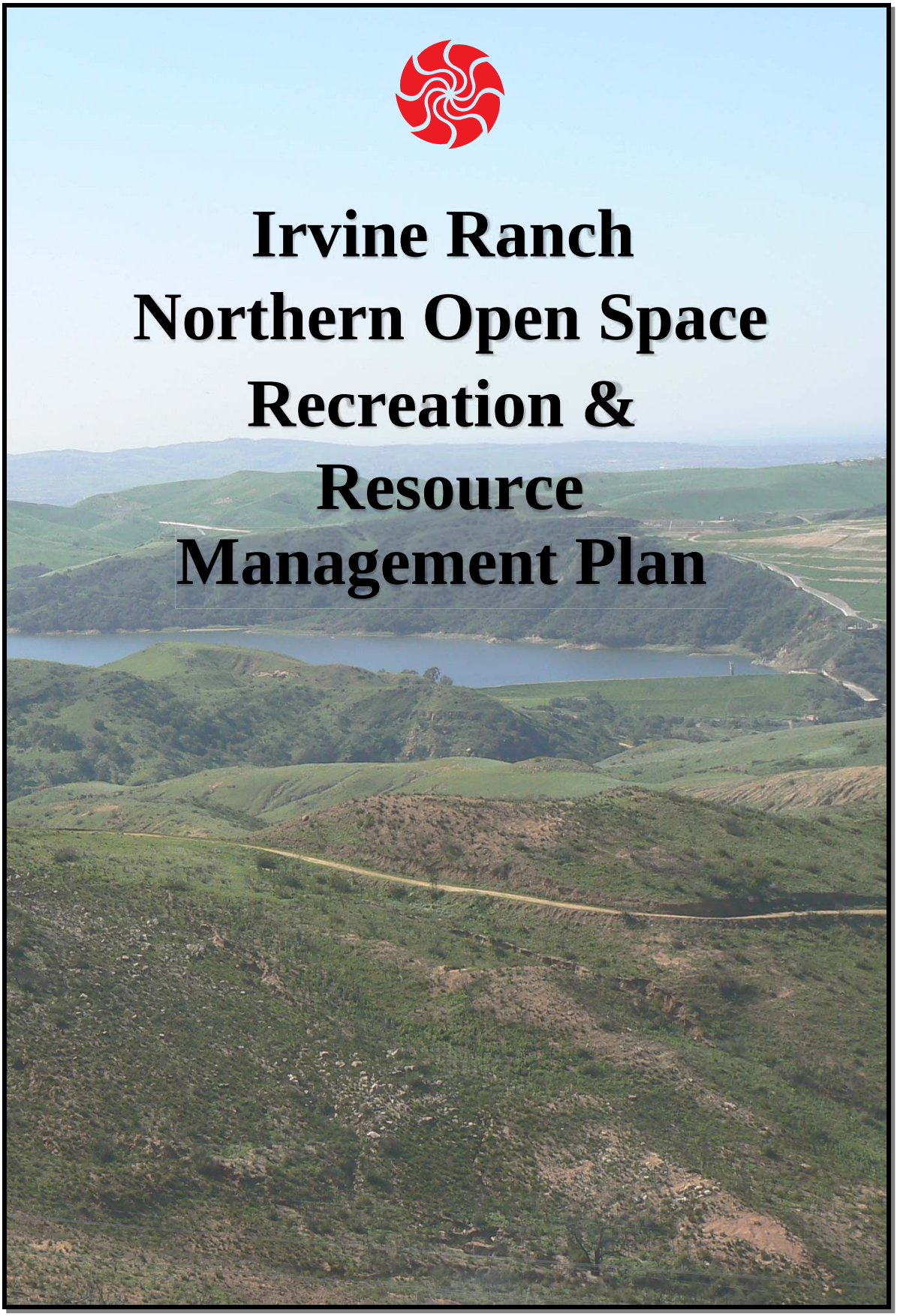

Irvine Ranch Northern Open Space Recreation & Resource Management Plan

June 9, 2010

The Irvine Ranch
Northern Open Space
Recreation and Resource Management Plan

Prepared by:
LSA Associates, Inc. and Irvine Ranch Conservancy

Prepared for:
Irvine Company
Dean Kirk, Senior Director Environmental Permitting and Compliance

IRVINE COMPANY
Since 1864

Special Thanks

The Irvine Company would like to thank the following resource agencies for their time and suggestions:

The United States Fish and Wildlife Service

The California Department of Fish and Game

Acknowledgements

This document includes information compiled from the following sources:

- Natural Community Conservation Plan and Implementation Agreement (County of Orange 1996)
- Nature Reserve of Orange County – Central/Coastal Subregion Habitat Restoration and Enhancement Plan (LSA 2003)
- Photographs provided by the Irvine Ranch Conservancy and LSA Associates, Inc.

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Introduction

INTRODUCTION

MISSION STATEMENT

"My dream is that the Irvine Ranch will be known and celebrated as much for what has been preserved and protected here as it is known for the outstanding communities that have been built here" – Donald Bren, Chairman, Irvine Company.

The Irvine Company is dedicated to creating and promoting awareness of the Irvine Ranch's open space wildlands while encouraging programs that will ensure the preservation of the protected lands' natural resources for generations to come. By engaging members of the community in positive outdoor recreational and educational experiences, the wildlands will be managed and maintained as a welcomed and valued part of the region's quality of life.

STATEMENT OF PURPOSE

The Irvine Company currently owns over 8,000 acres (ac) of wildlands within the Natural Community Conservation Plan (NCCP) Reserve System. These lands will be dedicated to public ownership over time in accordance with existing development approvals, as provided in the NCCP Implementation Agreement (IA), Section 5.2.2, Phased Dedication of Land Owned by the Irvine Company. Initially, the Irvine Company owned 17,877 ac of land within the Reserve System, of which approximately 7,500 ac have been placed into public ownership as of the date of this Plan.

As a signatory to the Central and Coastal Subregion NCCP and Habitat Conservation Plan (HCP), the Irvine Company has certain responsibilities under the IA. One of those responsibilities is a commitment to interim management measures, Section 4.4.1. As part of the interim management measures, the Irvine Company has prepared this Recreation and Resource Management Plan (RRMP) for the approximately 8,057 ac of land it currently owns within the Central Subarea or the Reserve System. This RRMP has been prepared to address the access uses and facilities for these lands and will be adopted by the County of Orange (County) when ownership of the lands is transferred to the County. The Irvine Company will continue to manage these lands consistent with this RRMP until such time that a public entity accepts fee ownership of the lands that make up the Irvine Ranch Northern Open Space.

EXECUTIVE SUMMARY

In 1991, the California Legislature authorized the NCCP, which was prepared in response to "a need for broad-based planning to provide for the effective protection and conservation of the State's wildlife heritage while continuing to allow appropriate development and growth." The purpose of the NCCP/HCP was to create a multiple-species, multiple-habitat subregional Reserve System and to implement a long-term "adaptive management" program that would protect coastal sage scrub (CSS) and other habitats and species located within the CSS habitat mosaic. The program was also designed to provide for economic uses to meet the social and economic needs of the people of the subregion.

The Irvine Company became a signatory to the NCCP and IA in 1996 along with 20 other participants, including federal, State, regional, and local agencies and jurisdictions; affected landowners; utility companies; and the University of California, Irvine. The Nature Reserve of Orange County (NROC) was created as a nonprofit entity to coordinate the efforts of the signatories in implementing the NCCP.

The Irvine Company is a member of the NROC Board of Directors, participates in the quarterly Board meetings, and may participate in monthly Executive Board meetings. As a signatory to the NCCP, the Irvine Company is obligated to perform certain tasks related to the management of its open space land.

One of the landowners' responsibilities is a commitment to interim management measures. The Irvine Company has prepared this RRMP as an interim management measure until the ultimate landowner adopts this RRMP as their management plan or prepares a replacement RRMP that is to be reviewed and approved by the appropriate agencies. This RRMP describes access plans, permitted uses, planned trails and trailheads, and visitor facilities located within the habitat Reserve System owned by the Irvine Company. This RRMP was submitted for review and recommendation to the California Department of Fish and Game (CDFG) and the United States Fish and Wildlife Service (USFWS).

PROJECT LOCATION

The Irvine Ranch Northern Open Space land is a composition of various-sized parcels that stretch from Chino Hills State Park in the north, extend along the ridgeline of Gypsum Canyon to parts of Weir Canyon to the west, and continue south to parcels clustered around Santiago Creek, including parcels around Irvine Lake and parts of Loma Ridge, and large areas of Limestone Canyon to the south.

Non-NCCP Reserve open space lands also owned by the Irvine Company surround and connect much of the Irvine Ranch Northern Open Space, forming a vast and continuous area of protected open space. The surrounding open space system and its relation to the Irvine Ranch Northern Open Space are shown on the Regional Context Map (Exhibit A). Open space lands in close proximity to the Irvine Ranch Northern Open Space include the Cleveland National Forest, Chino Hills State Park, Santiago Oaks Wilderness Park, Irvine Regional Park, Peters Canyon Regional Park, Limestone and Whiting Wilderness Park, the proposed El Toro National Wildlife Refuge, and the Irvine Company conservation easement lands encompassing areas of Gypsum Canyon, SilMod (Silverado and Modjeska Canyons), Fremont Canyon, East Orange, and Weir Canyon.

HISTORICAL OVERVIEW

The Irvine Ranch Northern Open Space lands are part of the 50,000 ac of permanently protected wildlands and parks of the historic 93,000 ac Irvine Ranch. In October 2006, after a detailed federal scientific evaluation process, 37,000 ac of these open space lands were designated a National Natural Landmark (NNL) for both geologic and biologic value. This was the first NNL designated in California by the federal government since 1987. Moreover, in April 2008, these same lands (with the

EXHIBIT A

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LEGEND

- Irvine Ranch Northern Open Space
- Historical Irvine Ranch Boundary
- Open Space and Parks (Existing and Proposed)

* Based upon best available information, 2006.

Irvine Ranch Northern Open Space RRMP

Regional Context Map

SOURCE: Eagle Aerial (2005), TIC (2006).

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addition of Coal Canyon Ecological Reserve) were recognized as the first-ever California Natural Landmark (CNL).

As significant as they were, the NNL and CNL designations represent just one of many important milestones in the history of open space preservation and stewardship of the Irvine Ranch. Another defining moment was in May 1996, when the Irvine Company, the County, various cities, and other landowners entered into an agreement to place certain lands within the NCCP Reserve (Exhibit B). The following paragraphs outline a brief history leading to the development of the NCCP Reserve, of which the Irvine Ranch Northern Open Space is a part.

Natural Community Conservation Plan

The NCCP law and program were enacted by the California Legislature in 1991. The purpose of the NCCP is to preserve entire biotic communities while allowing compatible development and growth. This focus of the NCCP represents a dramatic shift from protecting "individual species" to protecting "habitat" and the natural communities on which those species depend.

This program was designed as an alternative to the individual species regulation and protection under the California Endangered Species Act (CESA) and the Federal Endangered Species Act (FESA). Both of these protective programs were costly and were considered by many to be ineffective as a mechanism for preventing plant and animal extinctions, while at the same time not providing the breadth or certainty of regulatory coverage needed by private landowners and local governments. The NCCP recognizes that habitat-based, multispecies, or ecosystem-driven preservation programs have a greater potential for long-term environmental and regulatory success.

Areas identified for their valuable biotic resources are also recognized under the NCCP/HCP. The successful implementation of the NCCP/HCP allows for the conservation of large, diverse areas of natural habitat for the coastal California gnatcatcher (all scientific names are presented in Appendix B) and 41 other "identified species" and their associated habitats.

Southern California Coastal Sage Scrub Program

The Southern California CSS NCCP Program was the first effort to be undertaken pursuant to the NCCP Act. It is a pilot project and has served as a model for other efforts elsewhere in the State. The Southern California CSS NCCP is made up of 11 subregions covering 6,000 square miles in a five-county area. The Central and Coastal Subregion is one of the 11 subregions and encompasses 208,000 ac of developed, agricultural, and undeveloped lands (an area encompassing approximately 40 percent of the County). Within the Central and Coastal Subregion are approximately 104,000 ac of existing natural habitat, including 34,392 ac of CSS. The Irvine Company's Northern Open Space composes approximately 8,057 ac of this program.

Natural Community Conservation Plan/Habitat Conservation Plan

The NCCP/HCP for the Central and Coastal Subregion was prepared by the County and was approved on July 10, 1996, by the County, participating local jurisdictions, the USFWS, and the

EXHIBIT B

241

Santiago Canyon Road

241

261

Portola Parkway

Hicks Canyon Haul Road

Bee Canyon Access Road

133

241

LSA

LEGEND

Irvine Ranch Northern Open Space RRMP

Historic Irvine Ranch Boundary

Open Space Designation

NCCP Reserve

Special Linkage

N

0 2100 4200

FEET

Irvine Ranch Northern Open Space RRMP

NCCP Overlay Map

SOURCE: Digital Globe (2008); EDAW (2008)

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CDFG. As a signatory to the NCCP/HCP, the Irvine Company is required to adhere to the management guidelines outlined in the IA.

This program is intended to ensure the long-term survival of plant and animal species in accordance with State-sanctioned NCCP program guidelines. Specific project purposes for the HCP are:

- Planning for the protection of multiple species and multiple habitats within the CSS habitat mosaic by creating a habitat Reserve System that contains substantial CSS, chaparral, grassland, riparian, oak woodland, cliff and rock, forest, and other habitats;
- Developing a conservation program that shifts away from the current focus on the project-by-project, single-species protection to conservation and management of many species and multiple habitats on a subregional level;
- Allowing social and economic uses within the subregion that are compatible with the protection of identified species and habitats; and
- Protecting the federally listed coastal California gnatcatcher in a manner consistent with Section 10(a) of the FESA and the Special 4(d) Rule for the coastal California gnatcatcher while providing for future incidental take of the species.

The NCCP/HCP guidelines designated three "target" species to be used as surrogates for planning purposes in the CSS habitat. Long-term protection of the habitat for these three target species is intended to also protect sufficient CSS habitat to benefit a much broader range of CSS-related species. The three species are:

- Coastal California gnatcatcher
- Cactus wren
- Orange-throated whiptail


Coastal California Gnatcatcher


Cactus Wren


Orange-throated Whiptail

A number of other habitat types and species were included in the NCCP/HCP planning process as "Covered Habitats" or "Identified Species." Covered Habitats refers to those habitat types protected by the NCCP/HCP in a manner comparable to CSS (oak woodland, Tecate cypress forest, cliff and rock, and chaparral within the Coastal Subarea). Identified Species comprise those species, including

all life stages thereof, identified in the NCCP/HCP that are addressed as if they were listed as Endangered species under FESA and CESA and whose conservation and management is provided for in the NCCP/HCP.
Under the NCCP/HCP, land management actions within the Reserve will be monitored closely and modified (adapted) over time to respond to new scientific information, changing conditions, and habitat needs.

The Nature Reserve of Orange County

The first step in implementation of the NCCP/HCP in the Central and Coastal Subregion of Orange County was establishment of NROC, a 37,000 ac area (with the same name as the nonprofit coordinating body) designed to protect CSS communities and the three target species found predominantly in this habitat. The Reserve protects more than 18,800 ac of CSS.

The NROC Reserve also includes 7,300 ac of chaparral; 6,100 ac of grassland; 1,800 ac of riparian; 950 ac of woodland; 200 ac of forest; and significant portions of six other habitats that currently exist in the subregion. Inclusion of these non-CSS habitats and their resident species will increase biodiversity values and result in a multiple-species, multiple-habitat Reserve.

According to the NCCP/HCP document, the Reserve will ultimately be owned and managed by public agencies and administered by the NROC Nonprofit Management Corporation, whose board consists of representatives from each of the following:

- Each local government owning land in the Reserve (to date, this includes the County, City of Irvine, City of Laguna Woods, and City of Laguna Beach)
- Southern California Water District
- Irvine Ranch Water District
- Southern California Edison (SCE)
- Metropolitan Water District
- Transportation Corridor Agencies
- The Irvine Company
- California Department of Parks and Recreation
- CDFG
- USFWS
- Regents of the University of California
- Each nonprofit entity owning land within the Reserve
- Three public representatives appointed by the Board of Directors
- A nonvoting ex-officio member representing the California Department of Forestry
- A nonvoting ex-officio member representing the Orange County Fire Authority

The Nonprofit Corporation coordinates activities within the Reserve System, receives and disburses funds to Reserve owners/managers, hires staff and biologists to conduct adaptive management activities, and prepare annual reports for public review. NROC is specifically not a regulatory agency or body.

The Irvine Company's Northern Open Space subject to this RRMP is enrolled in the Central and Coastal Subregion NCCP Program and is within NROC.

REVIEW AND APPROVAL PROCESS

The Irvine Company's Northern Open Space RRMP was submitted for review and approval by CDFG and USFWS. This RRMP addresses the public access uses and facilities for these lands until the ultimate landowner adopts this RRMP as their management plan or prepares a replacement RRMP that is to be reviewed and approved by the appropriate agencies. The Irvine Company will continue to manage these lands consistent with this RRMP until such time that a public entity accepts fee ownership of the lands that make up the Irvine Ranch Northern Open Space.

UPDATES AND AMENDMENTS

The landowner and/or their land manager (if any) will review the Irvine Ranch Northern Open Space RRMP annually to determine whether updates/amendments are warranted.

IRVINE RANCH

Recreation & Resource Management Plan

Existing Conditions

EXISTING CONDITIONS

As a consequence of previous historical land uses, including development, grazing activities in the past, and agriculture, some native habitats within the area subject to this RRMP have been modified, while others, in the steeper hills and canyon bottoms, remain relatively undisturbed. In addition, the foothills of the Santa Ana Mountains provide an important link to larger regional habitat areas, including the Cleveland National Forest, Chino Hills State Park, O'Neill Regional Park, and the Audubon California Starr Ranch Sanctuary. This is important for wide-ranging target species such as large carnivores, or for species with widely distributed populations such as certain native plants.

