitative evaluation of container plant survival shall be determined through counts of dead container plants. The fall site visit shall assess plant mortality and recommend container plant replacement, if needed.

2.2 Quino Checkerspot Butterfly

The Quino checkerspot butterfly was federally listed as endangered on January 16, 1997 (62 FR 2313). A Quino checkerspot butterfly Recovery Team was assembled by USFWS in September 1999 to analyze existing information and new data collected from more recent surveys. On February 7, 2001, the USFWS issued a proposed Critical Habitat designation for the species and a Quino Checkerspot Butterfly Final Recovery Plan was issued by the USFWS in January 2003. On April 15, 2002, the final Critical Habitat designation was issued. The Critical Habitat designation was revised on June 17, 2009, and was reduced by approximately 110,000 acres. The proposed project is within critical habitat for Quino checkerspot butterfly (Figure 8).

The recovery actions are based on the recommendations contained in the Quino Checkerspot Butterfly Draft Recovery Plan (January 2003), prepared by USFWS in consultation with the Recovery Team. The Draft Recovery Plan presents the tasks necessary to ultimately reclassify the Quino checkerspot butterfly to threatened and ensure the species' long-term conservation based on the best available scientific information and expert opinions. The Recovery Plan represents the best available direction on the actions required for the conservation and recovery of the species.