Key societal features on the lands include archaeological, historical, and paleontological resources as well as development areas and edges. Societal features in areas adjacent to the Irvine Ranch Northern Open Space include the Frank R, Bowerman Landfill, Irvine Lake, orchard crops and agricultural operations, city/county parks, other open space areas, and residential and industrial development.

TOPOGRAPHY

The Irvine Ranch Northern Open Space is located within the Santa Ana Mountains and the Lomas de Santiago in the northwest portion of the Peninsular Range Geomorphic Province. The Lomas de Santiago are considered foothills to the Santa Ana Mountains and are located between the Tustin Plain to the south and Santiago Canyon to the north. Both the Santa Ana Mountains and the Lomas de Santiago consist of rolling terrain with moderately steep slopes, canyons, and narrow ridges. A prominent cliff face known as Loma Ridge lies in the southwestern portion of the Irvine Ranch Northern Open Space. Other significant geological features are spectacular rock outcroppings, many of which contain eroded sandstone caves. The highest geographical point of the Irvine Ranch Northern Open Space is located at the northeastern end of the Irvine Ranch Northern Open Space along Main Divide Road, between Gypsum Canyon to the northwest and Fremont Canyon to the southeast, where the elevations rise to 2,075 feet (ft) above sea level at several locations. The lowest geographical point is located near the mouth of Weir Canyon as it enters Santiago Canyon, where the elevation is 540 ft above sea level.

GEOLOGY AND SOILS

The Irvine Ranch Northern Open Space includes sedimentary rocks with both marine and nonmarine origins, representing fluctuations in an ancient sea level as well as tectonic uplift.

The portion of the Irvine Ranch Northern Open Space within the Lomas de Santiago is a series of northeast-trending hills and canyons along a larger northwest-trending ridge and the northwest trending Santiago Canyon that separates the Lomas de Santiago from the main portion of the Santa Ana Mountains. The dominant feature of the Irvine Ranch Northern Open Space in the Santa Ana Mountains is the northeast-southwest-trending Weir Canyon. Exposed within the canyons and ridges of the Lomas de Santiago and Santa Ana Mountains are Cretaceous through middle Miocene

sedimentary rocks that are occasionally capped by Pleistocene and Holocene surficial deposits. Major features of the present topography and geomorphology are the result of late Miocene faulting, regional uplift of the Santa Ana Mountains, and subsequent erosion.

The sedimentary formations (from youngest to oldest) are as follows:

- Puente Formation, Soquel Member—middle to late Miocene
- Puente Formation, La Vida Member—middle to late Miocene
- Topanga Formation—early to middle Miocene
- Undifferentiated Sespe Formation and Vaqueros Formations—late Oligocene (Arikareean) to early Miocene
- Sespe Formation—late Oligocene (Arikareean) to early Miocene
- Vaqueros Formation—late Oligocene (Arikareean) to early Miocene
- Santiago Formation—middle Eocene
- Silverado Formation—Paleocene age
- Williams Formation, Pleasants Sandstone Member—late Cretaceous (Campanian)
- Williams Formation, Shulz Ranch Member—late Cretaceous (Campanian)
- Ladd Formation, Holz Shale Member—late Cretaceous (Campanian)
- Ladd Formation, Baker Canyon Conglomerate Member—late Cretaceous (Campanian)

Surficial units that cap the formations in several locations include nonmarine terrace deposits, alluvium, and colluvium. These sediments were deposited during the last 1.8 million years by local streams and as the result of slopewash. Several landslide areas occur within the Irvine Ranch Northern Open Space, occurring primarily within the Santiago, Sespe, Vaqueros, and Puente Formations.

Scientifically significant fossils of marine and nonmarine animals and plants have been found throughout the region within the same geologic formations as well as surficial sediments that are older than 10,000 years. It is very likely that similar resources exist in the Irvine Ranch Northern Open Space. These resources will be preserved and protected within the Irvine Ranch Northern Open Space for future scientific and educational studies. Looting and vandalism are a concern with any existing archaeological and paleontological resource. Methods to reduce these risks may include the inventory and periodic monitoring of all known resources, screening vegetation to reduce the likelihood of trespassing and damage, and master planning of facilities to reduce conflicts with known resources. Additional programs may be developed to increase the public understanding of the value of paleontological sites through educational programs and/or active monitoring and stewardship.

The Irvine Ranch Northern Open Space has three predominant soil types. These include: the Calleguas Clay Loam series, the Cieneba Sandy Loam series, and the Anaheim Clay Loam series. The Calleguas and the Cieneba series consist of very shallow to shallow, well-drained soils that form on weathered bedrock on slopes ranging from 9 to 80 percent. The Anaheim series are well-drained, moderately deep soils that form on foothills containing weathered, fine-grained sandstone or shale.

Several unnamed inactive faults are located within the immediate region of the Irvine Ranch Northern Open Space. Most of these were created during uplift of the hills over the last several million years. The faults are generally northwest-trending right-lateral and parallel the Newport/Inglewood Fault Zone to the southwest and the Chino Fault Zone to the northeast. The nearest major active faults are the Whittier Fault, located approximately 2.5 miles (mi) to the northwest, and the Chino Fault, located approximately 5 mi to the northeast. The Newport-Inglewood Fault lies approximately 21 mi to the southwest. Other active faults that have generated the strongest historical earthquakes nearest to the Irvine Ranch Northern Open Space include the San Andreas, San Jacinto, and Elsinore Faults and the Elysian Park thrust.

HYDROLOGY

Primary sources of water for the Irvine Ranch Northern Open Space are rainfall and runoff from surrounding lands. Runoff is not consistent because of low, intermittent rainfall. Plants and animals in the Irvine Ranch Northern Open Space have adapted to the xeric (i.e., dry) conditions. Annual grasslands have a short lifespan, mainly during the winter months. Oak woodlands occur in moist canyons and cool microclimates, where deep roots are developed to access moisture.

Several named canyons are located within the Irvine Ranch Northern Open Space. Some, including Hicks and Round Canyon and Agua Chinon in the southern portion of the Irvine Ranch Northern Open Space, flow southwesterly and into the Tustin Plain. Other major canyons, like Limestone and Weir Canyons, flow into Santiago Canyon, which is also located in the Irvine Ranch Northern Ranch Open Space and flows northwesterly before entering the northern extent of the Tustin Plain near the City of Villa Park. The northern end of the Irvine Ranch Northern Open Space is located near the headwaters for Gypsum Canyon that flows in a northern direction before joining up with the Santa Ana River. Many of the smaller creeks only flow during periods of rain and are dry most of the year.

One large reservoir (Irvine Lake, formally called Santiago Reservoir) is located in the vicinity of, but not within, the Irvine Ranch Northern Open Space and receives some runoff from it. Irvine Lake is formed by an approximately 100 ft high earth-filled dam, known as Santiago Dam, with a concrete lined spillway. The lake occupies approximately 700 ac and holds approximately 28,000 acre-feet of water. It was constructed in 1931 by the Irvine Company and the Serrano Irrigation District (now called the Serrano Water District). It is owned by the Irvine Ranch Water District and the Serrano Water District. The Irvine Ranch Water District uses untreated water from the lake for agricultural purposes, and the Serrano Water District uses treated water to provide water to Villa Park and some parts of Orange. The lake is also used for recreation, including fishing and camping along the shore.

BIOLOGICAL RESOURCES

This section documents the general biological character of the Irvine Ranch Northern Open Space in terms of plant communities, wildlife habitats, wildlife movement, and special-interest biological resources either present or potentially present within the Irvine Ranch Northern Open Space. The information contained in this section is based on the habitat survey performed by Jones & Stokes Associates, Inc. in 1992 (Jones & Stokes Associates, Inc. 1993); NCCP/HCP identified species (i.e., conditionally covered and target species); searches of the California Natural Diversity Database

(CNDDB) List of Plant Communities and Species of Special Interest published by CDFG (2009); and the California Native Plant Society (CNPS) 2009 Inventory of Rare and Endangered Plants.

Existing Vegetation Types

The distribution of the plant communities and their subtypes present within the Irvine Ranch Northern Open Space was obtained from the results of a habitat survey performed by Jones & Stokes Associates, Inc. in 1992. There are 12 major classifications of plant communities within the Irvine Ranch Northern Open Space:

1) CSS
2) Chaparral
3) Grassland
4) Riparian
5) Woodland
6) Forest
7) Cliff and Rock
8) Lakes, Reservoirs, and Basins
9) Watercourses
10) Agriculture
11) Developed
12) Disturbed

Descriptions of the plant communities and their subtypes present within the Irvine Ranch Northern Open Space are listed below (Table A) using the Orange County Habitat Classification System (HCS) articulated by Jones & Stokes Associates, Inc. The distribution of the plant communities within the Irvine Ranch Northern Open Space is depicted on Exhibit C.

Scrub (2.0 of the HCS). Scrub vegetation consists of drought-deciduous, low-growing, soft-leaved shrubs and herbs, and is often gray-green. It occupies gentle to steep slopes and occurs most often in shallow or heavy soils at elevations below 3,000 ft. CSS is considered a special-status vegetation type because of its high potential to support Threatened and Endangered wildlife species. There are four "types" of scrub present within the Irvine Ranch Northern Open Space. Scrub habitats make up 49 percent of the area within the Irvine Ranch Northern Open Space and are the dominant habitat type. The shrubs that make up scrub are rather short-lived and are adapted to a natural fire regime, possibly with an interval of 40 to 60 years (J. Keeley, personal communication), readily sprouting from seed or from the base of the parent plant following such an event. Following a fire, short-lived grasses and forbs are stimulated to grow by a combination of conditions, including fire stimulation, lack of overstory (increasing amount of sunlight reaching the soil), and enriched soil conditions. These short-lived plants provide valuable habitat for animals and enrich the biotic diversity of the Irvine Ranch Northern Open Space.

Table A: Acreage of Habitat Types within the Irvine Ranch Northern Open Space

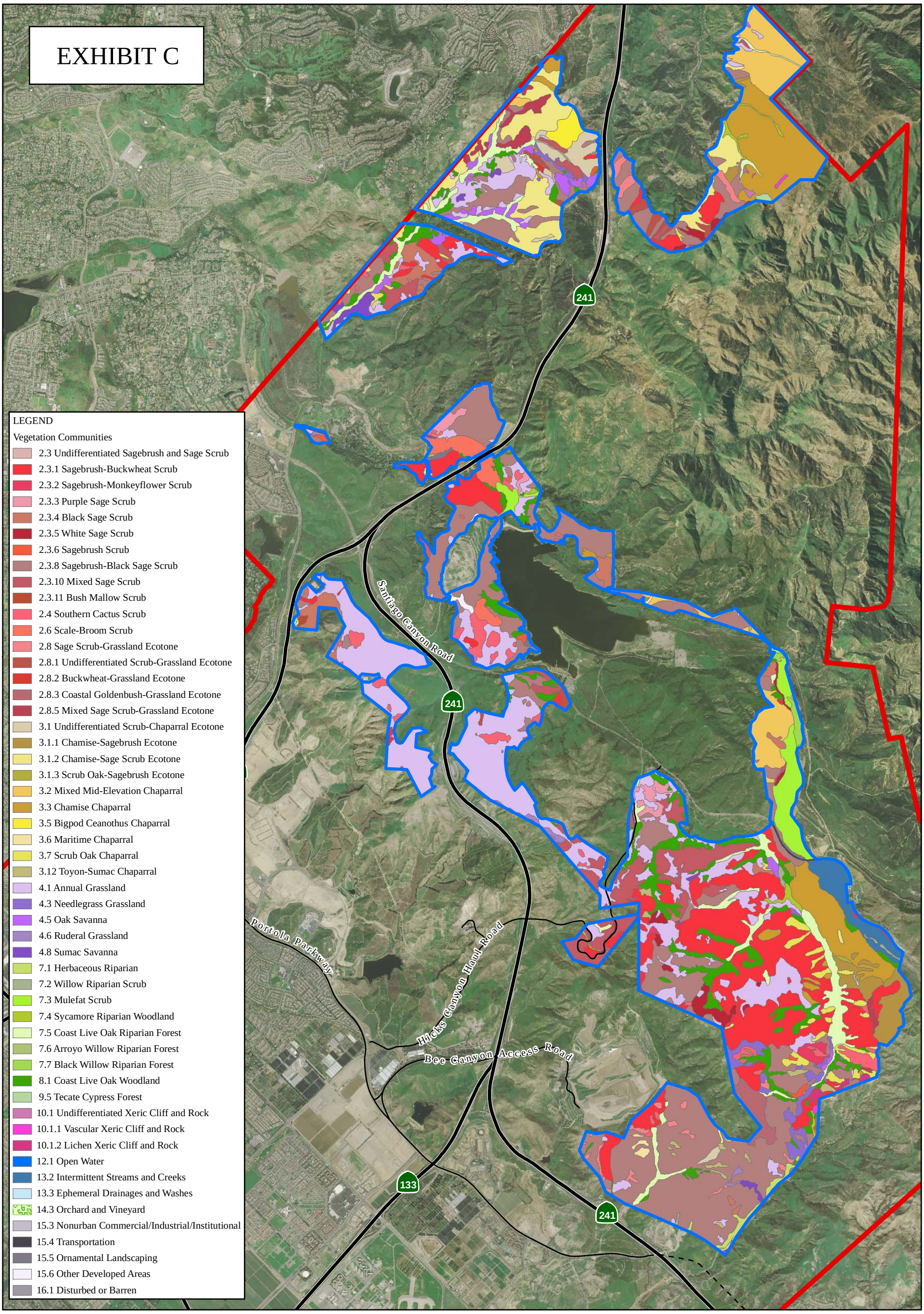
Habitat Type	Acreage
Scrub (2.0 of the HCS)[1]	**4,163**
Sagebrush and Sage Scrub (2.3 of the HCS)	3,696
Undifferentiated Sagebrush and Sage Scrub (2.3.? of the HCS)	*1*
Sagebrush-Buckwheat Scrub (2.3.1 of the HCS)	*1,099*
Sagebrush-Monkeyflower Scrub (2.3.2 of the HCS)	*23*
Purple Sage Scrub (2.3.3 of the HCS)	*53*
Black Sage Scrub (2.3.4 of the HCS)	*140*
White Sage Scrub (2.3.5 of the HCS)	*77*
Sagebrush Scrub (2.3.6 of the HCS)	*25*
Sagebrush-Black Sage Scrub (2.3.8 of the HCS)	*1,901*
Mixed Sage Scrub (2.3.10 of the HCS)	*373*
Bush Mallow Scrub (2.3.11 of the HCS)	*4*
Southern Cactus Scrub (2.4 of the HCS)	150
Scale-Broom Scrub (2.6 of the HCS)	89
Sage Scrub-Grassland Ecotone (2.8 of the HCS)	228
Undifferentiated Scrub-Grassland Ecotone (2.8.? of the HCS)	*64*
Sagebrush-Grassland Ecotone (2.8.1 of the HCS)	*47*
Buckwheat-Grassland Ecotone (2.8.2 of the HCS)	*3*
Coastal Goldenbush-Grassland Ecotone (2.8.3 of the HCS)	*54*
Mixed Sage Scrub-Grassland Ecotone (2.8.5 of the HCS)	*60*
Chaparral (3.0 of the HCS)	**1,619**
Scrub-Chaparral Ecotone (3.1 of the HCS)	581
Undifferentiated Scrub-Chaparral Ecotone (3.1.? of the HCS)	*91*
Chamise-Sagebrush Ecotone (3.1.1 of the HCS)	*143*
Chamise-Sage Scrub Ecotone (3.1.2 of the HCS)	*344*
Scrub Oak-Sagebrush Ecotone (3.1.3 of the HCS)	*3*
Mixed Mid-Elevation Chaparral (3.2 of the HCS)	299
Chamise Chaparral (3.3 of the HCS)	562
Bigpod Ceanothus Chaparral (3.5 of the HCS)	39
Maritime Chaparral (3.6 of the HCS)	9
Scrub Oak Chaparral (3.7 of the HCS)	89
Toyon-Sumac Chaparral (3.12 of the HCS)	34
Grassland (4.0 of the HCS)	**1,526**
Annual Grassland (4.1 of the HCS)	1,275
Needlegrass Grassland (4.3 of the HCS)	99
Oak Savanna (4.5 of the HCS)	83
Ruderal Grassland (4.6 of the HCS)	22
Sumac Savanna (4.8 of the HCS)	47

Table A: Acreage of Habitat Types within the Irvine Ranch Northern Open Space

Habitat Type	Acreage
Riparian (7.0 of the HCS)	**566**
Herbaceous Riparian (7.1 of the HCS)	30
Willow Riparian Scrub (7.2 of the HCS)	13
Mulefat Scrub (7.3 of the HCS)	170
Sycamore Riparian Woodland (7.4 of the HCS)	30
Coast Live Oak Riparian Forest (7.5 of the HCS)	301
Arroyo Willow Riparian Forest (7.6 of the HCS)	1
Black Willow Riparian Forest (7.7 of the HCS)	22
Woodland (8.0 of the HCS)	**458**
Coast Live Oak Woodland (8.1 of the HCS)	458
Forest (9.0 of the HCS)	**5**
Tecate Cypress Forest (9.5 of the HCS)	5
Cliff and Rock (10.0 of the HCS)	**21**
Xeric Cliff and Rock (10.1 of the HCS)	21
Undifferentiated Xeric Cliff and Rock (10.1.? of the HCS)	*3*
Vascular Xeric Cliff and Rock (10.1.1 of the HCS)	*5*
Lichen Xeric Cliff and Rock (10.1.2 of the HCS)	*13*
Lakes, Reservoirs, and Basins (12.0 of the HCS)	**1**
Open Water (12.1 of the HCS)	1
Watercourses (13.0 of the HCS)	**108**
Intermittent Streams and Creeks (13.2 of the HCS)	108
Ephemeral Drainages and Washes (13.3 of the HCS)	<1
Agriculture (14.0 of the HCS)	**2**
Orchards and Vineyards (14.3 of the HCS)	2
Developed (15.0 of the HCS)	**55**
Nonurban Commercial/Industrial/Institutional (15.3 of the HCS)	1
Transportation (15.4 of the HCS)	19
Ornamental Landscaping (15.5 of the HCS)	16
Other Developed Areas (15.6 of the HCS)	19
Disturbed (16.0 of the HCS)	**1**
Disturbed or Barren (16.1 of the HCS)	1
Total	**8,526**

[1] HCS = Orange County Habitat Classification System (Gray and Bramlet 1992).

EXHIBIT C



LEGEND

Vegetation Communities

- 2.3 Undifferentiated Sagebrush and Sage Scrub
- 2.3.1 Sagebrush-Buckwheat Scrub
- 2.3.2 Sagebrush-Monkeyflower Scrub
- 2.3.3 Purple Sage Scrub
- 2.3.4 Black Sage Scrub
- 2.3.5 White Sage Scrub
- 2.3.6 Sagebrush Scrub
- 2.3.8 Sagebrush-Black Sage Scrub
- 2.3.10 Mixed Sage Scrub
- 2.3.11 Bush Mallow Scrub
- 2.4 Southern Cactus Scrub
- 2.6 Scale-Broom Scrub
- 2.8 Sage Scrub-Grassland Ecotone
- 2.8.1 Undifferentiated Scrub-Grassland Ecotone
- 2.8.2 Buckwheat-Grassland Ecotone
- 2.8.3 Coastal Goldenbush-Grassland Ecotone
- 2.8.5 Mixed Sage Scrub-Grassland Ecotone
- 3.1 Undifferentiated Scrub-Chaparral Ecotone
- 3.1.1 Chamise-Sagebrush Ecotone
- 3.1.2 Chamise-Sage Scrub Ecotone
- 3.1.3 Scrub Oak-Sagebrush Ecotone
- 3.2 Mixed Mid-Elevation Chaparral
- 3.3 Chamise Chaparral
- 3.5 Bigpod Ceanothus Chaparral
- 3.6 Maritime Chaparral
- 3.7 Scrub Oak Chaparral
- 3.12 Toyon-Sumac Chaparral
- 4.1 Annual Grassland
- 4.3 Needlegrass Grassland
- 4.5 Oak Savanna
- 4.6 Ruderal Grassland
- 4.8 Sumac Savanna
- 7.1 Herbaceous Riparian
- 7.2 Willow Riparian Scrub
- 7.3 Mulefat Scrub
- 7.4 Sycamore Riparian Woodland
- 7.5 Coast Live Oak Riparian Forest
- 7.6 Arroyo Willow Riparian Forest
- 7.7 Black Willow Riparian Forest
- 8.1 Coast Live Oak Woodland
- 9.5 Tecate Cypress Forest
- 10.1 Undifferentiated Xeric Cliff and Rock
- 10.1.1 Vascular Xeric Cliff and Rock
- 10.1.2 Lichen Xeric Cliff and Rock
- 12.1 Open Water
- 13.2 Intermittent Streams and Creeks
- 13.3 Ephemeral Drainages and Washes
- 14.3 Orchard and Vineyard
- 15.3 Nonurban Commercial/Industrial/Institutional
- 15.4 Transportation
- 15.5 Ornamental Landscaping
- 15.6 Other Developed Areas
- 16.1 Disturbed or Barren

LSA

LEGEND

- Irvine Ranch Northern Open Space RRMP
- Historic Irvine Ranch Boundary

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SOURCE: Digital Globe (2008), Jones & Stokes (1992)

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Irvine Ranch Northern Open Space RRMP

Habitat Types within the Irvine Ranch Northern Open Space

Sagebrush and Sage Scrub (2.3 of the HCS). Sagebrush and Sage Scrub is equivalent to the Venturan-Diegan transitional CSS category used by others, although these classifications are not entirely appropriate for the Irvine Ranch Northern Open Space, as it is a transition zone with a mosaic of vegetation types. Within the Irvine Ranch Northern Open Space, Sagebrush and Sage Scrub composes 43 percent of the habitat and is the dominant plant community. It is considered a transitional association that contains elements of two recognized geographical associations of sage scrub, Venturan and Diegan. The Irvine Ranch Northern Open Space contains 10 subtypes of CSS, and most of the scrub falls within this group of subtypes. The CSS subtypes are distinguished by species dominance and physical factors, including aspect, direction, and steepness of slope as well as soil type. A small portion of the habitat within the Irvine Ranch Northern Open Space (less than 1 percent) was surveyed as CSS (2.3 of the HCS), with no subtype given.

- **Sagebrush-Buckwheat Scrub (2.3.1 of the HCS).** This highly variable subtype is found on both mesic and drier slopes of the Irvine Ranch Northern Open Space and makes up 13 percent of the Irvine Ranch Northern Open Space habitat. It is characterized by a codominance of coastal sagebrush and California buckwheat. Other shrub species in this habitat include white sage, black sage, bush monkey flower, California encelia, coastal deerweed, coastal goldenbush, lemonade berry, giant wild-rye, coyote bush, and lax-flowered bushmallow; it has an understory of foothill needlegrass, Pacific fescue, California brome grass, bicolored cudweed, and blue dicks. The understory is often grassy on the more mesic slopes, but may be more open and have less herbaceous cover on the drier slopes.
- **Sagebrush-Monkeyflower Scrub (2.3.2 of the HCS).** Sagebrush-monkeyflower scrub is dominated by coastal sagebrush and bush monkey flower. Other species present include coyote bush, Emory's baccharis, giant wild-rye, poison oak, coastal goldenbush, Mexican elderberry, and white sage. It occurs on mesic foothill slopes below 1,000 ft in elevation. Sagebrush-monkeyflower scrub makes up less than 1 percent of the habitat within the Irvine Ranch Northern Open Space.
- **Purple Sage Scrub (2.3.3 of the HCS).** Purple sage scrub is dominated by purple sage or supports purple sage and coastal sagebrush as codominants. Also occurring are coastal goldenbush, California buckwheat, bush monkey flower, white sage, and black sage. It occurs on foothill slopes between 500 and 1,500 ft in elevation. Purple sage scrub makes up 1 percent of the habitat within the Irvine Ranch Northern Open Space.
- **Black Sage Scrub (2.3.4 of the HCS).** This subtype is dominated by black sage and makes up 2 percent of the Irvine Ranch Northern Open Space habitat. It is usually found on drier east-facing slopes below 1,000 ft, but may also be located in more mesic situations. Other shrubs associated with this habitat include California buckwheat, coastal sagebrush, lax-flowered bushmallow, coastal prickly pear, chaparral bedstraw, white sage, and our Lord's candle. The understory is often very open, with mostly leaf litter and duff beneath these shrubs.
- **White Sage Scrub (2.3.5 of the HCS).** White sage scrub is dominated by white sage or an even mix with coastal sagebrush. Other species that occur within white sage scrub include California buckwheat, coastal deerweed, lax-flowered bushmallow, coastal goldenbush, and laurel sumac. It occurs on slopes and flats below 3,000 ft in elevation and intergrades with grassland and chaparral. White sage scrub makes up 1 percent of the habitat within the Irvine Ranch Northern Open Space.

- **Sagebrush Scrub (2.3.6 of the HCS).** Sagebrush scrub makes up less than 1 percent of the Irvine Ranch Northern Open Space habitat, is almost exclusively dominated by coastal sagebrush, and is usually found on mesic slopes. It usually occurs as small patches within grasslands or with other CSS subtypes that support coastal sagebrush as a codominant.
- **Sagebrush-Black Sage Scrub (2.3.8 of the HCS).** Sagebrush-black sage scrub is dominated by coastal sagebrush and black sage and is usually found on mesic slopes below 1,000 ft. Other shrubs associated with this habitat include California buckwheat, coastal sagebrush, lax-flowered bushmallow, coastal prickly pear, chaparral bedstraw, white sage, and our Lord's candle. Sagebrush-black sage scrub constitutes 22 percent of the Irvine Ranch Northern Open Space.
- **Mixed Sage Scrub (2.3.10 of the HCS).** Mixed sage scrub makes up 4 percent of the Irvine Ranch Northern Open Space habitat and is dominated by an even mix of each of four or more CSS species. CSS species that may make up mixed scrub are California buckwheat, black sage, purple sage, white sage, California encelia, laurel sumac, bush monkey flower, and coastal prickly pear. Coastal sagebrush can occur but is not an important species in this community.
- **Bush Mallow Scrub (2.3.11 of the HCS).** Bush mallow scrub makes up less than 1 percent of the Irvine Ranch Northern Open Space habitat and occurs on steep to moderate slopes in heavy soils. It is dominated by lax-flowered bushmallow. Black sage often occurs as a codominant; however, other CSS species may be codominants or subdominants.

Southern Cactus Scrub (2.4 of the HCS). Southern cactus scrub contains large stands of coastal prickly pear with at least 20 percent relative cover by cactus. Other codominants or subdominants include California encelia, coastal sagebrush, California buckwheat, black sage, and Mexican elderberry. It occurs primarily on south-facing slopes of low foothills, with the exception of the cactus component. This community differs little in vegetative composition from, and integrates with, sagebrush and sage scrub habitat types. Southern cactus scrub makes up 2 percent of the Irvine Ranch Northern Open Space habitat and generally exists as small pockets scattered throughout the Irvine Ranch Northern Open Space. This is the preferred habitat type of the cactus wren.

Scale-Broom Scrub (2.6 of the HCS). Scale-broom scrub (floodplain sage scrub) consists of deep-rooted and upland shrubs that occupy infrequently flooded and scoured habitats such as floodplains and alluvial fans. Scale-broom scrub is dominated by scale-broom. Other species that occupy this habitat are California buckwheat, California brickellbush, mulefat, coastal sagebrush, and laurel sumac. Scale-broom scrub makes up 1 percent of the Irvine Ranch Northern Open Space habitat.

Sage Scrub-Grassland Ecotone (2.8 of the HCS). Sage scrub-grassland ecotone makes up less than 1 percent of the Irvine Ranch Northern Open Space habitat and is an open shrub/grassland association with 5–20 percent relative shrub cover. A small portion of the habitat within the Irvine Ranch Northern Open Space (1 percent) was surveyed as sage scrub-grassland ecotone (2.8 of the HCS), with no subtype given. Common shrubs include coastal goldenbush, coastal sagebrush, and California buckwheat. Subshrubs and forbs are a very important component of this habitat type, but nonnative annual grasses often dominate the cover. It occurs in many areas of the County below 1,000 ft. The Irvine Ranch Northern Open Space contains four subtypes of sage scrub-grassland ecotone.

- **Sagebrush-Grassland Ecotone (2.8.1 of the HCS).** Sagebrush-grassland ecotone makes up less than 1 percent of the Irvine Ranch Northern Open Space habitat and is dominated by grass species, with coastal sagebrush as the dominant shrub component.
- **Buckwheat-Grassland Ecotone (2.8.2 of the HCS).** Buckwheat-grassland ecotone makes up less than 1 percent of the Irvine Ranch Northern Open Space habitat and is dominated by grass species, with California buckwheat as the dominant shrub component.
- **Coastal Goldenbush-Grassland Ecotone (2.8.3 of the HCS).** Coastal goldenbush-grassland ecotone makes up 1 percent of the Irvine Ranch Northern Open Space habitat and is dominated by grass species, with coastal goldenbush as the dominant shrub component.
- **Mixed Sage Scrub-Grassland Ecotone (2.8.5 of the HCS).** Mixed sage scrub-grassland ecotone makes up 1 percent of the Irvine Ranch Northern Open Space habitat. It is dominated by grass species, with no one species as the dominant shrub component.

Chaparral (3.0 of the HCS). Chaparral consists of evergreen, dark-green-leaved, medium-height to tall shrubs that are adapted to a fire regime of roughly 40 to 60 years (J. Keeley, personal communication). As the community grows, it becomes woody and senescent, producing fuel loads that, combined with the oily resins exuded from the plants, create a highly flammable environment. Fires remove aboveground biomass and allow forbs and grasses to regenerate in the fertile ash. Chaparral plants respond to fire by crown sprouting and seed germination. There are seven types of chaparral in the Irvine Ranch Northern Open Space, and make up 20 percent of the Irvine Ranch Northern Open Space habitat. A small portion of the habitat within the Irvine Ranch Northern Open Space (less than 1 percent) was surveyed as chaparral (3.0 of the HCS), with no subtype given.

Scrub-Chaparral Ecotone (3.1 of the HCS). Scrub-chaparral ecotone (coastal sage-chaparral scrub) makes up 7 percent of the Irvine Ranch Northern Open Space habitat and represents a gradation and intermingling of CSS types and chaparral types. These represent ecotonal areas between chaparral and scrub communities, with component species of both, and are usually patches of scrub with a strong component of chaparral species within a chaparral matrix. There are three scrub-chaparral ecotone subtypes described within the Irvine Ranch Northern Open Space. There was no subtype given for a small amount of area (1 percent) that was mapped as scrub-chaparral ecotone.

- **Chamise-Sagebrush Ecotone (3.1.1 of the HCS).** Chamise-sagebrush ecotone is dominated by chamise and coastal sagebrush. Chamise-sagebrush ecotone makes up 2 percent of the Irvine Ranch Northern Open Space habitat.
- **Chamise-Sage Scrub Ecotone (3.1.2 of the HCS).** Chamise-sage scrub ecotone is dominated by chamise and coastal scrub species other than coastal sagebrush. Chamise-sage scrub ecotone makes up 4 percent of the Irvine Ranch Northern Open Space habitat.
- **Scrub Oak-Sagebrush Ecotone (3.1.3 of the HCS).** Scrub oak-sagebrush ecotone is dominated by California scrub oak and coastal sagebrush. Scrub oak-sagebrush ecotone makes up less than 1 percent of the Irvine Ranch Northern Open Space habitat.

Mixed Mid-Elevation Chaparral (3.2 of the HCS). Mixed mid-elevation chaparral consists of a mix of chaparral species and generally occurs between 1,000 and 3,000 ft in elevation. Dominant species include chamise, laurel sumac, ceanothus, manzanita, and black sage. Mixed mid-elevation chaparral makes up 4 percent of the habitat within the Irvine Ranch Northern Open Space.

Chamise Chaparral (3.3 of the HCS). Chamise chaparral is dominated by chamise, with black sage, sugar bush, laurel sumac, ceanothus, and California buckwheat as subdominants. It occurs on xeric slopes with very shallow soils. Chamise chaparral makes up 7 percent of the habitat within the Irvine Ranch Northern Open Space.

Bigpod Ceanothus Chaparral (3.5 of the HCS). Bigpod ceanothus chaparral is similar to snowball chaparral but occurs at lower elevations and is dominated by bigpod lilac, with chamise, California mountain mahogany, lemonade berry, laurel sumac, and lax-flowered bushmallow as subdominants. Bigpod ceanothus chaparral makes up less than 1 percent of the habitat within the Irvine Ranch Northern Open Space.

Maritime Chaparral (3.6 of the HCS). Maritime chaparral consists of a diverse mix of broad-leaved evergreen shrubs characterized by occurrences of southern species with northern limits in Orange County. Maritime chaparral is dominated by Nuttall's scrub oak, bushrue, summer holly, San Diego mountain mahogany, and spiny redberry. Maritime chaparral makes up less than 1 percent of the habitat within the Irvine Ranch Northern Open Space.

Scrub Oak Chaparral (3.7 of the HCS). Scrub oak chaparral typically occurs on north-facing slopes and is dominated by California scrub oak, with ceanothus, toyon, laurel sumac, holly-leaved redberry, and California coffee berry as subdominants. Scrub oak chaparral makes up 1 percent of the habitat within the Irvine Ranch Northern Open Space.

Toyon-Sumac Chaparral (3.12 of the HCS). Toyon-sumac chaparral makes up less than 1 percent of the Irvine Ranch Northern Open Space habitat, is typically found on mesic north-facing slopes, and is dominated by stands of laurel sumac, toyon, and lemonade berry. Other species present include holly-leaved redberry and fuchsia-flowered gooseberry. A sparse understory of CSS species may be present, but it is nearly or completely excluded by the shade of the taller evergreen shrubs.

Grassland (4.0 of the HCS). Historically (pre-European settlement), needlegrass grassland covered as much as 17 percent of California (Keeley 1989), but it has been greatly reduced by the invasion of nonnative annual grasses and forbs of Mediterranean origin, changes in the kinds of animals present and their grazing patterns, cultivation, and fire (Heady 1977). These nonnative plants, often considered weeds, include grasses such as bromes, wild oats, and barley, and herbs such as mustards and thistles. Several animal species, including grasshopper sparrow, white-tailed kite, and American badger, utilize grassland habitats. Only 0.1 percent of historic perennial native grasslands in California are extant (Barry 1981). Due to its reduction in range, native grassland is considered a special-status vegetation type. Five types of grasslands make up 17 percent of the habitat within the Irvine Ranch Northern Open Space. A small portion of the habitat within the Irvine Ranch Northern Open Space (less than 1 percent) was surveyed as grassland (4.0 of the HCS), with no subtype given.

Annual Grassland (4.1 of the HCS). Annual grasslands are dominated by annual grasses that are primarily Mediterranean in origin. Dominant species include bromes, wild oats, fescues, and barleys. Many species of native forbs and bulbs, as well as naturalized annual forbs, are found in annual grasslands. Native forbs in these grasslands may include common fiddleneck, miniature lupine, California popcorn flower, California milkweed, common cryptantha, and fascicled tarweed. Annual grasslands occur on gradual slopes with deep soils below 3,000 ft in elevation. Annual grasslands are the predominant grassland within the Irvine Ranch Northern Open Space and make up 15 percent of the habitat.

Needlegrass Grassland (4.3 of the HCS). As mapped in 1992, needlegrass grassland was identified as making up 1 percent of the habitat within the Irvine Ranch Northern Open Space. Needlegrass grassland is grassland with 10 percent or more cover by purple needlegrass or another needlegrass species. It is associated with grassland goldenbush, San Diego bentgrass, junegrass, fescues, bromes, California blue-eyed grass, blue dicks, mariposa lily, and common golden stars.

Oak Savanna (4.5 of the HCS). Oak savanna consists of annual or needlegrass grassland with widely scattered trees (less than 10–20 percent canopy cover). The dominant tree is coast live oak. It occurs in open grassland areas near coast live oak forest/woodland in the Santa Ana Mountains. Oak savanna makes up 1 percent of the habitat within the Irvine Ranch Northern Open Space.