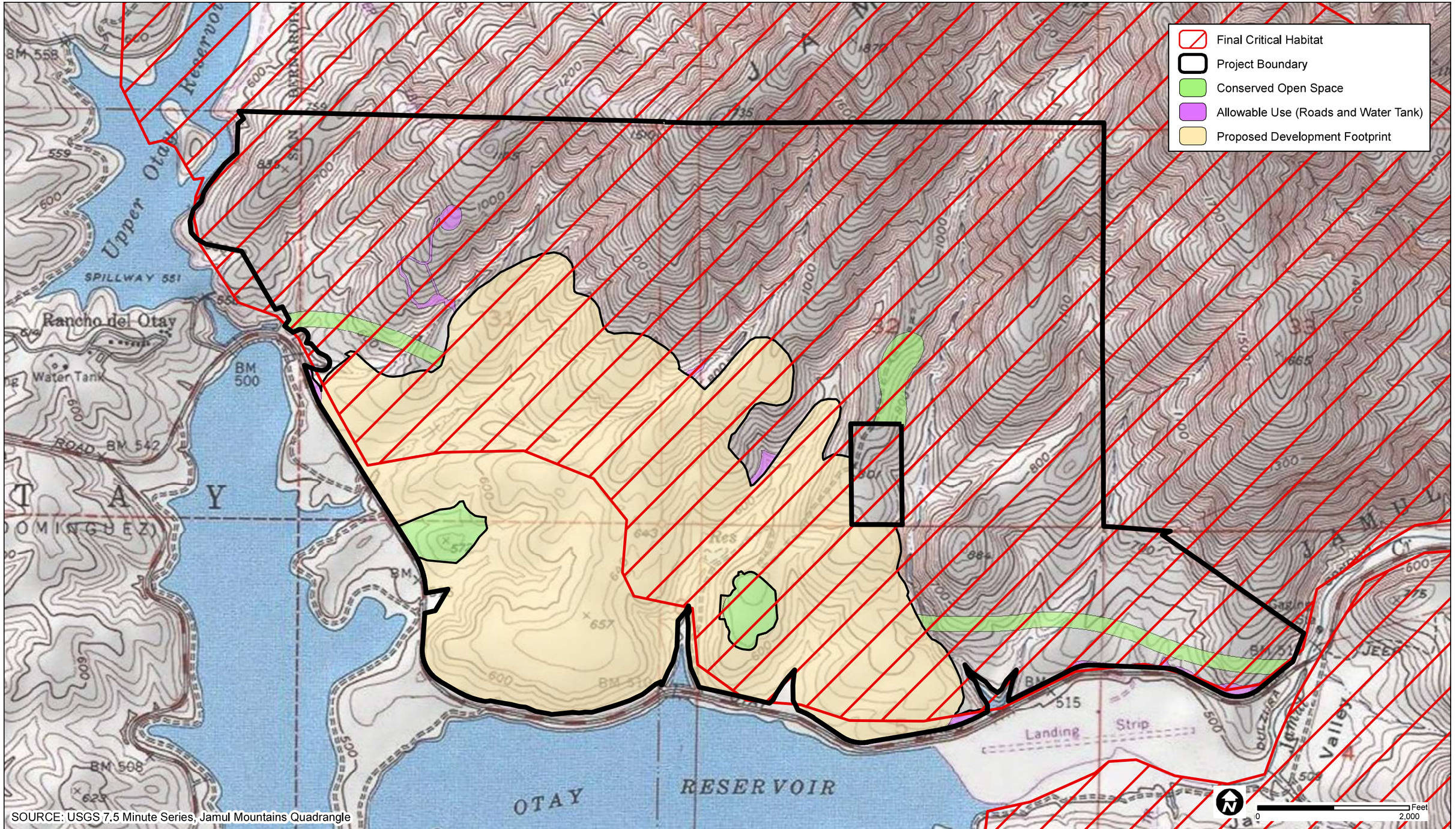
2.2.1 Quino Checkerspot Butterfly Goals

Goal: Maintain viable populations of Quino checkerspot butterfly on site which will in turn expand viable and interconnected Quino local subpopulations and ultimately restore and establish connections between regional Quino populations.

2.2.2 Quino Checkerspot Butterfly Objectives

The proposed Otay Ranch Resort Village Project will contribute to implementation of the recovery actions by working towards the following objectives:

- Preserve suitable habitat and known locations of Quino checkerspot butterfly on site
- Maintain connectivity along key habitat linkages within the property
- Minimize project impacts to Quino checkerspot butterfly and their suitable habitat.
- Fund the management of the Preserve for the benefit of the Quino checkerspot butterfly (along with other special status species and sensitive habitats)
- Restore/enhance Quino checkerspot butterfly habitat where necessary; and
- Monitor areas currently occupied by butterflies or that are occupied by host plant and nectar sources



SOURCE: USGS 7.5 Minute Series, Jamul Mountains Quadrangle

Document Path: Z:\Projects\j652401\MAPDOC\MAPS\QCB Enhancement\QCB Fig8_QCB_crit_hab.mxd

DUDEK

FIGURE 8

QCB Proposed Critical Habitat

Otay Ranch Resort Village Site - Quino Checkerspot Butterfly Management/Enhancement Plan

INTENTIONALLY LEFT BLANK

2.2.3 Quino Checkerspot Butterfly Implementation Tasks

Preservation, Connectivity, and Impacts

The MSCP Subarea Plan identifies a "hard line" preserve/development boundary for the Otay Ranch Resort Village that reflects an agreement reached among the wildlife agencies and the Baldwin Company (the applicants' predecessor in interest) at the time that the MSCP Subarea Plan was approved.

Alternative H, with a combination of Otay Ranch RMP Preserve and Other Conserved Lands, ultimately provides preservation of 1,177 acres of Preserve dominated by currently suitable Quino checkerspot butterfly habitat. The preserve design includes significant larval host plant populations, known occurrences of the Quino checkerspot butterfly from multiple years of surveys, suitable habitat for the species, and ridgelines and hilltops where the species has been recorded (Figure 5). There also is connectivity to off-site occupied areas to the north, east, and south, and provisions are included in the project design to provide for connectivity within the site as well as to off-site areas. Thus the project includes preservation of occupied Quino checkerspot butterfly habitat within the same region and ensures connectivity to suitable off-site habitat.

Funding

Funding is discussed in Section 3.0, Staffing, Management Costs and Funding, and outlined in Table 7.

Restoration/Enhancement

Restoration and enhancement are discussed under Section 2.1, Vegetation Communities.

Quino Occupancy Monitoring

A qualified project biologist shall be retained for the post-construction surveys and monitoring of the Quino checkerspot butterfly within the Resort Village Preserve. The purpose of the surveys is to monitor the population and habitat of the Quino checkerspot butterfly in an effort to ensure the long-term success of this management/enhancement plan. The population surveys will track Quino checkerspot butterfly population trends over time. Quino checkerspot butterfly habitat monitoring will track changes in habitat quality and quantity.