Ruderal Grassland (4.6 of the HCS). Ruderal grassland makes up less than 1 percent of the habitat within the Irvine Ranch Northern Open Space and consists of early successional grassland dominated by pioneering herbaceous plants that readily colonize disturbed ground. Ruderal grassland is dominated by many grassland species and species of the genera *Centaurea, Brassica, Malva, Salsola, Eremocarpus, Amaranthus,* and *Atriplex*. Ruderal grassland occurs scattered throughout the County at any site that has been disturbed by either natural or human causes.

Sumac Savanna (4.8 of the HCS). Sumac savanna makes up 1 percent of the habitat within the Irvine Ranch Northern Open Space and consists of annual or needlegrass grassland with widely scattered laurel sumac (5–15 percent canopy cover).

Riparian (7.0 of the HCS). Riparian habitats consist of trees, shrubs, or herbs that occur along watercourses and bodies of water. The vegetation is adapted to flooding and soil saturation during at least a portion of its growing season. Riparian communities are considered sensitive by CDFG (Holland 1986). In the Irvine Ranch Northern Open Space there are seven types of riparian habitat, which make up 7 percent of the total habitat within the Irvine Ranch Northern Open Space.

Herbaceous Riparian (7.1 of the HCS). Herbaceous riparian habitat makes up less than 1 percent of the Irvine Ranch Northern Open Space habitat and is an early successional stage of riparian scrub and forest. Flooding (or other disturbances) often scours woody riparian vegetation away, and the site is rapidly colonized by pioneer wetland herbaceous plants such as western verbena, California mugwort, sweet clover, cat-tails, sedges, rabbitfoot grass, Bermuda grass, beardless wild-rye, giant wild-rye, coastal salt grass, common plantain, cocklebur, and prickly sow-thistle. Flooding in these areas is frequent.

Willow Riparian Scrub (7.2 of the HCS). Willow riparian scrub makes up less than 1 percent of the Irvine Ranch Northern Open Space habitat and is dominated by willow species and saplings of riparian forest. Common willow scrub dominants include arroyo willow and narrow-leaved willow, with lesser amounts of mulefat and black willow. Weedy species found in this scrub include castor bean, giant reed, tree tobacco, and pampas grass.

Mulefat Scrub (7.3 of the HCS). Mulefat scrub consists of dense stands of mulefat and lesser amounts of willow. It usually occupies intermittent streambeds, seeps, and the toe of landslides (where local seeps develop). Other associated species include Bermuda grass, California mugwort, lamb's quarters, western ragweed, Douglas' nightshade, castor bean, and cocklebur. Mulefat scrub makes up 2 percent of the Irvine Ranch Northern Open Space habitat.

Sycamore Riparian Woodland (7.4 of the HCS). Sycamore riparian woodland consists of open to dense woodlands dominated by western sycamore, with coast live oak and scale-broom, mulefat, or willow as understory species. Large grassland areas dominated by bromes are often present. Sycamore riparian woodland makes up less than 1 percent of the habitat within the Irvine Ranch Northern Open Space.

Coast Live Oak Riparian Forest (7.5 of the HCS). Coast live oak riparian forest is dominated by coast live oaks, with western sycamores, Mexican elderberry, and Southern California black walnut present as subdominants. This forest is found in large, intermittent drainages and creeks. In narrow drainages, it often integrates with oak woodland. Understory shrubs present include laurel sumac, holly-leaved redberry, mulefat, poison oak, fuchsia-flowered gooseberry, lemonade berry, toyon, California scrub oak, and Mexican elderberry. Coast live oak riparian forest makes up 4 percent of the habitat within the Irvine Ranch Northern Open Space.

Arroyo Willow Riparian Forest (7.6 of the HCS). Arroyo willow riparian forest has a closed canopy of arroyo willow in arborescent form. The understory is similar in composition to black willow forest. The forest occurs on floodplains along major streams and rivers. Arroyo willow riparian forest makes up less than 1 percent of the habitat within the Irvine Ranch Northern Open Space.

Black Willow Riparian Forest (7.7 of the HCS). Black willow riparian forest is a multilayered forest with a canopy dominated by black willow, with some red willow and arroyo willow. The subcanopy layer contains arroyo willow and mulefat. Coast live oak and western sycamore are occasionally present on the outer margins of this forest. The understory is composed of different associations of species, such as hoary nettle, poison oak, California mugwort, and Douglas' nightshade. The habitat develops on floodplains along major rivers and streams. Examples of this community are found along the Santa Ana River, Santiago Creek, and San Juan Creek. Black willow riparian forest makes up less than 1 percent of the Irvine Ranch Northern Open Space habitat.

Woodland (8.0 of the HCS). Woodland consists of multilayered vegetation with a canopy that is 20–80 percent tree cover.

Coast Live Oak Woodland (8.1 of the HCS). Coast live oak woodland makes up 5 percent of the Irvine Ranch Northern Open Space habitat and is the only woodland habitat found within the Irvine Ranch Northern Open Space. Coast live oak woodland is dominated by coast live oak, with associated shrubs such as California scrub oak, holly-leaved redberry, California coffee berry, toyon, fuchsia-flowered gooseberry, Mexican elderberry, and poison oak. Coast live oak woodland is considered a significant plant community whose canopy forms important habitat for a number of bird species, especially raptors. The oak tree acorns are an important food source for a number of animal species. Among the animal species supported by the oak woodland/forest are mule deer, mountain lion, white-tailed kite, and red-shouldered hawk. Oak woodland is found in the foothills throughout Orange County.

Forest (9.0 of the HCS). Forest consists of multilayered vegetation with a closed, dense tree canopy.

Tecate Cypress Forest (9.5 of the HCS). Tecate cypress forest is the only forest found within the Irvine Ranch Northern Open Space and is characterized by dense stands of Tecate cypress. Tecate cypress forest makes up less than 1 percent of the Irvine Ranch Northern Open Space habitat. A variety of shrub species are found in the understory, including black sage, heart-leaved pitcher sage, California coffee berry, peninsular nolina, and thickleaf yerba santa.

Cliff and Rock (10.0 of the HCS). Cliff and rock habitats are characterized by an assortment of vascular plants and lichens. The vegetation composition depends on the amount of water and site conditions of a particular cliff habitat.

Xeric Cliff and Rock (10.1 of the HCS). Xeric cliffs are dominated by a mix of vascular plants and lichen species. The habitat typically develops on inland, south- or southwest-facing slopes, and coastal bluffs. Xeric cliff and rock makes up less than 1 percent of the habitat within the Irvine Ranch Northern Open Space and is the only type of cliff and rock present. A small portion of the habitat within the Irvine Ranch Northern Open Space (less than 1 percent) was surveyed as xeric cliff and rock (10.1 of the HCS), with no subtype given.

- **Vascular Plant Xeric Cliff and Rock (10.1.1 of the HCS).** Vascular plants of xeric cliff habitats include California brickellbush, long-stemmed buckwheat, chia, wild canterbury-bell, and chalky live-forever. Vascular plant xeric cliff and rock makes up less than 1 percent of the habitat within the Irvine Ranch Northern Open Space.
- **Lichen Xeric Cliff and Rock (10.1.2 of the HCS).** Lichen xeric cliff and rock faces are dry, south-facing exposures of consolidated substrates that are dominated by crutose- and foliose-type lichens and have no or only widely scattered vascular plants. Lichen xeric cliff and rock makes up less than 1 percent of the habitat within the Irvine Ranch Northern Open Space.

Lakes, Reservoirs, and Basins (12.0 of the HCS). Lakes, reservoirs, and basins are bodies of open water that may support vegetation tolerant of or requiring permanently flooded conditions.

Open Water (12.1 of the HCS). These bodies of water often contain several phytoplankton species and filamentous blue-green and green algae. In shallow water, vascular species may be found floating on the water surface. Open water makes up less than 1 percent of the Irvine Ranch Northern Open Space habitat.

Watercourses (13.0 of the HCS). Watercourses include flood control channels, streams, and rivers. There are two types of watercourses present within the Irvine Ranch Northern Open Space and make up 1 percent of the habitat.

Intermittent Streams and Creeks (13.2 of the HCS). Intermittent streams and creeks make up 1 percent of the habitat within the Irvine Ranch Northern Open Space.

Ephemeral Drainages and Washes (13.3 of the HCS). Ephemeral drainages and washes make up less than 1 percent of the habitat within the Irvine Ranch Northern Open Space.

Agriculture (14.0 of the HCS). Agriculture consists of annual crops, vineyards, orchards, dairies, and stockyards. Within the Irvine Ranch Northern Open Space, the only type of agriculture present is orchards and vineyards.

Orchards and Vineyards (14.3 of the HCS). Orchards (primarily avocado) make up less than 1 percent of the Irvine Ranch Northern Open Space habitat. In general, orchards and vineyards are scattered throughout bottomland portions of the County and include a variety of fruit and nut trees and vines.

Developed (15.0 of the HCS). Developed sites include urban areas, roads, parks, and cleared or graded sites. There are four types of developed land within the Irvine Ranch Northern Open Space. Developed land makes up 1 percent of the habitat within the Irvine Ranch Northern Open Space.

Nonurban Commercial/Industrial/Institutional (15.3 of the HCS). This classification includes scattered commercial/industrial buildings or such institutional facilities as sewage treatment plants outside any existing urban zone. These make up less than 1 percent of the Irvine Ranch Northern Open Space.

Transportation (15.4 of the HCS). Transportation consists of freeways and the arterial highway system. It makes up less than 1 percent of the Irvine Ranch Northern Open Space.

Ornamental Landscaping (15.5 of the HCS). Ornamental landscaping (parks and ornamental plantings) consists of introduced trees, shrubs, flowers, and turf grass. Ornamental landscaping occurs in greenbelts, parks, and horticultural plantings throughout the County. Ornamental landscaping makes up less than 1 percent of the Irvine Ranch Northern Open Space.

Other Developed Areas (15.6 of the HCS). Other developed areas are developed sites that do not fall under one of the other five categories described within the HCS. Other developed areas make up less than 1 percent of the Irvine Ranch Northern Open Space.

Disturbed (16.0 of the HCS). The only type of disturbed land within the Irvine Ranch Northern Open Space is disturbed or barren.

Disturbed or Barren (16.1 of the HCS). Disturbed or barren (cleared or graded) areas either lack vegetation or are dominated by a sparse cover of ruderal vegetation, such as tocalote, wild oats, black mustard, prickly sow-thistle, and prickly lettuce. Disturbed or barren land makes up less than 1 percent of the Irvine Ranch Northern Open Space.

Existing Wildlife Species

The Irvine Ranch Northern Open Space supports a wide diversity of wildlife species. This diversity is expected, given the relatively large size of the Irvine Ranch Northern Open Space and its location within a substantial block of natural open space in the foothills of the Santa Ana Mountains. This section describes the wildlife species that may potentially be found within the Irvine Ranch Northern Open Space.

Amphibians. Amphibians require moisture for at least a portion of their lifecycle, and many require standing or flowing water for reproduction. Although the drainages within the Irvine Ranch Northern Open Space are dry for much of the year, a number of amphibian species occur or potentially occur even in the more xeric habitats. These species are able to survive in dry areas by remaining beneath the soil in burrows or under logs or leaf litter, emerging only when temperatures are low and humidity is high. Many of these species occur in habitat associated with water, and emerge to breed once the rainy season begins. Soil moisture conditions can remain high throughout the year within some habitat types, depending on factors such as amount of vegetation cover, elevation, and the slope aspect.

Some of the native amphibians that may be found within the Irvine Ranch Northern Open Space include arboreal salamander, black-bellied slender salamander, Baja California treefrog, western toad, and western spadefoot. The riparian vegetation types present are especially expected to support populations of common amphibian species such as Baja California treefrog and western toad. Nonnative amphibian species that may potentially be found within the Irvine Ranch Northern Open Space include African clawed frog and American bullfrog. Both species are harmful to native amphibian species.


Western spadefoot


Baja California treefrog

Reptiles. Reptilian diversity and abundance typically varies with vegetation type and character. Many species prefer only one or two vegetation types; however, most will forage in a variety of habitats. Most species occurring in open areas use rodent burrows for cover and protection from predators and extreme weather conditions.

Some of the native reptiles that may be found within the Irvine Ranch Northern Open Space include western pond turtle, western fence lizard, common side-blotched lizard, coastal western whiptail, orange-throated whiptail, southern alligator lizard, western skink, coast horned lizard, granite spiny lizard, coachwhip, California whipsnake, gopher snake, northern red-diamond rattlesnake, western rattlesnake, San Bernardino ringneck snake, common kingsnake, rosy boa, and coast patch-nosed snake.


Blainville's horned lizard


Northern red-diamond rattlesnake

Birds. Birds are the most commonly observed vertebrates within the Irvine Ranch Northern Open Space, occurring commonly in all of the plant communities. Although many species can be observed in multiple habitat types, the vegetation types present within the Irvine Ranch Northern Open Space have been organized in the following manner in order to discuss the more common bird species. Some of the bird species potentially present within the Irvine Ranch Northern Open Space are discussed below according to general habitat preferences. Raptors (birds of prey) use a wide variety of habitats for nesting and foraging and are of particular interest; therefore, these birds are discussed separately.

Birds of Prey. Raptors (birds of prey) are common in the area. Many forage primarily in grasslands. Some of the raptor species that may occur within the Irvine Ranch Northern Open Space include red-tailed hawk, American kestrel, Cooper's hawk, sharp-shinned hawk, white-tailed kite, northern harrier, barn owl, great horned owl, western screech-owl, and red-shouldered hawk.

Coastal Sage Scrub Birds. CSS vegetation within the Irvine Ranch Northern Open Space supports an avifauna that is composed of species adapted to the dense, low vegetation that typifies these areas. Although a large number of individuals may be found within the Irvine Ranch Northern Open Space, species diversity is low to moderate, depending on the season. A relatively high number of birds breeding in CSS habitat are permanent residents. Some of the bird species that are typically found in CSS habitat and may potentially be found within the Irvine Ranch Northern Open Space include California quail, coastal California gnatcatcher, greater roadrunner, Bewick's wren, wrentit, California towhee, spotted towhee, cactus wren, Southern California rufous-crowned sparrow, white-crowned sparrow, Lincoln's sparrow, hermit thrush, and Costa's hummingbird.

Birds of Agricultural Habitats. Agricultural habitats often support large numbers of a few species and provide excellent foraging habitat for a variety of raptors. Some of the other bird species that may occupy this habitat within the Irvine Ranch Northern Open Space include rock pigeon (nonnative), California horned lark, European starling (nonnative), western meadowlark, Brewer's blackbird, mourning dove, American pipit, red-winged blackbird, white-crowned sparrow, and house finch.

Chaparral Birds. Chaparral provides habitat for many resident and wintering species. Some of the bird species that may occur within the chaparral habitats of the Irvine Ranch Northern Open Space include Anna's hummingbird, western scrub-jay, Bewick's wren, wrentit, California thrasher, orange-crowned warbler, spotted towhee, ruby-crowned kinglet, hermit thrush, yellow-rumped warbler, and fox sparrow.

Grassland Birds. Some of the bird species that potentially occur within the grasslands of the Irvine Ranch Northern Open Space include the killdeer, Say's phoebe, western kingbird, California horned lark, loggerhead shrike, lark sparrow, grasshopper sparrow, western meadowlark, American pipit, savannah sparrow, and European starling (nonnative).

Riparian Woodland Birds. The riparian woodland communities within the Irvine Ranch Northern Open Space provide important habitat for a wide variety of birds, including nesting trees for species that forage in a variety of habitats. Some of the bird species that may potentially occur within the Irvine Ranch Northern Open Space include common yellowthroat, blue grosbeak, California towhee, song sparrow, house finch, lesser goldfinch, Anna's hummingbird, Bullock's oriole, brown-headed cowbird, black-chinned hummingbird, Nuttall's woodpecker, ash-throated flycatcher, common raven, house wren, black-headed grosbeak, western wood-pewee, and yellow warbler.

Mammals. Some of the small mammal species that potentially occur within the Irvine Ranch Northern Open Space include desert cottontail, California ground squirrel, Botta's pocket gopher, northwestern San Diego pocket mouse, western harvest mouse, California mouse, cactus mouse, deer mouse, San Diego desert woodrat, big-eared woodrat, California vole, and introduced house mouse.

Bats occur throughout most of Southern California and may use any portion of the Irvine Ranch Northern Open Space as foraging habitat. Riparian and woodland vegetation provides potential roosting opportunities for several bat species. Most of the bat species that potentially occur within the Irvine Ranch Northern Open Space are inactive during the winter months and either hibernate or migrate, depending on the species. Some of the potential inhabitants in the Irvine Ranch Northern Open Space include big brown bat, pallid bat, California mastiff bat, Brazilian free-tailed bat, Yuma myotis, western pipistrelle, and hoary bat.

Some of the medium- and large-sized mammals that may occur within the Irvine Ranch Northern Open Space include the Virginia opossum (nonnative), striped skunk, raccoon, American badger, ringtail, coyote, bobcat, mule deer, mountain lion, and gray fox.