Monitoring and management for Quino checkerspot butterfly for the Resort Village is based on the information presented in the County of San Diego Quino Addition as well as documentation on the species in San Diego County (County 2010; Longcore et al. 2003). The monitoring program includes two phases: baseline surveys and long-term monitoring for the butterfly and its habitat. Surveys conducted in 2008 serve as baseline surveys for the Resort Village since the numbers of

the species that were recorded were the highest of any of the surveys that have been conducted. The 2008 season was exceptionally good for detecting Quino checkerspot butterfly due to the rainfall and subsequent development of the host plant.

The long-term monitoring of the Quino checkerspot butterfly and its habitat will be conducted on an annual basis within the Resort Village Preserve. General habitat monitoring will be performed to determine if changes occur in habitat quality and quantity. The population size and variation, changes in habitat condition and occupancy of the species will be monitored as required. The Resort Village Preserve is considered to be a single "macrosite", per the Amendment, and it is composed of multiple microsites (County 2010).

The location of monitoring points will be randomly selected from potential Quino checkerspot butterfly habitat in the Preserve. Presence/absence surveys for Quino checkerspot butterfly will be done at these locations. The sampling framework will involve both sentinel sites (i.e., sites to be surveyed every year) and panel sites (i.e., sites that will be surveyed less frequently). During some years, Quino checkerspot butterfly do not exhibit an adult phase and cannot be adequately detected. In such a case, the survey schedule will be delayed until the next year when Quino checkerspot butterfly can be adequately surveyed. By conducting Quino checkerspot butterfly occupancy and habitat monitoring at the same locations, information regarding Quino checkerspot butterfly habitat requirements within the Resort Village Preserve will be generated.

As described above, the occupancy monitoring method will be used to monitor population trends for Quino checkerspot butterfly. Occupancy monitoring requires the presence or absence of the species to be determined at each sampling location. Five surveys for Quino checkerspot butterfly should detect, with a probability of 0.95, populations with more than 10 observable individuals (Zonneveld et al. 2003). Observable individuals account for search efficiency; if search efficiency is 10%, a population of 100 Quino checkerspot butterfly will have 10 observable individuals. Such survey protocol is used by the USFWS and will be applied to sentinel and panel sites.

Walking surveys that cover the sample site will be conducted. When Quino checkerspot butterfly is found, a point count system can be established. Zonneveld et al. (2003) suggest that the five presence surveys for Quino checkerspot butterfly should be completed on the last day of February, March 16, March 30, April 14, and May 1, which may be amended to reflect weather circumstances. To avoid a situation in which an individual adult Quino checkerspot butterfly that has immigrated to a site is counted as presence of the species at that location, more than one individual must be observed to be considered indicative of presence for quantitative analysis. Additionally, sites where adults have been observed for the first time should be surveyed to locate pre-diapausal larvae to confirm recruitment and presence for quantitative analysis.

Monitoring is summarized in the following table (Table 7) which is adapted from the County of San Diego Quino Addition (County 2010).

Table 7
Quino Checkerspot Butterfly Monitoring Summary

Site	Description	Data Collected	Frequency of Data Collection
Habitat Monitoring			
Macrosite	Contiguous blocks of habitat. Size can be from 25 acres to the entire preserve.	Distance to nearest occupied macrosite located off site; average elevation; topographic diversity; average climate; slope; aspect; distance to roads; distance to the development; time elapsed since fire.	Year 1 as baseline. Update as land use changes and butterfly occupancy changes.
Microsite	Points within macrosites that correspond with butterfly survey sites.	Vegetation cover, abundance of larval host plants, nectar plant populations, percent bare ground, presence of cryptogamic soils.	Year 1 as baseline. Update every four years in rotation.
Butterfly Monitoring			
Sentinel	3-4 occupied sites	Five visits to estimate presence and numbers.	Yearly
Panel	Up to 20 sites within the macrosite to be studied over a four year period. Thus five sites will be study each year. They can be occupied or unoccupied.	Five visits to estimate presence	Every year over a four year rotation.