Bobcat


Gray fox


Mule deer

Wildlife Movement/Habitat Connectivity

Wildlife movement activities usually fall into one of three categories: (1) dispersal; (2) seasonal migration; and (3) movements related to home range activities. A number of terms have been used in various wildlife movement studies, such as "wildlife corridor," "travel route," "habitat linkage," and "wildlife crossing," to refer to an area wildlife use to move from one area to another. The following terms are therefore defined below:

- **Travel Route:** A landscape feature (such as a ridgeline, drainage, canyon, or riparian strip) within a larger natural habitat area that is used frequently by animals to facilitate movement and provide access to necessary resources (e.g., water, food, cover, den sites). The travel route is generally preferred because it provides the least amount of topographic resistance in moving from one area to another; it supplies adequate food, water, and/or cover to wildlife moving between habitat areas and provides a relatively direct link between target habitat areas.
- **Wildlife Corridor:** A piece of habitat, usually linear in nature, that connects two or more habitat patches that would otherwise be fragmented or isolated from one another. Wildlife corridors are usually bounded by urban land areas or other areas unsuitable for wildlife. The corridor generally contains suitable cover, food, and/or water to support species and facilitate their movement while in the corridor. Larger landscape-level corridors (often referred to as "habitat or landscape linkages") can provide both transitory and resident habitat for a variety of species.
- **Wildlife Crossing:** A wildlife crossing is a small, narrow area, relatively short in length and generally constricted in nature, that allows wildlife to pass under or through an obstacle or barrier that would otherwise hinder or prevent movement. Crossings typically are man-made and include culverts, underpasses, drainage pipes, and tunnels to provide access across or under roads, highways, pipelines, or other physical obstacles. These often represent "choke points" along a movement corridor. There are several wildlife crossings associated with the Irvine Ranch Northern Open Space. The Windy Ridge and Santiago Creek undercrossings at the State Route 241 (SR-241) provide valuable connections for large mammals (e.g., mountain lion, mule deer, and coyote) between the open space areas to the east of SR-241 (i.e., Fremont Canyon, Gypsum Canyon, and beyond) and the Weir Canyon portion of the Irvine Ranch Northern Open Space to the west of SR-241 (USGS 2009). The Santiago Creek undercrossing and Santiago Bridge at

Santiago Canyon Road provide a crossing between the Limestone Canyon portion of the Irvine Ranch Northern Open Space and the open space lands to the north (USGS 2006; USGS 2009). There are several smaller wildlife crossings (e.g., box culverts and concrete pipes) associated with Santiago Canyon Road that may provide opportunities for safe crossing of Santiago Canyon Road for large and medium-sized wildlife between the Limestone Canyon portion of the Irvine Ranch Northern Open Space and the open space lands to the north.

Wildlife corridors link together areas of suitable wildlife habitat that are otherwise separated by physical barriers, changes in vegetation, or human disturbance. The fragmentation of open space areas by urbanization creates isolated "islands" of wildlife habitat. Various studies have concluded that some wildlife species, especially the larger and more mobile mammals, will not likely persist over time in fragmented or isolated habitat areas without habitat linkages that allow movement to adjoining open space areas because barriers prohibit full utilization of habitat and the infusion of new individuals and genetic information (MacArthur and Wilson 1967; Soule 1987; Harris and Gallagher 1989; Bennett 1990). Corridors mitigate the effects of this fragmentation by:

- Allowing animals to move between remaining habitats, which allows depleted populations to be replenished and promotes genetic exchange;
- Providing escape routes from fire, predators, and human disturbances, thus reducing the risk that catastrophic events (such as fire or disease) will result in population or local species extinction; and
- Preserving travel routes for individual animals as they move within their home ranges in search of food, water, mates, and other needs (Farhig and Merriam 1985; Simberloff and Cox 1987; Harris and Gallagher 1989).

Within large areas of open space in which there are few or no man-made or naturally occurring physical constraints to wildlife movement, natural wildlife corridors per se may not exist. Given an open space area that is large enough to maintain viable populations of species and variable enough to provide a variety of opportunities for movement, wildlife will use local travel routes when searching for food, water, shelter, and mates. Some travel routes (e.g., large drainages and canyons) that have particularly dense cover, ample resources, or are otherwise very attractive to wildlife serve as important sources for food, water, and cover, particularly for small and medium-sized animals. This is especially true if the travel route is within a larger open space area.

Open space areas may become constrained and/or fragmented as a result of urban development or construction of physical obstacles such as roads and highways. Remaining landscape features or travel routes that connect the larger open space areas can become corridors as long as they provide adequate space, cover, food, and water and do not contain obstacles or distractions (man-made noise, lighting) that would hinder wildlife movement. Wildlife corridors can serve as a useful habitat in their own right in addition to serving as conduits for seasonal or daily movement of wildlife. These corridors are important for the free movement of animals between populations, for access to food and water sources during droughts, as escape routes from brush fires, and eventually for dispersal of genetic traits between populations. The value of these corridors depends upon their width, habitat type, and structure; the nature of surrounding habitat; human use patterns; and other factors.

Special-Status and Special-Interest Biological Resources

The following section addresses special-status and special-interest biological resources observed, reported, or having the potential to occur within the Irvine Ranch Northern Open Space. These resources include plant and wildlife species that have been afforded special status and/or recognition by federal and State resource agencies, as well as species that are of special interest to federal and State resource agencies and private conservation organizations. In general, the principal reason an individual taxon (species, subspecies, or variety) is given such recognition is the documented or perceived decline or limitation of its population size or geographical extent and/or distribution, resulting in most cases from habitat loss.

Definition of Special-Status and Special-Interest Biological Resources. Special-status wildlife and plant species are defined here as those that are listed as or proposed for listing as Threatened or Endangered status by either federal or State resource agencies, as well as State Fully Protected species. Special-interest species are those species that are designated by either federal or State agencies as something other than Endangered, Threatened, or Fully Protected (e.g., species of special concern, special animal), or by private conservation organizations (e.g., CNPS). Special-status habitats are vegetation types, associations, or subtypes that support concentrations of special-status plant or wildlife species that are of relatively limited distribution, or are of particular value to wildlife. Although special-status habitats are not afforded legal protection unless they support protected species, potential impacts on them may increase concerns and mitigation suggestions by resource agencies.

A **federal Endangered species** is a special-status species facing extinction throughout all or a significant portion of its geographic range. A **federal Threatened species** is one likely to become Endangered within the foreseeable future throughout all or a significant portion of its range. The presence of any federally listed Threatened or Endangered species on a project site generally imposes severe constraints on activities that would result in "take" of the species or its habitat. The term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in such conduct. Harm in this sense can include any disturbance to habitats used by the species during any portion of its life history.

Proposed species are special-status species that are officially proposed by the USFWS for addition to the federal Threatened and Endangered species list. Because proposed species may soon be listed as Threatened or Endangered, these species could become listed prior to or during implementation of a proposed project.

Federal Species of Concern are special-interest species with an informal designation by the USFWS for some declining species that are not federal candidates for listing at this time. This designation does not provide legal protection but signifies that these species are recognized as special-interest by the USFWS.

The State of California considers an **Endangered species** one whose prospects of survival and reproduction are in immediate jeopardy. A **Threatened species** is one present in such small numbers throughout its range that it is likely to become an Endangered species in the near future in the absence of special protection or management. A **Rare species** is one present in such small numbers throughout its range that it may become Endangered if its present environment worsens. The Rare species status applies to California native plants. State Threatened and Endangered species are special-status species and are protected against take.

California Species of Special Concern is a designation used by the CDFG for some declining wildlife species that are not State candidates. This designation does not provide legal protection but signifies that these species are recognized as special-interest by the CDFG.

Species that are **California Fully Protected** are special-status species and include those protected by special legislation for various reasons, such as the ringtail and white-tailed kite.

The **CNPS** is a local resource conservation organization that has developed an inventory of California's special-status and special-interest plant species. Species presented within the inventory may be special-status or special-interest species, depending on their State or federal designation. This inventory is the summary of information on the distribution, rarity, and endangerment of California's vascular plants. This rare plant inventory comprises four lists. CNPS presumes that **List 1A** plant species are extinct in California because they have not been seen in the wild for many years. CNPS considers **List 1B** plants as Rare, Threatened, or Endangered throughout their range. **List 2** plant species are considered Rare, Threatened, or Endangered in California but more common in other states. Plant species for which CNPS needs additional information are included on **List 3**. **List 4** plant species are those of limited distribution in California whose susceptibility to threat appears low at this time. **List 4** plant species are not discussed within this document.

Special-Status Vegetation Types. The CNDDB provides an inventory of vegetation types that are considered special-status by the State and federal resource agencies, academic institutions, and various conservation groups. Determination of the level of sensitivity is based on the Nature Conservancy Heritage Program Status Ranks that rank both species and plant communities on a global and statewide basis according to the number and size of remaining occurrences as well as recognized threats (e.g., proposed developments, habitat degradation, and invasion by nonnative species). Special-status plant communities known to occur within or near the Irvine Ranch Northern Open Space are described in more detail below and depicted on Exhibit D.

- **Riparian Vegetation.** The riparian vegetation within the Irvine Ranch Northern Open Space generally occurs along drainages that are typically subject to seasonal flooding. In the coastal floodplain of Southern California, 95 to 97 percent of riparian habitat has been lost due to channelization for flood control and sand and gravel mining (Faber et al. 1989). The United States Army Corps of Engineers (Corps) and CDFG may take jurisdiction over these areas. Due to the reduction of riparian habitat throughout Southern California, this is considered a special-status vegetation type.

EXHIBIT D-1

241

- Allen's Pentachaeta
- Peninsular Nolina
- Intermediate Mariposa Lily
- Long-spined Spineflower
- Malibu Baccharis
- Many-stemmed Dudleya
- Plummer's Mariposa Lily
- San Fernando Valley Spineflower
- Tecate Cypress
- Braunton's Milk-vetch
- California Walnut Woodland
- Heart-leaved Pitcher Sage
- Southern Coast Live Oak Riparian Forest
- Southern Interior Cypress Forest
- Southern Riparian Scrub
- Southern Sycamore Alder Riparian Woodland

LSA

LEGEND

- Irvine Ranch Northern Open Space RRMP
- Historic Irvine Ranch Boundary

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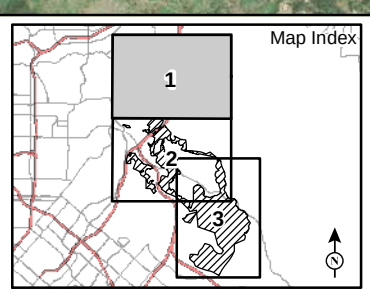

SOURCE: Digital Globe (2008); CFWO (2008); CNDDB (2010); LSA; Harnsworth; Glenn Lukos Associates

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Irvine Ranch Northern Open Space RRMP

Special-Status/Interest Plant Species and Vegetation Types

EXHIBIT D-2

Santiago Canyon Road

241

Allen's Pentachaeta
Peninsular Nolina
Intermediate Mariposa Lily
Long-spined Spineflower
Malibu Baccharis
Many-stemmed Dudleya
Plummer's Mariposa Lily
San Fernando Valley Spineflower
Tecate Cypress
Braunton's Milk-vetch
California Walnut Woodland
Heart-leaved Pitcher Sage
Southern Coast Live Oak Riparian Forest
Southern Interior Cypress Forest
Southern Riparian Scrub
Southern Sycamore Alder Riparian Woodland

LSA

LEGEND

Irvine Ranch Northern Open Space RRMP

Historic Irvine Ranch Boundary

N

0 1000 2000

FEET

Map Index

1

2

3

Irvine Ranch Northern Open Space RRMP

Special-Status/Interest Plant Species and Vegetation Types

SOURCE: Digital Globe (2008); CFWO (2008); CNDDB (2010); LSA; Harnsworth; Glenn Lukos Associates

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EXHIBIT D-3

Allen's Pentachaeta
Peninsular Nolina
Intermediate Mariposa Lily
Long-spined Spineflower
Malibu Baccharis
Many-stemmed Dudleya
Plummer's Mariposa Lily
San Fernando Valley Spineflower
Tecate Cypress
Braunton's Milk-vetch
California Walnut Woodland
Heart-leaved Pitcher Sage
Southern Coast Live Oak Riparian Forest
Southern Interior Cypress Forest
Southern Riparian Scrub
Southern Sycamore Alder Riparian Woodland

241

LSA

LEGEND

Irvine Ranch Northern Open Space RRMP

Historic Irvine Ranch Boundary

N

0 1000 2000
FEET

Map Index

1 2 3

SOURCE: Digital Globe (2008); CFWO (2008); CNDDB (2010); LSA; Harnsworth; Glenn Lukos Associates

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Irvine Ranch Northern Open Space RRMP

Special-Status/Interest Plant Species and Vegetation Types

- **Streambeds.** The Irvine Ranch Northern Open Space contains seasonal streambed areas with defined beds and banks, and small areas that may meet the criteria of jurisdictional wetlands. These drainage areas support native plant communities and are considered sensitive resources by State and federal resource agencies. Several sensitive animal species potentially occur along the drainage courses of the Irvine Ranch Northern Open Space, including western spadefoot toads and Cooper's hawks. Cactus wrens and coastal California gnatcatchers use streambeds that contain upland scrub, with coastal California gnatcatchers also occurring in some of the mulefat scrub and willow scrub communities.

  Both State and federal policies emphasize avoidance of streambeds to the maximum practicable extent. As an initial step toward obtaining the required permits and agreement, a jurisdictional delineation acceptable to the Corps and CDFG is required to determine the location and acreage of any affected jurisdictional areas.

- **Coastal Sage Scrub.** CSS is located throughout the undeveloped portions of the foothills of Southern California. This vegetation type occurs within the Irvine Ranch Northern Open Space in the form of sagebrush and sage scrub, southern cactus scrub, scale-broom scrub, and sage scrub-grassland ecotone.

  CSS is considered a special-status vegetation type because of its high potential to support Threatened and Endangered wildlife species. All three of the "target species" of the NCCP program (coastal California gnatcatcher, orange-throated whiptail, and cactus wren) are known to occur in CSS within the Irvine Ranch Northern Open Space.

- **Native Grassland.** In its pristine condition in Southern California, native grassland was dominated by purple needlegrass (a perennial bunchgrass), as well as wild-rye and alkali grasslands. Historically (pre-European settlement), valley needlegrass grassland covered as much as 17 percent of California (Keeley 1989), but it has been greatly reduced by the invasion of nonnative annual grasses and forbs of Mediterranean origin, changes in the kinds of animals present and their grazing patterns, cultivation, and fire (Heady 1977). Only 0.1 percent of historical perennial native grasslands in California are extant (Barry 1981). Due to its reduction in range, native grassland is considered a special-status vegetation type.

- **Oak Resources.** Oak trees are biologically productive and of limited distribution in Orange County and statewide. As a result, the County of Orange General Plan Resource Element considers oak resources to be a significant natural resource, and this RRMP requires mitigation for habitat removal. State and federal resource agencies also consider oaks to be sensitive resources and may regulate losses of trees along drainage courses under the CDFG Code Section and United States Clean Water Act Section 404, respectively.

Special-Status and Special-Interest Plants. One special-status and six special-interest plant species have been documented within the Irvine Ranch Northern Open Space (Table B). A number of additional special-status and special-interest plant species have the potential to occur within the Irvine Ranch Northern Open Space but have not been detected to date (Table C). Tables B and C provide a brief description of the known habitat associated with each species, distribution of each species within California, activity period for each species, and each species' known location within the Irvine Ranch Northern Open Space (Table B) or the probability that the species may occur within the Irvine Ranch Northern Open Space (Table C). The distributions of special-status and special-interest species known to occur within and near the Irvine Ranch Northern Open Space are depicted on Exhibit D.


Many-stemmed dudleya


Intermediate mariposa lily

Special-Status and Special-Interest Wildlife. Special-status and special-interest wildlife species are those animals occurring or potentially occurring within the Irvine Ranch Northern Open Space that are rare or endangered; are of current local, regional, or State concern; or are target, identified, or conditionally covered species listed in Chapter 2 of the Central and Coastal NCCP/HCP.

Due to its size and diverse physical structures and plant communities, the Irvine Ranch Northern Open Space supports a diverse fauna. Four special-status and 24 special-interest wildlife species are known to occur within the Irvine Ranch Northern Open Space and are presented in Table D. In addition, a number of other special-status and special-interest wildlife species may occur within the Irvine Ranch Northern Open Space (presented in Table E). The locations of past observations of special-status and special interest wildlife species within and near the Irvine Ranch Northern Open Space are depicted on Exhibit E.

WILDLIFE HABITAT MANAGEMENT

General wildlife management objectives and techniques recommended to be implemented within the Irvine Ranch Northern Open Space include the following.

Biological monitoring is critical to assessing both the state of natural resources protected within the NCCP and the direction of adaptive management actions. Although monitoring of species and habitat types covered by the NCCP is stipulated as the responsibility of the NROC, supplemental biological monitoring will be conducted to better inform management decisions. All supplemental monitoring

Table B: Special-Interest Plant Species Known to Occur within the Irvine Ranch Northern Open Space

Species/Common Name	Designation	Habitat and Distribution in California	Activity Period	Occurrence Location
Braunton's milk-vetch *(Astragalus brauntonii)*	US: Endangered CNPS: 1B	Perennial herb considered a limestone endemic and dependent on fire; typically associated with the fire-dependent chaparral habitat on limestone and on downwash sites; elevation is below 3,000 ft; Los Angeles, Orange, and Ventura Counties.	Blooms March through July	Known from Gypsum Canyon area within the Irvine Ranch Northern Open Space.
Catalina mariposa lily *(Calochortus catalinae)*	CNPS: 4 NCCP: Identified Species	Perennial herb of chaparral, cismontane woodland, CSS, and valley and foothill needlegrass grasslands; 50–2,300 ft in elevation; San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, and San Diego Counties.	Blooms February through May	Known to commonly occur throughout the Irvine Ranch Northern Open Space, primarily in grassland and CSS habitats.
Intermediate mariposa lily *(Calochortus weedii* var. *intermedius)*	CNPS: 1B NCCP: Conditionally Covered Species	Rocky areas in hills with annual grassland and CSS, 600–2,800 ft in elevation; Los Angeles, Orange, and Riverside Counties.	Blooms June through July, with foliage April through July	Known to commonly occur throughout the Irvine Ranch Northern Open Space along ridgelines in CSS and chaparral.