Quino Habitat Monitoring

The Quino checkerspot butterfly habitat monitoring program is intended to improve the current understanding of the habitat and environmental correlations to Quino checkerspot butterfly population size and stability, and provide the basis for adaptive management strategies. Variables measured at each patch will include structure and composition of the plant community; presence and density of larval host plants, nectar plants, and other plants that co-occur with Quino checkerspot butterfly; amount of bare ground; and other correlates of Quino checkerspot butterfly occupancy, such as the presence of cryptobiotic soil crusts. Topographic analysis will also be conducted as determined after setting up a grid system over the densest population area. Features to be recorded include the azimuth and tilt. This analysis can be used to provide a stratified sampling method that is determined by the degree of insolation (Murphy and Weiss 1988b). This method can be used to develop a stratified random sampling method that can correlate with the results of the butterfly population surveys. While the Murphy and Weiss (1988b) method uses the results of larvae as part of the analysis, the proposed

monitoring will use results from adult surveys in order to be cost effective. The habitat monitoring goal is to maintain the 966 acres of currently and potential occupied upland habitat as suitable habitat for the species. The continued condition of habitat as shown on Figure 5 is acceptable since the disturbed coastal sage scrub is generally categorized as disturbed due to low shrub cover with areas of exposed soil with some non-native cover including grasses and forbs; however, open ground is still present and Quino checkerspot butterfly has been recorded. Enhancement and restoration, as described above, will improve other habitat areas such as the non-native grassland patches and the non-native grass dominated valley needlegrass and coastal sage scrub patches.

Adaptive Management

The following adaptive management triggers are provided (with minor revisions to apply to the specific project area) from the County of San Diego Quino Addition (County of San Diego 2010) and will be applied to the Resort Village site:

- **Trigger 1: Significant Declining Occupancy Trend.** A logistic regression of the presence-absence data over a six year period will be analyzed. The analysis should be performed across the Resort Village Preserve. If statistically fewer sites are occupied than in the past, then the distribution of the sites should be considered to determine whether dispersal, habitat quality, or weather conditions are likely to be explanatory. These can be investigated by using appropriate dependent variables to test each explanation (e.g., distance to nearest patch, vegetation variables, and rainfall). If declines are uniform across the Resort Village Preserve, and can be attributable to low rainfall, then no action is triggered. If vegetation variables are explanatory, then active management actions will occur where Quino checkerspot butterfly have been extirpated. If dispersal seems to be the key, (i.e., sites with extirpation are statistically more distant from other sites), then analyze using Trigger 2.
- **Trigger 2: Site Extirpation.** If a site has experienced a population extirpation without butterflies returning for three years during which the population size at sentinel sites was equal to or greater than the mean population size (e.g., three "good" years), then one of two actions will be considered for the site:
    - If the percent cover of larval host plants and nectar sources at the site have diminished since the site was last occupied, then the Active Management Program will focus on restoration at the site.
    - If habitat quality does not appear to be the cause of extirpation, then the POM will initiate other actions, such as performing additional research studies or reintroducing the species through translocation of wild or captive stock, in coordination with the Wildlife Agencies.

- **Trigger 3: Stability in Occupied Sites.** When occupancy remains constant through time (i.e., three sampling periods or longer), this shows that populations appear stable. In this situation, the Active Management Program will focus on restoration or creation of Quino checkerspot butterfly habitat in unoccupied areas. In this manner, available resources will be directed to creation of new habitat only when declines in existing habitat have been addressed.

2.3 Coordination

On a region-wide basis, the Otay SRP and RMP are being implemented through the RMP requirements of preserve conveyance and preserve management funding. These requirements have resulted in offers for conveyance of preserve land within Otay Ranch and the establishment of the POM to monitor, manage and maintain these preserve areas. The conveyance and management of the preserve is being actively coordinated between the City of Chula Vista and the County of San Diego (as the POM) in consultation with the Resource Agencies.

2.3.1 Coordination Goals

The POM will establish coordination goals; however, these goals should be focused around the aforementioned vegetation and species goals. Examples include:

- Coordinate with other land managers with Quino checkerspot butterfly and the SDMMP to compare enhancement and restoration successes, monitoring data and adaptive management practices;
- Coordinate with US Border Patrol to limit the use of the Resort Village Preserve for potential disruptive activities.
- Coordinate with the Resource Agencies to provide results of ongoing monitoring, updates on enhancement and restoration activities and needed adaptive management.

2.3.2 Coordination Objectives

The POM will establish coordination objectives.

2.3.3 Coordination Implementation Tasks

The POM will establish coordination implementation tasks.

2.4 Property Stewardship

The Biological Resources Technical Report Supplemental Analysis - Otay Ranch Resort Village – Alternative H (Dudek 2019) outlines several long-term edge effects that might occur due to project

construction. Long-term edge effects could include intrusions by humans and domestic pets and possible trampling of individual plants, invasion by exotic plant and wildlife species, exposure to urban pollutants (fertilizers, pesticides, herbicides, and other hazardous materials), soil erosion, litter, fire, hydrologic changes (e.g., surface and groundwater level and quality), lighting, and noise.

2.4.1 Property Stewardship Goals

Goal: Reduce potential long-term edge effects on the preserve.

2.4.2 Stewardship Objectives

- **Objective:** Limit the ability for the proposed project to have indirect impacts on the preserve through the creation of project design features within the Specific Plan and Tentative maps.
- **Objective:** Implement the Resort Village Preserve Edge Plan

2.4.3 Stewardship Implementation Tasks

Currently, the entire project area is gated and fenced along west and south sides. Access from the north is through a City of San Diego gate in Proctor Valley that is currently fenced and locked. Property to the East is owned by the CDFW and there is no access to the project area from that land.

As the Resort Village project is constructed, the designated preserve area which abuts proposed development will be fenced and signs will be placed along the fencing to discourage entrance into the preserve. Once the land is dedicated and the POM takes over stewardship, preserve enforcement will be tasked to the POM. Within the preserve there are existing dirt roads; however, none of these areas will be designated as trails. Border patrol currently uses these existing roads and will likely continue to do so after project completion. However, there will be no scheduled maintenance for the roads within the Preserve. One facility within the preserve, a water tank, will be fenced and will not require regular maintenance.

As stated in the Biological Resources Technical Report Supplemental Analsis - Otay Ranch Resort Village – Alternative H (Dudek 2019), the Project applicants shall implement the following Project design features as conditions of the Specific Plan and Tentative Maps to avoid indirect impacts to natural vegetation communities and sensitive species (i.e. edge effects):

- No invasive, non-native plant species shall be introduced into areas immediately adjacent to the Preserve. All slopes immediately adjacent to the Preserve shall be planted with native species that reflect the adjacent native habitat.

- Grading and/or improvement plans shall include the requirement that a fencing and signage plan be prepared and that permanent fences or walls be placed along the open space boundaries. Placement of permanent fencing or walls is required at the conclusion of the grading activity and prior to Record Plan approval.
- Submit to the director of the Department of Planning and Development Services evidence that permanent signs have been placed to protect all open space easements in accordance with the open space signage exhibit that will be placed on file with the Department of Planning and Development Services as Environmental Review Number 04-19-005.
- A hydroseed mix that incorporates native species, is appropriate to the area, and is without invasives shall be used for slope stabilization in transitional areas.
- Peruvian pepper trees and other invasive vegetation would not be planted in streetscapes, or within 50 feet of the Preserve, where they could impact native habitat.
- Lighting of all developed areas adjacent to the Preserve shall be directed away from the preserve, wherever feasible and consistent with public safety. Where necessary, development shall provide adequate shielding with non-invasive plant materials (preferably native), berming, and/or other methods to protect the preserve and sensitive species from night lighting.
- Uses in or adjacent to the preserve shall be designed to minimize noise impacts. Berms or walls shall be constructed adjacent to commercial areas and any other use that may introduce noises that could impact or interfere with wildlife utilization of the preserve.
- During Project operation, all recreational areas that use chemicals or animal by-products, such as manure, that are potentially toxic or impactful to sensitive habitats or plants shall incorporate methods on-site to reduce impacts caused by the application and/or drainage of such materials into Preserve areas.

2.5 Fire Management

A Fire Protection Plan has been created for the development portion of the proposed project (Dudek 2018). That plan designates the fire risk assessment for the project area, fire safety requirements, fire and emergency services as well as a community protection and evacuation plan. A 100’ fuel modification zone is included around the project site which, in addition to protecting the developed portions of the project site from potential wildland fires, serves the opposite purpose of preventing home fires from spreading to the Preserve. In addition, the Fire Protection Plan includes recommendations for fuel modification adjacent to roadways within or adjacent to the Preserve to prevent or minimize the risk of vehicle-related ignition. However, the plan does not address fire management within the preserve. Fire management within the preserve will be handled by the POM.