Table B: Special-Interest Plant Species Known to Occur within the Irvine Ranch Northern Open Space

Species/Common Name	Designation	Habitat and Distribution in California	Activity Period	Occurrence Location
Tecate cypress *(Callitropsis forbesii)*	CNPS: 1B NCCP: Identified Species	Evergreen tree found in closed-cone coniferous forest and chaparral at elevations from 800–4,900 ft; known from Orange and San Diego Counties; fewer than five occurrences; trees known from Riverside County are planted.	Foliage year-round	Known to occur in Gypsum and Fremont Canyons within the Irvine Ranch Northern Open Space; many individuals have perished in recent fires.
Many-stemmed dudleya *(Dudleya multicaulis)*	CNPS: 1B	In heavy, clayey soils within chaparral, CSS, and grasslands, 0–2,600 ft in elevation; Los Angeles, Orange, Riverside, San Diego, and San Bernardino Counties.	Blooms May through June, with foliage April through July	Large populations known to occur within Weir Canyon. Also present within other portions of the Irvine Ranch Northern Open Space.
Heart-leaved pitcher sage *(Lepechinia cardiophylla)*	CNPS: 1B NCCP: Identified Species	Closed-cone coniferous forest, chaparral, cismontane woodland; 1,800–4,500 ft in elevation; Santa Ana Mountains in Riverside and Orange Counties; also reported from San Diego County and Baja California.	April through July	Known to occur within the Gypsum Canyon portion of the Irvine Ranch Northern Open Space.
Peninsular nolina *(Nolina cismontana)*	CNPS: 1B	Evergreen shrub found in chaparral, CSS, sandstone, or gabbro; 500–4,200 ft in elevation; Los Angeles, Orange, San Diego, and Ventura Counties.	Blooms May through July, with foliage year-round	Known to occur within the northern portion of Weir Canyon.
Allen's pentachaeta *(Pentachaeta aurea* ssp. *allenii)*	CNPS: 1B	Annual herb within grassland and scrub habitats; 250–1,700 ft in elevation; known in California from Orange County.	March through June	Known to occur within the Gypsum/Fremont Canyon portion of the Irvine Ranch Northern Open Space.

CNPS = California Native Plant Society CSS = coastal sage scrub ft = foot/feet NCCP = Natural Communities Conservation Plan

Table C: Special-Status and Special-Interest Plant Species That May Occur within the Irvine Ranch Northern Open Space

Species/Common Name	Designation	Habitat and Distribution in California	Activity Period	Occurrence Probability
Chaparral sand-verbena *(Abronia villosa* var. *aurita)*	CNPS: 1B	Annual herb associated with sandy soils; found in chaparral, CSS, and desert dune habitats 200–5,000 ft in elevation; known from Los Angeles, Orange, Riverside, San Bernardino, San Diego, Imperial, and Ventura Counties; Arizona; and Baja California.	Blooms January through September	**Low.** Considered extirpated in Orange County.
Munz' onion *(Allium munzii)*	US: Endangered CA: Threatened CNPS: 1B	On clay soils in openings within CSS, pinyon juniper woodland, and grassland; 1,000–3,500 ft in elevation. Known only from western Riverside County in Temescal Canyon, Gavilan Plateau, and Skunk Hollow areas.	March through May	**Low.** Known occurrences are distant from the Irvine Ranch Northern Open Space.
Coulter's saltbush *(Atriplex coulteri)*	CNPS: 1B	Perennial herb of alkaline or clay soils in ocean bluffs and ridgetops and alkaline low places in coastal bluff scrub, coastal dunes, CSS, and valley and foothill grasslands below 1,500 ft in elevation; known only from Los Angeles, Orange, Riverside, Santa Barbara, San Bernardino, and San Diego Counties.	March through October	**Low.** Marginally suitable substrate or growing conditions. Known occurrences are distant from the Irvine Ranch Northern Open Space.
Malibu baccharis *(Baccharis malibuensis)*	CNPS: 1B	Perennial subshrub in Conejo volcanic substrates, often on exposed road cuts within CSS, chaparral, and cismontane woodland; known from Santa Monica Mountains and Simi Hills.	Late summer to fall	**Low.** In 2000 there was a reported sighting in Fremont Canyon, the only known occurrence in Orange County.
Thread-leaved brodiaea *(Brodiaea filifolia)*	US: Threatened CA: Endangered CNPS: 1B	Clay, loamy sand, or alkaline soils; open grasslands at edges of vernal pools or floodplains; below 4,000 ft in elevation; Los Angeles, Orange, Riverside, and San Diego Counties; known from about 20 locations.	April through June	**Low.** Known occurrences are distant from the Irvine Ranch Northern Open Space.
Plummer's mariposa lily *(Calochortus plummerae)*	CNPS: 1B	Perennial herb of sandy or rocky sites of (usually) granitic or alluvial material in valley and foothill grassland, coastal scrub, chaparral, cismontane woodland, and lower montane coniferous forest at 300–5,600 ft in elevation. Known from the Santa Monica Mountains to San Jacinto Mountains in Riverside, San Bernardino, Los Angeles, and Ventura Counties.	Blooms May through July	**Low.** Known occurrences are distant from the Irvine Ranch Northern Open Space.

Table C: Special-Status and Special-Interest Plant Species That May Occur within the Irvine Ranch Northern Open Space

Species/Common Name	Designation	Habitat and Distribution in California	Activity Period	Occurrence Probability
Lewis' evening primrose *(Camissonia lewisii)*	CNPS: 3	Annual herb within areas with sandy soils in grassland and scrub habitats; 0–1,000 ft in elevation. Known in California from Los Angeles, Orange, and San Diego Counties.	March through June	**Moderate:** Suitable growing conditions present on site.
Southern tarplant *(Centromadia parryi* ssp. *australis)*	CNPS: 1B	Margins of marshes and swamps, vernal pools; often in disturbed sites near the coast, also in alkaline soils with coastal salt grass; below 1,500 ft in elevation.	May through November	**Moderately Low.** Marginal substrate or growing conditions.
Smooth tarplant *(Centromadia pungens* ssp. *laevis)*	CNPS: 1B	Alkaline areas in chenopod scrub, meadows, playas, riparian woodland, valley and foothill grassland below 1,600 ft in elevation. Known from Riverside and San Bernardino Counties; extirpated from San Diego County.	April through September	**Low.** Known occurrences are distant from the Irvine Ranch Northern Open Space.
Small-flowered mountain mahogany *(Cercocarpus minutiflorus)*	NCCP: Identified Species	Large perennial shrub within chaparral habitats; 0–4,265 ft in elevation; known to occur in Inyo, San Luis Obispo, Riverside, Orange, and San Diego Counties.	Foliage year-round	**Low.** Known to occur in Santa Ana Mountains and in coastal foothills of Orange County. Could occur where chaparral is present within species elevation range.
San Fernando Valley spineflower *(Chorizanthe parryi* var. *fernandina)*	US: Candidate CA: Endangered CNPS: 1B	Annual herb found in sandy soils in coastal scrub, primarily in the northeastern Western Transverse Ranges and San Gabriel Mountains at elevations between 10 and 4,000 ft.	April through June	**Low.** Known occurrences are distant from the Irvine Ranch Northern Open Space.
Long-spined spineflower *(Chorizanthe polygonoides* var. *longispina)*	CNPS: 1B	Annual herb of clay soils in chaparral, CSS, meadows and seeps, valley and foothill grassland at 100–4,800 ft in elevation; occurs in Orange, Riverside, and San Diego Counties.	April through July	**Moderate.** Suitable substrate or growing conditions limited; closest known population from Gypsum Canyon.
White-bracted spineflower *(Chorizanthe xanti* var. *leucotheca)*	CNPS: 1B	Annual herb of Mojave desert scrub and pinyon and juniper woodland, 900–4,000 ft in elevation. Known only from Los Angeles, Riverside, and San Bernardino Counties.	April through June	**Low.** Known occurrences are distant from the Irvine Ranch Northern Open Space.

Table C: Special-Status and Special-Interest Plant Species That May Occur within the Irvine Ranch Northern Open Space

Species/Common Name	Designation	Habitat and Distribution in California	Activity Period	Occurrence Probability
Slender-horned spineflower *(Dodecahema leptoceras)*	US: Endangered CA: Endangered CNPS: 1B	Gravel soils of Temecula, arkose deposits in openings in chamise chaparral in the Vail Lake Area, or sandy soils in opening in alluvial scrub (usually late seral stage) in floodplain terraces and benches that receive overbank deposits every 50–100 years from generally large washes or rivers; 600–2,500 ft in elevation. Los Angeles, Riverside, and San Bernardino Counties.	April through June	**Low.** Known occurrences are distant from the Irvine Ranch Northern Open Space.
Santa Monica Mountains dudleya *(Dudleya cymosa* ssp. *ovatifolia)*	US: Threatened CNPS: 1B NCCP: Identified Species	Perennial herb of cracks and crevices of rock outcrops and cliff faces in canyons (primarily on north-facing slopes) in chaparral and CSS at 500–5,500 ft in elevation; known only from Los Angeles and Orange Counties.	March through June	**Low.** Known occurrences are distant from the Irvine Ranch Northern Open Space.
Santa Ana River woolly-star *(Eriastrum densifolium* ssp. *sanctorum)*	US: Endangered CA: Endangered CNPS: 1B	Sandy soils on river floodplains and terraced fluvial deposits. Known only from the Santa Ana River and larger tributaries in San Bernardino and Riverside Counties; elevations of 400–2,100 ft.	Foliage year-round	**Low.** Suitable substrate or growing conditions not present.
Vernal barley *(Hordeum intercedens)*	CNPS: 3	Annual herb found in coastal dunes, CSS, valley and foothill grassland (saline flats and depressions), and vernal pools in Los Angeles, Orange, Riverside, Santa Barbara, San Diego, and Ventura Counties; found at elevations of 20–3,300 ft.	March through June	**Low-Moderate.** Suitable substrate or growing conditions generally not present.
Robinson's peppergrass *(Lepidium virginicum* var. *robinsonii)*	CNPS: 1B	Annual herb found in chaparral and CSS habitats from sea level to 2,500 ft in elevation; known from Los Angeles, Orange, Riverside, Santa Barbara, San Bernardino, and San Diego Counties; Santa Cruz Island; and Baja California.	Blooms January through July	**High.** Suitable growing conditions present within the Irvine Ranch Northern Open Space.
Felt-leaved monardella *(Monardella hypoleuca* ssp. *lanata)*	CNPS: 1B	Chaparral and woodland, 1,000–3,900 ft in elevation. Known from Peninsular Ranges in Orange and San Diego Counties and from northern Baja California.	Blooms June through August	**Low.** Known occurrences are distant from the Irvine Ranch Northern Open Space.
Hall's monardella *(Monardella macrantha* ssp. *hallii)*	CNPS: 1B	Perennial herb of dry slopes and ridges, in openings in chaparral, woodland, and forest at 2,300–7,200 ft in elevation. Known only from San Diego, Orange, Riverside, and San Bernardino Counties.	June through August	**Low.** Known occurrences are distant from the Irvine Ranch Northern Open Space.

Table C: Special-Status and Special-Interest Plant Species That May Occur within the Irvine Ranch Northern Open Space

Species/Common Name	Designation	Habitat and Distribution in California	Activity Period	Occurrence Probability
Mud nama *(Nama stenocarpum)*	CNPS: 2	Annual or perennial herb of lake shores, riverbanks, and similar intermittently wet areas at 20–1,600 ft in elevation; known in California from San Diego, Imperial, Los Angeles, Orange, and Riverside Counties and San Clemente Island.	January through July	**Moderate.** Could occur along muddy margins or reservoirs/retention basins and streams in the Irvine Ranch Northern Open Space. Known to occur to the south at Lambert Reservoir.
California beardtongue *(Penstemon californicus)*	CNPS: 1B	Perennial herb within chaparral. 1,170 to 2,300 meters (3,800 to 7,500 ft) in elevation. Known from Orange and Riverside Counties.	May through June	**Low-Moderate.** Suitable substrate or growing conditions are present in the Irvine Ranch Northern Open Space. May occur in Tecate cypress forest.
White rabbit tobacco *(Pseudognaphalium leucocephalum)*	CNPS: 2	Perennial herb within chaparral, CSS, cismontane woodland, and riparian woodland. 0 to 2,100 meters (0 to 7,000 ft) in elevation. Known from San Luis Obispo County south to Baja California.	August through November	**Low.** Known to occur to the north in the Santa Ana River bottom.
Coulter's matilija poppy *(Romneya coulteri)*	CNPS: 4 NCCP: Identified Species	Perennial herb within dry washes and canyons of chaparral and CSS habitats; 20–1,200 meters (65–4,000 ft) in elevation; known from Los Angeles, Orange, Riverside, and San Diego Counties.	March through July	**High.** Known to occur in surrounding areas and likely to occur where suitable habitat within the species elevation range occurs.
Rayless ragwort *(Senecio aphanactis)*	CNPS: 2	Annual herb of drying alkaline flats in cismontane woodland, CSS, and chaparral at 50–1,900 m (2,600 ft) in elevation; known in California from Alameda, Contra Costa, Fresno, Los Angeles, Merced, Orange, Riverside, Santa Barbara, Santa Clara, San Diego, San Luis Obispo, Solano, and Ventura Counties.	Blooms January through April	**Moderate.** Historical occurrence from Hicks Canyon.

Table C: Special-Status and Special-Interest Plant Species That May Occur within the Irvine Ranch Northern Open Space

Species/Common Name	Designation	Habitat and Distribution in California	Activity Period	Occurrence Probability
Salt Spring checkerbloom *(Sidalcea neomexicana)*	CNPS: 2	Perennial herb of alkaline springs and marshes below 5,000 ft in elevation. In California, known only from Los Angeles, Orange, Riverside, Santa Barbara, San Bernardino, and Ventura Counties.	Blooms March through June	**Low.** Known occurrences are distant from the Irvine Ranch Northern Open Space.
San Bernardino aster *(Symphyotrichum defoliatum)*	CNPS: 1B	Perennial herb of vernally mesic sites (such as ditches, streams, and springs) in many plant communities below 6,700 ft in elevation; in California, known from Ventura, Kern, San Bernardino, Los Angeles, Orange, Riverside, and San Diego Counties.	Blooms July through November	**Low.** Thought to be extirpated, but was probably known from Anaheim Marsh in early 1930s (CNDDB).

CNDDB = California Natural Diversity Database
CNPS = California Native Plant Society
CSS = coastal sage scrub
ft = foot/feet
NCCP = Natural Communities Conservation Plan

Table D: Special-Status and Special-Interest Wildlife Species Known to Occur within the Irvine Ranch Northern Open Space

Scientific Name	Common Name	Designation	Associated Habitat	Known Location within the Irvine Ranch Northern Open Space
Amphibians				
Aneides lugubris	Arboreal salamander	NCCP: Identified Species	Found in oak woodland and chaparral habitats; utilizes rotting logs, rocks, bark, and leaf litter for cover.	Known to occur within oak woodland and chaparral habitats throughout the Irvine Ranch Northern Open Space.
Batrachoseps nigriventris	Black-bellied slender salamander	NCCP: Identified Species	Found in oak woodland and chaparral habitats; utilizes rotting logs, rocks, bark, and leaf litter for cover.	Known to occur within oak woodland and chaparral habitats throughout the Irvine Ranch Northern Open Space.
Spea hammondii	Western spadefoot	State: Special Concern NCCP: Identified Species	Primarily found in grassland habitats; requires pools for breeding.	Reported within Weir and Limestone Canyons.
Reptiles				
Aspidoscelis hyperythra	Orange-throated whiptail	State: Special Concern NCCP: Target Species	Low-elevation CSS, chaparral and woodlands; sandy areas with rocks and perennial brush.	Reported throughout the Irvine Ranch Northern Open Space.
Aspidoscelis tigris stejnegeri	Coastal western whiptail	State: Special Animal NCCP: Identified Species	Wide variety of habitats, including CSS, sparse grassland, and riparian woodland; coastal and inland valleys and foothills.	Known to occur throughout the Irvine Ranch Northern Open Space.
Charina trivirgata	Rosy boa	State: Special Animal NCCP: Identified Species	Inhabits desert and chaparral from the coast to the Mojave and Colorado Deserts.	Known to occur within Weir Canyon.
Crotalus ruber ruber	Northern red-diamond rattlesnake	State: Special Concern NCCP: Identified Species	In rocky or densely vegetated areas of CSS, chaparral, woodland, and grasslands.	Reported within Weir and Limestone Canyons.
Diadophis punctatus modestus	San Bernardino ringneck snake	State: Special Animal NCCP: Identified Species	Woodland, grassland, chaparral, or scrub habitats; prefer moist habitats; seldom seen in open; often found under rocks, logs, and other debris.	Reported within Weir and Limestone Canyons.

Table D: Special-Status and Special-Interest Wildlife Species Known to Occur within the Irvine Ranch Northern Open Space

Scientific Name	Common Name	Designation	Associated Habitat	Known Location within the Irvine Ranch Northern Open Space
Plestiodon skiltonianus	Western skink	State: Special Concern NCCP: Identified Species	Mesic areas of grasslands, CSS, chaparral, and woodlands; utilizes rocks, rotting logs, and leaf litter for cover.	Known to occur throughout the Irvine Ranch Northern Open Space.
Phrynosoma coronatum	Coast horned lizard	State: Special Concern NCCP: Identified Species	Occurs in valley-foothill hardwood, conifer and riparian habitats, CSS, chaparral, and annual grassland. Prefers open country, especially sandy areas, washes, and floodplains. Requires open areas for sunning, bushes for cover, patches of loose soil for burial, and abundant supply of ants or other insects.	Known to occur throughout the Irvine Ranch Northern Open Space.
Salvadora hexalepis virgultea	Coast patch-nosed snake	State: Special Concern	Brushy or shrubby vegetation with small mammal burrows for refuge.	Known to occur within Weir and Limestone Canyons.
Thamnophis hammondii	Two-striped garter snake	State: Special Concern	Highly aquatic and only occurs in or near permanent sources of water.	Known to occur at the mouth of Fremont Canyon and near Weir and Limestone Canyons.
Birds				
Accipiter cooperii	Cooper's hawk (nesting)	State: Special Animal	Uses wooded habitat for nesting; foraging occurs over a much wider range of habitats.	Known to occur in Weir Canyon.
Accipiter striatus	Sharp-shinned hawk (nesting)	State: Special Animal NCCP: Identified Species	Preys on other birds, particularly in and along the margins of woodland habitats; most commonly associated with woodland and brush habitats.	Known to occur in Limestone Canyon.
Aimophila ruficeps canescens	Southern California rufous-crowned sparrow	State: Special Animal NCCP: Identified Species	Inhabits grass-covered hillsides within CSS and chaparral habitats; nests on the ground.	Known to occur in Limestone Canyon.

Table D: Special-Status and Special-Interest Wildlife Species Known to Occur within the Irvine Ranch Northern Open Space

Scientific Name	Common Name	Designation	Associated Habitat	Known Location within the Irvine Ranch Northern Open Space
Asio otus	Long-eared owl	State: Special Concern	Nests in riparian woodlands and requires adjacent habitat with mice and old nests of American crows or hawks for breeding.	Known to occur within the Irvine Ranch Northern Open Space; last reported in Weir Canyon in 2009.
Buteo lineatus	Red-shouldered hawk	NCCP: Identified Species	Nests in oak and sycamore woodlands with open water and clearings nearby.	Known to occur throughout much of the Irvine Ranch Northern Open Space where suitable habitat occurs.
Campylorhynchus brunneicapillus	Cactus wren	NCCP: Target Species	CSS habitat; requires tall stands of *Opuntia* cactus for nesting and roosting.	Reported throughout much of the Irvine Ranch Northern Open Space.
Elanus leucurus	White-tailed kite (nesting)	State: Fully Protected	Forages primarily in and around grassy fields and nests in well-developed riparian woodlands located near suitable hunting grounds.	Known to occur in Weir and Limestone Canyons.
Empidonax traillii extimus	Southwestern willow flycatcher (nesting)	US: Endangered State: Endangered NCCP: Conditionally Covered Species	Nests in dense growths of willows and mulefat within riparian habitats, usually with surface water present nearby.	Known to occur in Limestone Canyon.
Falco columbarius	Merlin (wintering)	State: Special Animal	Open country; breeds in the Holarctic and winters south to the Tropics.	Known to occur in Limestone Canyon.
Picoides nuttallii	Nuttall's woodpecker (nesting)	State: Special Animal	Permanent resident of woodland habitat; suitable habitat present within the Irvine Ranch Northern Open Space.	Known to occur in Limestone Canyon.
Polioptila californica californica	Coastal California gnatcatcher	US: Threatened State: Special Concern NCCP: Target Species	CSS below elevations of 2,500 ft in Southern California.	Reported throughout much of the Irvine Ranch Northern Open Space.

Table D: Special-Status and Special-Interest Wildlife Species Known to Occur within the Irvine Ranch Northern Open Space

Scientific Name	Common Name	Designation	Associated Habitat	Known Location within the Irvine Ranch Northern Open Space
Selasphorus sasin	Allen's hummingbird (nesting)	State: Special Animal	Inhabits chaparral and riparian woodland habitats; suitable nesting habitat occurs within the Irvine Ranch Northern Open Space.	Known to occur in Limestone Canyon.
Spizella atrogularis	Black-chinned sparrow (nesting)	State: Special Animal	Breeds in chaparral, sagebrush, and arid scrub in the southwestern U.S. and northwestern Mexico and winters primarily in Mexico.	Known to occur in Limestone Canyon.
Mammals				
Antrozous pallidus	Pallid bat	State: Special Concern	Found in many habitats; roosts in rocky areas and trees that protect it from high temperatures and disturbances.	Known to utilize portions of Weir, Fremont, and Limestone Canyons for foraging habitat. May roost within as well.
Bassariscus astutus	Ringtail	State: Fully Protected	Occupies woody and rocky areas; marginal habitat present.	Known to occur within Limestone Canyon.
Canis latrans	Coyote	NCCP: Identified Species	Found in all wildland habitats, and often found within agricultural and developed lands.	Known to occur throughout the Irvine Ranch Northern Open Space.
Corynorhinus townsendii	Townsend's big-eared bat	State: Special Concern	Occupies varied habitats; however, it is rare in Orange County; roosts in caves or cave-like structures.	Known to occur within Weir Canyon.
Eumops perotis californicus	California mastiff bat	State: Special Concern	Found in many habitats; roosts in crevices of cliff faces, high buildings, trees, and tunnels.	Known to utilize portions of Weir, Fremont, Blind, and Limestone Canyons for foraging habitat. May roost within as well.
Lasiurus blossevillii	Western red bat	State: Special Concern	Forages over a wide range of habitats, but generally roosts in woodlands and forests; may forage in the general area.	Known to occur in Fremont and Limestone Canyons.

Table D: Special-Status and Special-Interest Wildlife Species Known to Occur within the Irvine Ranch Northern Open Space

Scientific Name	Common Name	Designation	Associated Habitat	Known Location within the Irvine Ranch Northern Open Space
Nyctinomops femerosaccus	Pocketed free-tailed bat	State: Special Concern	Occupies varied habitats, but usually associated with high cliffs or rocky areas.	Known to occur within Weir, Fremont, Blind, and Limestone Canyons.
Urocyon cinereoargenteus	Gray fox	NCCP: Identified Species	Found in many habitat types, preferring woodlands, chaparral, and CSS.	Known to occur within woodland and chaparral habitats throughout the Irvine Ranch Northern Open Space.

CSS = coastal sage scrub
ft = foot/feet
NCCP = Natural Communities Conservation Plan

Table E: Special-Status and Special-Interest Wildlife Species That May Occur within the Irvine Ranch Northern Open Space

Scientific Name	Common Name	Designation	Habitat and Comments
Invertebrates			
Branchinecta lynchi	Vernal pool fairy shrimp	US: Threatened	Grasslands and ponded areas such as vernal pools, cattle watering holes, basins, etc.; habitat is generally lacking in Irvine Ranch Northern Open Space; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **low.**
Branchinecta sandiegoensis	San Diego fairy shrimp	US: Endangered NCCP: Conditionally Covered Species	Vernal pools having a restricted permeability subsurface claypan; closest known population is found in the southeast of Weir Canyon; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **low.**
Euphydryas editha quino	Quino checkerspot butterfly	US: Endangered NCCP: Conditionally Covered Species	Grasslands and open scrub; requires California plantain or purple owl's clover as food sources; believed to be extinct in Orange County; historical occurrences known from Fremont, Blind, and Santiago Canyons; the potential for satellite populations to colonize the Irvine Ranch Northern Open Space is **low.**
Streptocephalus woottoni	Riverside fairy shrimp	US: Endangered NCCP: Conditionally Covered Species	Vernal pools having a restricted permeability subsurface hardpan, claypan, or rock; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **low.**
Fish			
Rhinichthys osculus ssp. 3	Santa Ana speckled dace	State: Special Concern	Prefers clean, clear pools or flowing streams with cobble and riffles; typically is the only fish species present in a creek/pool; occurs in Santiago Creek above Irvine Lake; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **low.**
Catostomus santaanae	Santa Ana sucker	US: Threatened State: Special Concern	Los Angeles basin and south coastal streams, including the Santa Ana River watershed; although the streams within the Irvine Ranch Northern Open Space are part of the Santa Ana River watershed, the Villa Park Dam and the ephemeral nature of the streams within the Irvine Ranch Northern Open Space make the likelihood of occurrence for this species **low.**
Amphibians			
Anaxyrus californicus	Arroyo toad	US: Endangered State: Special Concern NCCP: Conditionally Covered Species	Associated with semiarid regions near washes or intermittent streams; requires gravel and/or sand-bottomed overflow pools adjacent to the inflow channel of third-order- or greater-level streams for breeding; last reported in 1974 in Santiago Creek; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **moderate.**

Table E: Special-Status and Special-Interest Wildlife Species That May Occur within the Irvine Ranch Northern Open Space

Scientific Name	Common Name	Designation	Habitat and Comments
Taricha torosa torosa	Coast range newt	State: Special Concern	Lives in terrestrial habitats and will migrate over 1 kilometer (km) to breed in ponds, reservoirs, and slow-moving streams; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **moderately high.**
Reptiles			
Actinemys mamorata pallida	Southwestern pond turtle	State: Special Concern	Inhabits permanent or nearly permanent bodies of water in many habitat types and requires basking sites such as partially submerged logs, vegetation mats, or open mud banks; wanders well away from water sources; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **moderate.**
Anniella pulchra pulchra	Silvery legless lizard	State: Special Concern	Frequents loose soil and humus of relatively open habitats; is susceptible to drying and lives only where it can reach damp soil; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **moderately high.**
Lampropeltis zonata pulchra	San Diego mountain kingsnake	State: Special Concern	Inhabits chaparral and riparian areas; last reported sighting in the general area was near Silverado Canyon in 1993; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **moderately low.**
Birds			
Ammodramus savannarum	Grasshopper sparrow (nesting)	State: Special Concern	Requires tall grasslands that provide occasional taller bushes, weedy stems, fence posts, etc., for perching and singing; in Orange County, is most reliably found in native grasslands dominated by needlegrass; restoration/enhancement of native grasslands may provide habitat for this species; there is a **moderately high** likelihood of this species foraging and nesting within the Irvine Ranch Northern Open Space.
Amphispiza belli belli	Bell's sage sparrow (nesting)	State: Special Animal	Inhabits chaparral and CSS; sui**t**able habitat is present within upper Weir and Upper Fremont Canyons; the likelihood of this species foraging and nesting within the Irvine Ranch Northern Open Space is **high.**
Ardea herodias	Great blue heron (rookery site)	State: Special Animal	Nests colonially in woodlands near wetland habitats; suitable nesting habitat is scarce within the project area; the likelihood of this species foraging within the Irvine Ranch Northern Open Space is **moderately high** and the likelihood of it nesting is **low.**

Table E: Special-Status and Special-Interest Wildlife Species That May Occur within the Irvine Ranch Northern Open Space

Scientific Name	Common Name	Designation	Habitat and Comments
Aquila chrysaetos	Golden eagle (nesting and wintering)	State: Fully Protected NCCP: Conditionally Covered Species	Inhabits rolling foothills and mountainous areas; nests in cliff-walled canyons; formerly nested in upper Gypsum Canyon; the likelihood of this species foraging within the Irvine Ranch Northern Open Space is **moderate** and the likelihood of it nesting is **low.**
Athene cunicularia	Burrowing owl (burrows)	State: Special Concern	Inhabits grassland or other open areas that have an abundance of ground squirrel holes, its preferred nesting site; although there is habitat to support the burrowing owl, the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **low.**
Baeolophus inornatus	Oak titmouse (nesting)	State: Special Animal	Inhabits oak woodland habitat; suitable habitat is present within the Irvine Ranch Northern Open Space; the likelihood of this species foraging and nesting within the Irvine Ranch Northern Open Space is **high.**
Buteo lagopus	Rough-legged hawk	NCCP: Identified Species	Winters in open grasslands and pastures; although suitable habitat is present within the Irvine Ranch Northern Open Space, this species usually does not winter this far south; the likelihood of this species wintering within the Irvine Ranch Northern Open Space is **low.**
Buteo regalis	Ferruginous hawk (wintering)	State: Special Animal	Grasslands provide foraging habitat; formerly known to occur at Marine Corps Air Station (MCAS) El Toro; although there is suitable habitat present, the likelihood of this species wintering within the Irvine Ranch Northern Open Space is **moderately low.**
Calypte costae	Costa's hummingbird (nesting)	State: Special Animal	Forages within CSS habitat; nests within shrubs; the likelihood of this species foraging and nesting within the Irvine Ranch Northern Open Space is **high.**
Carduelis lawrencei	Lawrence's goldfinch (nesting)	State: Special Animal	Occupies oak woodland, chaparral, riparian woodland, and other habitats in arid regions, but usually near water; suitable habitat is present; the likelihood of this species foraging and nesting within the Irvine Ranch Northern Open Space is **moderately high.**
Chondestes grammacus	Lark sparrow (nesting)	State: Special Animal	Open habitats with scattered brush or trees; the likelihood of this species nesting or foraging within the Irvine Ranch Northern Open Space is **high.**
Circus cyaneus	Northern harrier (nesting)	State: Special Concern NCCP: Identified Species	Forages over a wide range of open habitats; nests on the ground or within shrubs; the likelihood of this species utilizing the Irvine Ranch Northern Open Space as foraging habitat is **high** and for nesting habitat is **moderately low.**

Table E: Special-Status and Special-Interest Wildlife Species That May Occur within the Irvine Ranch Northern Open Space

Scientific Name	Common Name	Designation	Habitat and Comments
Dendroica petechia brewsteri	Yellow warbler (nesting)	State: Special Concern	Inhabits riparian woodland habitat dominated by cottonwoods, alders, and willows; there is a small amount of suitable habitat within the Irvine Ranch Northern Open Space; the likelihood of this species foraging or nesting within the Irvine Ranch Northern Open Space is **moderately high.**
Eremophila alpestris actia	California horned lark	State: Special Animal	Resides and nests in grasslands; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **high.**
Falco mexicanus	Prairie falcon	State: Special Animal NCCP: Conditionally Covered Species	Generally nests in cliffs; forages in grasslands and other open habitats; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **low.**
Falco peregrinus anatum	American peregrine falcon (nesting)	State: Endangered, Fully Protected NCCP: Identified Species	Widespread, but scarce and local throughout North America; nests on buildings and bridges in the Los Angeles Basin; the likelihood of this species foraging within the Irvine Ranch Northern Open Space is **moderate** and the likelihood of it nesting is **low.**
Icteria virens	Yellow-breasted chat (nesting)	State: Special Concern	Summer resident that inhabits riparian thickets of willow and other brushy tangles near watercourses; potential habitat does exist for this species, and the likelihood of this species foraging and nesting within the Irvine Ranch Northern Open Space is **high.**
Lanius ludovicianus	Loggerhead shrike (nesting)	State: Special Concern	Open country in much of North America; habitat is suitable but the species is now very rare in the region; the likelihood of this species foraging or nesting within the Irvine Ranch Northern Open Space is **moderately low.**
Pandion haliaetus	Osprey (nesting)	State: Special Animal	Few nesting pairs known to occur in Orange County; habitat adjacent to Irvine Lake may be suitable; the likelihood of this species nesting within the Irvine Ranch Northern Open Space is **low.**
Vireo bellii pusillus	Least Bell's vireo (nesting)	US: Endangered State: Endangered NCCP: Conditionally Covered Species	Utilizes large patches of willow scrub and mulefat scrub habitat for nesting. Known to occur south of Weir Canyon and south of Agua Chinon. The likelihood of this species foraging within the Irvine Ranch Northern Open Space is **moderately high** and the likelihood of it nesting is **moderately low**.
Mammals			
Chaetodipus fallax fallax	Northwestern San Diego pocket mouse	State: Special Concern	CSS, sage scrub-grassland ecotone, and chaparral habitats; sandy, gravelly, or rocky soils; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **high.**

Table E: Special-Status and Special-Interest Wildlife Species That May Occur within the Irvine Ranch Northern Open Space

Scientific Name	Common Name	Designation	Habitat and Comments
Choeronycteris mexicana	Mexican long-tongued bat	State: Special Concern	Feeds on nectar and pollen of night-blooming succulents and typically roosts near the entrances of caves, mines, and rock crevices, and in and around buildings; the likelihood of it occurring in the Irvine Ranch Northern Open Space is **low.**
Lasiurus cinereus	Hoary bat	State: Special Animal	Forages over a wide range of habitats, but generally roosts in woodlands and forests; may forage in the general area; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **high.**
Lasiurus xanthinus	Western yellow bat	State: Special Animal	Occupies varied habitats, but usually near water; is often associated with palm trees; marginal habitat present; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **moderately low.**
Lepus californicus bennettii	San Diego black-tailed jackrabbit	State: Special Concern	Inhabits open country of coastal Southern California and northern Baja California; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **moderate.**
Myotis ciliolabrum	Western small-footed myotis	State: Special Animal	Roosts in cliffs and forages nearby; marginal habitat present; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **moderately high.**
Myotis yumanensis	Yuma myotis	State: Special Animal	Occupies varied habitats in western North America; may forage in the general area; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **high.**
Neotoma lepida intermedia	San Diego desert woodrat	State: Special Concern NCCP: Identified Species	Frequently found in poorly vegetated, arid lands and especially associated with cactus patches; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **high.**
Nyctinomops macrotis	Big free-tailed bat	State: Special Concern	Occupies low-lying, arid areas in Southern California; requires high cliffs or rocky outcrops for roosting sites; feeds primarily on large moths; suitable foraging and roosting habitat exists in the study area; the likelihood of this species occurring within the Irvine Ranch Northern Open Space is **moderately low.**
Taxidea taxus	American badger	State: Special Concern	Inhabits open areas with friable soils and uncultivated land; although there is sufficient habitat present to support it, the likelihood of this species occurring within Irvine Ranch Northern Open Space is **moderately low.**

CSS = coastal sage scrub
NCCP = Natural Communities Conservation Plan

EXHIBIT E-1

Sensitive Animal Species

- Arroyo Toad
- Bell's Sage Sparrow
- Cactus Wren
- California Horned Lark
- California Mastiff Bat
- Coast Horned Lizard
- Coast Patch-nosed Snake
- Coast Range Newt
- Coastal California Gnatcatcher
- Coastal Western Whiptail
- Cooper's Hawk
- Least Bell's Vireo
- Loggerhead Shrike
- Long-eared Owl
- Merlin
- Mountain Lion
- Northern Harrier
- Northern Red-diamond Rattlesnake
- Orange-throated Whiptail
- Palid Bat
- Pocketed Free-tailed Bat
- Quino Checkerspot Butterfly
- Southern California Rufous-crowned Sparrow
- San Bernardino Ringneck Snake
- San Diego Desert Woodrat
- San Diego Fairy Shrimp
- San Diego Mountain Kingsnake
- Northwestern San Diego Pocket Mouse
- Santa Ana Speckled Dace
- Sharp-shinned Hawk
- Rosy Boa
- Southwestern Pond Turtle
- Southwestern Willow Flycatcher
- Townsend's Big-eared Bat
- Two-striped Garter Snake
- Western Skink
- Western Spadefoot
- White-tailed Kite
- Yellow Warbler
- Yellow-breasted Chat

241

LSA

LEGEND

- Irvine Ranch Northern Open Space RRMP
- Historic Irvine Ranch Boundary

0 1000 2000
FEET

Map Index

1
2
3

SOURCE: Digital Globe (2008); CFWO (2008); CNDDB (2010); LSA; Harmsworth; Glenn Lukos

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Irvine Ranch Northern Open Space RRMP