2.5.1 Fire Management Goals

Fire management goals will be at the discretion of the POM and in accordance with the MSCP. Examples include:

- Minimize the threat of fire through fuel management practices as permitted in the MSCP and Otay Ranch RMP.

2.5.2 Fire Objectives

The POM will designate fire objectives for the preserved portion of the project. Examples

- Coordinate with the Fire Authority Having Jurisdiction during the summer and fall months to assess annual fire threats and take appropriate actions.
- Limit the extent to which any fuel management activities occur within higher quality Quino habitat areas.
- In the event of a fire, coordinate with the Resource Agencies to develop a Post-Fire Resource Recovery Plan

2.5.3 Fire Implementation Tasks

Implementation tasks will be at the discretion of the POM and in accordance with the MSCP.

3 STAFFING, MANAGEMENT COSTS AND FUNDING

Monitoring and maintenance cost estimates for the various actions within the Preserve are summarized in Table 8. For the purposes of this cost estimate, it is assumed that a maximum of four Sentinel locations will be selected within the Resort Village Preserve. For the Resort Village, it is assumed that five panel sites will be established for the monitoring conducted every year with rotation of a four-year period to ultimately cover 20 panel sites.

Table 8
Quino Checkerspot Butterfly Monitoring and Management Cost Estimate

Task	Frequency	Number of Visits	Number of Days to Cover	Method	Acreage	When	Purpose	Cost per Year
Short Term Management and Monitoring								
Surveys								
Pre-construction survey Completed	1	5	115	USFWS protocol	1,869 (entire site)	2008	Set baseline population and host plant occurrence	Done
Habitat Restoration and Enhancement								
Enhancement	As needed			Limited herbicide, mowing		After project initiation	Enhance areas of shrub cover that have some weed cover	$10,000 acre/year
Complete Restoration	As needed			Dethatch, herbicide, mowing, seeding		After project initiation	Restore areas with no host plant and dense grass	$25,000 acre/year
Long Term Management and Monitoring								
Habitat Restoration and Enhancement								
Maintenance and enhancement	yearly	As required	As required	Seed collection; Seed redistribution; Weed removal beyond that conducted by the POM	15 acres per year	After project initiation	Enhance habitat suitable for Quino checkerspot butterfly	$30,000

Table 8
Quino Checkerspot Butterfly Monitoring and Management Cost Estimate

Task	Frequency	Number of Visits	Number of Days to Cover	Method	Acreage	When	Purpose	Cost per Year
Butterfly monitoring								
Butterfly monitoring sentinel	yearly	4 sites 1 day to cover the 4 sites	5 visits total per year	Standard USFWS protocol	1 occupied sites; 50 m radius	Upon dedication to County	Population trend	$8,000
Butterfly monitoring Panel	yearly	5 1 day to cover the 5 sites	5 visits total per year		4 sites; rotate from year to year; 50 m radius		Population trend (samples 0.2% of the site for the total of 24 points)	$8,000
Long-term Habitat Monitoring								
Habitat monitoring macrosite	Year 1 of dedication of preserve, as needed based on changes in land use or population of quino; assume every 5 years	1		GIS exercise	1	Upon dedication to County	Distance to nearest occupied macrosite located off site; average elevation; topographic diversity; average climate; slope; aspect; distance to roads; distance to the development ; time elapsed since fire.	$1200 /5 = $240

Table 8
Quino Checkerspot Butterfly Monitoring and Management Cost Estimate

Task	Frequency	Number of Visits	Number of Days to Cover	Method	Acreage	When	Purpose	Cost per Year
Habitat monitoring microsite	Year 1 of dedication of preserve then every 4 years	1		50 m point intercept transects; possibly two quadrats (0.5 m2)	5 locations	Upon dedication to County	Structure and composition of the plant community; presence and density of larval host plants, nectar plants; amount of bare ground; presence of cryptobiotic soil crusts	$6,000 / 4= $1,500
Actions based on triggers								
Adaptive management	Yearly as needed	--	--	Dethatch, herbicide treatment, mowing and seeding as determined based on monitoring	1,076.5 (965.1) acres of Quino checkers pot habitat.	As indicated by monitoring	Restoration to address declines in population; if no declines then just low level restoration to improve the habitat each year.	As needed

INTENTIONALLY LEFT BLANK

4 LITERATURE CITED

62 FR 2313. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Laguna Mountains Skipper and Quino Checkerspot Butterfly. January 16, 1997.

62 FR 2315. Quino Checkerspot Butterfly (*Euphydryas editha quino*) 5-Year Review: Summary and Evaluation.

66 FR 9475. Endangered and Threatened Wildlife and Plants; Proposed Determination of Critical Habitat for the Quino Checkerspot Butterfly; Proposed Rule. February 7, 2001.

Bauer, D. 1975. Tribe Melitaeini. In W. Howe (ed.) The Butterflies of North America, pp. 139-195. Doubleday and Company, Inc., Garden City, New York. 633 pp.

Boughton, D.A. 1999. Empirical evidence for complex source-sink dynamics with alternative states in a butterfly metapopulation. Ecology 80:2727-2739.

Boughton, D.A. 2000. The dispersal system of a butterfly: A test of source-sink theory suggests the intermediate-scale hypothesis. American Naturalist 156:131-144.

County of San Diego. 1997. *Multiple Species Conservation Program. County of San Diego Subarea Plan*. http://www.sdcounty.ca.gov/pds/mscp/docs/SCMSCP/MSCP_County_Subarea_Plan.pdf

County of San Diego. 2009. Quino Amendment: Summary of Proposed Adaptive Management and Monitoring Strategy July 23, 2009 Draft - Quino Stakeholder Group 9

County of San Diego, 2010. Draft Quino Checkerspot Butterfly Amendment to the County of San Diego Multiple Species Conservation Program Subarea Plan. October 2010.

Dudek. 2008. *Quino Checkerspot Butterfly Survey for Otay Ranch Village 13/Resort Site*. Report to: U.S. Fish and Wildlife Service. Prepared for Otay Ranch Company, Inc. September 3.

Dudek. 2016. *Quino Checkerspot Butterfly Survey for Otay Ranch Village 13/Resort Site*. Report to: U.S. Fish and Wildlife Service. Prepared for Otay Ranch Company, Inc.

Dudek. 2015. *Otay Ranch Resort Village Biological Resources Technical Report, San Diego California*. Prepared for Baldwin and Sons, LLC, and JPB Development LLC. September.

Dudek. 2018. The Otay Ranch Resort Village Fire Protection Plan. Prepared for: Prepared for Baldwin and Sons, LLC, and Moller Otay Lakes Investments LLC.

Dudek. 2018. Conceptual Vernal Pool Mitigation Plan. Prepared for Baldwin and Sons, LLC, and Moller Otay Lakes Investments LLC.

Dudek. 2019. Biological Resources Technical Report Supplemental Analysis - Otay Ranch Resort Village – Alternative H

Ehrlich, P.R. 1961. Intrinsic barriers to dispersal in a checkerspot butterfly. Science 134:108-109.

Ehrlich, P.R. 1965. The population biology of the butterfly, *Euphydryas editha*. II. The structure of the Jasper Ridge colony. Evolution 19:327-336.

Emmel, T.C., and J.F. Emmel. 1973. The butterflies of southern California. Natural History Museum of Los Angeles County, Science Series No. 26. 148 pp.

Freudenberger, D.O., B.E. Fish, and Keeley J.E. 1987. Distribution and stability of grasslands in the Los Angeles basin. Bulletin of Southern California Academy of Sciences 86:13-26.

Longcore, T., D. Murphy, D. Deutschman, R. Redak, R. Fisher. 2003. A management and Monitoring Plan for Quino Checkerspot Butterfuly (*Euphydryas editha quino*) and its Habitats in San Diego County. Advisory report to the County of San Diego.

Mattoni, R., G.F. Pratt, T.R. Longcore, J. F. Emmel and J. N. George. 1997. The endangered Quino checkerspot, *Euphydryas editha quino* (Lepidoptera: Nymphalidae). Journal of Research on the Lepidoptera 34:99-118.

Minnich, R.A. and R.J. Dezzani. 1998. Historical decline of coastal sage scrub in the Riverside-Perris Plain, California. Western Birds 29:366-391.

MSCP Policy Committee and MSCP Working Group. *MSCP (Multiple Species Conservation Program) Plan*. 1996. San Diego, California.

Murphy, D. D. 1990. A report on the California butterflies listed as candidates for endangered status by the United States Fish and Wildlife Service. Draft report for California Department of Fish and Game, Contract No. C-1755. 60 pp.

Murphy, D.D., and R.R. White. 1984. Rainfall, Resources, and Dispersal in Southern populations of *Euphydryas editha* (*Lepidoptera: Nymphalidae*). Pan-Pacific Entomologist 60:350-355.

Murphy, D.D., and S.B. Weiss. 1988a. Ecological studies and the conservation of the Bay checkerspot butterfly, *Euphydryas editha bayensis*. Biological Conservation 46:183-200.

Murphy, D.D., and S.B. Weiss. 1988b. *A Long-Term Monitoring Plan for a Threatened Butterfly*. Conservation Biology Volume 2, No. 4, December 1988.

Ogden Environmental and Energy Service Company (Ogden). 1992. *Final Program Environmental Impact Report – Otay Ranch*. Prepared for Otay Ranch Joint Planning Project. December.

Osborne, K.H. and R.A. Redak. 2000. Microhabitat conditions associated with the distribution of post-diapause larvae of *Euphydryas editha quino* (Behr) 135 (Lepidoptera: Nymphalidae). Annals of the Entomological Society of America 93:110-114.

Otay Ranch. 1993. "Otay Subregional Plan, Volume 2." *General Development Plan/Subregional Plan (GDP/SRP)*. Applicant: Otay Vista Associates. Prepared for Otay Ranch Joint Planning Project. Approved by: City of Chula Vista and County of San Diego. October 28.

Preston, K. L., R. A. Redak, M. F. Allen, and J. T. Rotenberry. 2012. *Changing distribution patterns of an endangered butterfly: Linking local extinction patters and variable habitat relationships.* Biological Conservation 152 (2012) 280-290.

San Diego Management and Monitoring Program (SDMMP). 2013a. Management Strategic Plan for Conserved Lands in Western San Diego County, Vol. 1: Overview and Approach. 3 Volumes. Prepared for the San Diego Association of Governments. San Diego. Version 08.27.2013.

SDMMP. 2013b. Management Strategic Plan for Conserved Lands in Western San Diego County, Vol. 2: Regional and Management Unit Goals and Objectives. 3 Volumes. Prepared for the San Diego Association of Governments. San Diego. Version 08.27.2013.

SDMMP. 2013c. Restoration Methods and Experimental Design Summary South San Diego County Grasslands Project. http://www.sdmmp.com/Libraries/Management_Plans_and_Reports/Restoration_Methods___Experiments_Final_Draft_20120123_tb.sflb.ashx

Singer, M.C., and P.R. Ehrlich. 1979. Population dynamics of the checkerspot butterfly *Euphydryas editha*. Fortschritte der Zoologie 25:53-60.

Stylinski, C.D. and E.B. Allen. 1999. Lack of native species recovery following severe exotic disturbance in southern California shrublands. Journal of Applied Ecology 36:544-554.

USFWS (U.S. Fish and Wildlife Service). 2002. Quino Checkerspot Butterfly (*Euphydryas editha quino*): Survey Protocol Information. Carlsbad Fish and Wildlife Office, Carlsbad, California.

USFWS. 2003. Final Recovery Plan for the Quino Checkerspot Butterfly (*Euphydryas editha quino*). Portland, Oregon.

Zink, T.A., M.F. Allen, B.I. Heindl-Tenhunen, and E.B. Allen. 1995. The effect of a disturbance corridor on an ecological reserve. Restoration Ecology 3:304-311.

Zonneveld, C., T. Longcore, and C. Mulder. 2003. Optimal schemes to detect presence of insect species. Conservation Biology 17(2):476–487.

INTENTIONALLY LEFT BLANK