Special-Status/Interest Wildlife Species

EXHIBIT E-2

Sensitive Animal Species

- Arroyo Toad
- Bell's Sage Sparrow
- Cactus Wren
- California Horned Lark
- California Mastiff Bat
- Coast Horned Lizard
- Coast Patch-nosed Snake
- Coast Range Newt
- Coastal California Gnatcatcher
- Coastal Western Whiptail
- Cooper's Hawk
- Least Bell's Vireo
- Loggerhead Shrike
- Long-eared Owl
- Merlin
- Mountain Lion
- Northern Harrier
- Northern Red-diamond Rattlesnake
- Orange-throated Whiptail
- Palid Bat
- Pocketed Free-tailed Bat
- Quino Checkerspot Butterfly
- Southern California Rufous-crowned Sparrow
- San Bernardino Ringneck Snake
- San Diego Desert Woodrat
- San Diego Fairy Shrimp
- San Diego Mountain Kingsnake
- Northwestern San Diego Pocket Mouse
- Santa Ana Speckled Dace
- Sharp-shinned Hawk
- Rosy Boa
- Southwestern Pond Turtle
- Southwestern Willow Flycatcher
- Townsend's Big-eared Bat
- Two-striped Garter Snake
- Western Skink
- Western Spadefoot
- White-tailed Kite
- Yellow Warbler
- Yellow-breasted Chat

Santiago Canyon Road

241

261

LSA

LEGEND

- Irvine Ranch Northern Open Space RRMP
- Historic Irvine Ranch Boundary

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FEET

Map Index

1 2 3

Irvine Ranch Northern Open Space RRMP

Special-Status/Interest Wildlife Species

SOURCE: Digital Globe (2008); CFWO (2008); CNDDB (2010); LSA; Harmsworth; Glenn Lukos

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EXHIBIT E-3

Sensitive Animal Species

- Arroyo Toad
- Bell's Sage Sparrow
- Cactus Wren
- California Horned Lark
- California Mastiff Bat
- Coast Horned Lizard
- Coast Patch-nosed Snake
- Coast Range Newt
- Coastal California Gnatcatcher
- Coastal Western Whiptail
- Cooper's Hawk
- Least Bell's Vireo
- Loggerhead Shrike
- Long-eared Owl
- Merlin
- Mountain Lion
- Northern Harrier
- Northern Red-diamond Rattlesnake
- Orange-throated Whiptail
- Palid Bat
- Pocketed Free-tailed Bat
- Quino Checkerspot Butterfly
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- San Bernardino Ringneck Snake
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- San Diego Fairy Shrimp
- San Diego Mountain Kingsnake
- Northwestern San Diego Pocket Mouse
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- Sharp-shinned Hawk
- Rosy Boa
- Southwestern Pond Turtle
- Southwestern Willow Flycatcher
- Townsend's Big-eared Bat
- Two-striped Garter Snake
- Western Skink
- Western Spadefoot
- White-tailed Kite
- Yellow Warbler
- Yellow-breasted Chat

241

LSA

LEGEND

- Irvine Ranch Northern Open Space RRMP
- Historic Irvine Ranch Boundary

N

0 1000 2000
FEET

Map Index

1 2 3

Irvine Ranch Northern Open Space RRMP

Special-Status/Interest Wildlife Species

SOURCE: Digital Globe (2008); CFWO (2008); CNDDB (2010); LSA; Harmsworth; Glenn Lukos

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activities will be spatially referenced and added to the monitoring geographic information systems (GIS) database.

The monitoring framework in the Irvine Ranch Northern Open Space RRMP has three areas of emphasis: **(1) Focal Resources Monitoring**, **(2) Biodiversity/System Health Monitoring,** and **(3) Impacts/Stressors Monitoring.** "Focal Resources" refers to the habitats and species that are specifically covered by the NCCP. "Biodiversity/System Health" refers to the functioning of ecological and ecosystem processes. "Impacts/Stressors" are potential perturbations to ecological function, such as human activity and the disturbance associated with it, such as fire, disease, and climate change.

1) **Focal Resources.** Monitoring of target habitat types and species covered by the NCCP will be coordinated by the NROC as outlined in the Implementation Agreement for the Central and Coastal Subregion NCCP/HCP. Within the Central Reserve, covered habitat types include CSS, oak woodlands, cliff and rock, and Tecate cypress forest. The NCCP addresses the conservation of 39 target Identified Species, including the cactus wren, coastal California gnatcatcher, and orange-throated whiptail, that were used as the focus for NCCP Planning.

2) **Biodiversity/System Health.** Periodic surveys of previously marked CSS, grassland, and oak woodland plots will be conducted to assess change in the vegetation community over time. Riparian invasives will be monitored and their removal documented. A subset of populations of special-status and special-interest plants, including intermediate mariposa lily, many-stemmed dudleya, peninsular nolina, Braunton's milk-vetch, Tecate cypress, heart-leaved pitcher sage, and Allen's pentachaeta, will be resurveyed when conditions are appropriate (e.g., after fire or periodically). Depending on funding availability and need, wildlife activity, raptors, and, at more infrequent intervals, small mammals will be monitored. Fixed points documenting vegetation change after wildfire and restoration will be photographed periodically. Information from external surveys, such as quarterly Audubon bird point counts, Christmas Bird Counts, and other third-party surveys, will be collected. In the case that they are terminated, these surveys may be adopted and, if deemed important, continued (provided that funding is available). External research will be encouraged where it informs management goals, and data will be incorporated into the monitoring GIS database when available and appropriate. Periodic reports will be compiled on all major monitoring components, and important outcomes will be included in the Annual NROC Progress Report.

3) **Impacts/Stressors.** Recreational and other human access will be monitored using remote camera traps and trail counters. Wildlife activity patterns will be documented using remote camera traps. When available, supplemental information from external researchers, such as movement patterns obtained from collared animals, will be combined with camera trap data to inform management decisions. A trail degradation and illegal trail monitoring system will be established to identify recreation impact. Fire ignition points and perimeters will be obtained from the Orange County Fire Authority as they occur, added to the GIS database, and used to assist in identifying wildfire ignition and spread patterns, as well as disturbance perimeters. Photo monitoring points will identify fire-related habitat changes. Incidence of wildlife disease, such as mange, will be monitored. Climatic patterns will be available through the Remote Automated Weather Stations (RAWS) weather station and occasional external researcher data.

Protection of Breeding Territories and Nesting Sites

Breeding and/or nesting sites for sensitive species will be protected by redirecting human access traffic away from these areas during important periods such as breeding and dispersal, and by posting signage that prohibits entrance into these areas.

Protection of Sensitive Plant Populations

The health and status of sensitive plant populations will be recorded and updated as part of population surveys. Recommendations for management or enhancement of sensitive plant populations will be developed as needed and may include recommendations for protective fencing, removal of nonnative species, and addition of barrier plantings.

Deadwood/Leaf Litter Removal

Deadwood and leaf litter shall not be removed from natural habitat areas. Logs and branches provide valuable microhabitats for invertebrates, reptiles, small mammals, and birds. In addition, the decomposition of deadwood and leaf litter is essential for the replacement of the soil's nutrients and minerals. Vegetation removal for trail maintenance shall be minimized to the extent feasible and shall be overseen by a qualified professional. Any vegetation removed for trail maintenance should be chipped and used as mulch for on-site habitat creation activities or for covering unauthorized trails.

Snags

Native tree snags (dead tree limbs) and dying native trees shall not be removed from natural habitat areas, but shall be preserved for wildlife nesting and breeding habitat unless they threaten public safety, in which case they will be removed after determining the best management practices (BMPs) for the activity.

CULTURAL RESOURCES

The Irvine Ranch Northern Open Space contains a rich historical legacy. Its resources include information regarding prehistoric and historic occupation. The diverse human occupation of this land extends at least as far back as 10,000 to 12,000 years ago. Within these lands are a number of known prehistoric and historic archaeological sites. Many of the sites are documented as part of California Environmental Quality Act (CEQA) requirements for adjacent development and have been fully mitigated. Other known sites exist that have only been examined in a cursory manner, have not been closely studied, and could provide important new information. Finally, there are likely sites that have yet to be discovered that also could provide important information on the history and prehistory of the area.

Cultural resources will be preserved and protected within the Irvine Ranch Northern Open Space. Looting and vandalism are concerns with any existing resource. Methods to reduce these risks may include the inventory and periodic monitoring of all known resources, screening vegetation to reduce the likelihood of trespass and damage, and master planning of facilities to reduce conflicts with known resources. Additional programs may also be developed to increase the understanding of the value of cultural sites through educational programs and/or active monitoring and stewardship.

IRVINE RANCH

Recreation & Resource Management Plan

Recreation & Resource Management

RECREATION AND RESOURCE MANAGEMENT

REQUIREMENTS OF THE NATURAL COMMUNITY CONSERVATION PLAN

The NCCP/HCP requires the preparation and submittal of an RRMP for review and approval by CDFG and USFWS. This document is intended to constitute the required RRMP for the interim period during which the Irvine Company owns the property and until such time as a future landowner prepares a replacement plan and that plan is approved by the wildlife agencies. This RRMP details the policies and procedures for managing and monitoring the Irvine Ranch Northern Open Space.

Although NROC is responsible for coordinating the assembly and monitoring management of the Reserve and implementation of the adaptive management program, the actual management of the Reserve lands will be conducted by the individual landowners/managers. Following are the items identified in the NCCP IA as Reserve Owner/Manager activities:

- Coordinate management activities with NROC and ensure that such activities are consistent with the annually approved Work Plan.
- Prepare an annual Work Plan for activities for the upcoming year in consultation with NROC.
- Provide an annual Progress Report to NROC on the current year's Work Plan for inclusion in the NROC overall Annual Report submitted to CDFG. The Annual Report shall include, at a minimum, the results of recreational use monitoring (e.g., trail conditions, adverse habitat impacts), specific recommendations involving modification to existing management practices aimed at minimizing adverse impacts on biologic resources resulting from recreational use, and recommendations to initiate new management programs in response to changing circumstances/ conditions (e.g., educational programs, trail patrols).
- Conduct or allow NROC or other appropriate public or nonprofit agencies to conduct specific adaptive management measures required under the current NROC Work Plan, including:
    - Restoration
    - Enhancement
    - Habitat management
    - Public access/recreational management
    - Reserve System and public access facility maintenance
    - Cooperation in fire management, including controlled burns
    - Cooperation in invasive plant and animal species control

Additionally, with regard to Public Access, the NCCP has established Section 5.8, Public Access and Recreation Policies. The Public Access and Recreation Policy of the NCCP states that effective management shall demonstrate ability to:

- Effectively monitor and manage trails and facilities;
- Enforce user compliance with NCCP/HCP policies and RRMP policies;
- Provide technical Reserve management expertise; and,
- Provide funding for the above that is adequate to ensure that proposed access/recreation use can be accommodated consistent with the NCCP/HCP policies and Resource Management Plans

As a signatory to the Central and Coastal Subregion NCCP and HCP, the Irvine Company has certain responsibilities under the IA. One of those responsibilities is a commitment to interim management measures. Specifically, during the "interim management period," designated reserve lands shall not be developed or otherwise permitted to be used for purposes that would result in significant degradation of the biological values existing at the time the IA was signed. The Irvine Company has prepared this RRMP for the 8,057 acres of land that it currently owns within the Central Subarea of the Reserve System to achieve this goal while allowing for implementation of public access programs, trail development and maintenance, and resource management projects. As part of the interim management measures, the Irvine Company has prepared this RRMP for the 8,057 ac of land it currently owns within the Central Subarea of the Reserve System. This RRMP shows the access uses and facilities for these lands until the ultimate landowner adopts this RRMP as their management plan or prepares a replacement RRMP to be reviewed and approved by the appropriate agencies.

This RRMP addresses the facilities noted in the NCCP/HCP plan on Figure 28. Included are existing and proposed access uses and facilities located within the NCCP Reserve System. The RRMP's approval by the CDFG and USFWS will provide authorization for the landowner to maintain a similar level of access and uses within the Irvine Ranch Northern Open Space as currently exist and to move forward with trail development and maintenance, and resource management projects.

The NCCP Planning Guidelines adopted by CDFG for the coastal California gnatcatcher recommend that an "adaptive management" regime be implemented to manage biological resources within the subregion. This Irvine Ranch Northern Open Space Land RRMP is based on the adaptive management approach described in the NCCP.

KEY CHALLENGES AND POTENTIAL IMPACTS

Key management challenges for the Irvine Ranch Northern Open Space are the frequency of wildfires and their associated impacts to wildlife, the control of nonnative invasive plants and animals, and unauthorized activities by individuals and groups within the open space.

Wildfire Frequency

The Mediterranean climate of Southern California—characterized by wet, mild winters and dry, hot summers—is conducive to producing an abundance of fire fuel because of the long growing season. Over the last few decades, 90 percent of the acreage burned by wildfires in the Irvine Ranch Northern Open Space burned during high wind conditions, typically referred to as Santa Ana winds. Santa Ana wind-driven fires spread quickly and erratically, burn intensely, and are very hard to control. Today, fires occur much more often than they did historically (every 5 to 10 years, as compared to an estimated 60+ years historically).

Frequent wildfires can be a primary driver of loss and degradation of the native ecosystems. Too-frequent wildfires promote the spread of invasive species over the burned landscape, damage and impair the regeneration of oak woodlands, and can decimate wildlife populations. Reduction in the number of fire ignitions on open space lands, especially those that occur during Santa Ana wind conditions, is of utmost importance to the long-term viability of the native habitat.

Control of Nonnative Plants and Animals

Historical land uses, from cattle and sheep grazing to cultivation, have allowed nonnative invasive plants to establish themselves within certain areas of the Irvine Ranch Northern Open Space. Invasive plant and animal species can outcompete native species. Invasive species have the potential to degrade existing native habitat and reduce biodiversity, displacing native wildlife. Invasive species often compete with native plants for resources and habitat, and prevent seedling establishment.

The management of nonnative invasive plants is an important component of ensuring the continued health and vitality of the habitat.

Unauthorized Activities

Unauthorized activities by individuals and groups have the potential to cause extensive degradation of the natural resource values of the open space areas. Overuse and inappropriate use of the designated trail network can have negative environmental effects by altering natural drainage patterns, causing eroding and depositing of soil, introducing exotic vegetation, and increasing human-wildlife conflicts. Degraded trails also diminish the quality of the visitor experience by creating difficult or unsafe trail conditions and diminishing the scenic quality of the landscape.

Off-trail activities and the construction of unauthorized trails have the potential to result in trampling of native vegetation, degradation of habitat, soil erosion, disturbance of wildlife, and promotion of invasive exotic species. Monitoring of activities, both authorized and unauthorized, and elimination of unauthorized trails is an important management activity.

Strategy to Address Key Challenges

The sustainability of a natural habitat is affected by a number of factors, including the challenges noted in the previous paragraphs. This RRMP identifies actions by the landowner/land manager to maintain long-term habitat value by addressing undesirable changes and reducing/limiting the frequency of undesirable events to the habitat values of interest noted in the NCCP/HCP. An essential tool/strategy to address these noted challenges is adaptive management. This approach and the resulting strategies are outlined in the next section, which details how the land manager will actively address these issues of concern to the habitat values.

ADAPTIVE MANAGEMENT

Adaptive management, as defined by the NCCP, "shall mean the flexible, interactive approach to long-term management of biotic resources that is directed over time by the results of ongoing monitoring activities and other information. Under this approach, biological management techniques and specific objectives are regularly evaluated in light of monitoring results and other new information. These periodic evaluations are used over time to adapt both the management objectives and techniques to better achieve overall management goals."

Adaptive management will include the collection and maintenance of data on visitor use to assess the success of management strategies and the potential impacts of public use on the open space resources. Key components of the collected data will be included in the annual progress report submitted by the landowner to NROC, consistent with NROC-established guidelines and procedures.

The following elements are intended to ensure the maintenance of the long-term habitat and recreational value of the Irvine Ranch Northern Open Space. Many of these activities will be conducted by others; however, the landowner will approve and coordinate these activities on their lands in coordination with NROC:

- Management and monitoring of public access activities
- Monitoring and associated adaptive management of the biological resources located within the Irvine Ranch Northern Open Space in coordination with NROC
- Restoration and enhancement actions (other than creation of new CSS habitat) such as eradication of invasive, nonnative plant species, predator control, grazing management plans, and construction of additional spadefoot toad breeding sites
- Management designed to minimize the impacts of ongoing operations/maintenance of uses that existed prior to approval of the NCCP/HCP
- Assurance that permitted infrastructure uses proceed in the manner provided for in the NCCP/ HCP in order to minimize impacts of new uses to be allowed within the Irvine Ranch Northern Open Space
- Restoration and enhancement measures to increase CSS habitat valued to prevent potential loss of net long-term habitat value due to development of CSS habitat outside the Reserve System
- Field research and studies designed to contribute to the long-term protection of habitats and species and other basic research of habitats and species within the Irvine Ranch Northern Open Space
- Fire management activities consistent with the NCCP/HCP and fire management plans
- Recreation and public access consistent with the policies contained in the adaptive management program, including:
    - Passive recreation and activities such as hiking, nature interpretation, and picnicking;
    - Mountain biking and equestrian activities on designated trails;
    - Continued operation of preexisting facilities, including agricultural activities within disturbed areas;

  - Administrative and interpretive facilities; and
  - Construction, operation, and maintenance of new facilities necessary to support permitted recreation uses, including concessions that support permitted uses/activities within the Reserve
- Activities related to the provision and operation of necessary public and quasi-public infrastructure facilities
- Existing uses consistent with Section 5.11 of the NCCP/HCP

MANAGEMENT GOALS

The landowner is interested in protecting and preserving large areas of open space. The following are broad goals that encompass this purpose:

- Ensure the preservation and conservation of the Irvine Ranch Northern Open Space. The landowner will adhere to the monitoring criteria established by NROC in the Monitoring Plan and will monitor the open space lands through patrols and/or remote monitor techniques.
- Protect and maintain existing natural resources.
- Provide valuable "wilderness-type" passive recreational and educational activities.
- Restore and/or enhance degraded habitats to improve biological productivity and diversity within the Irvine Ranch Northern Open Space.

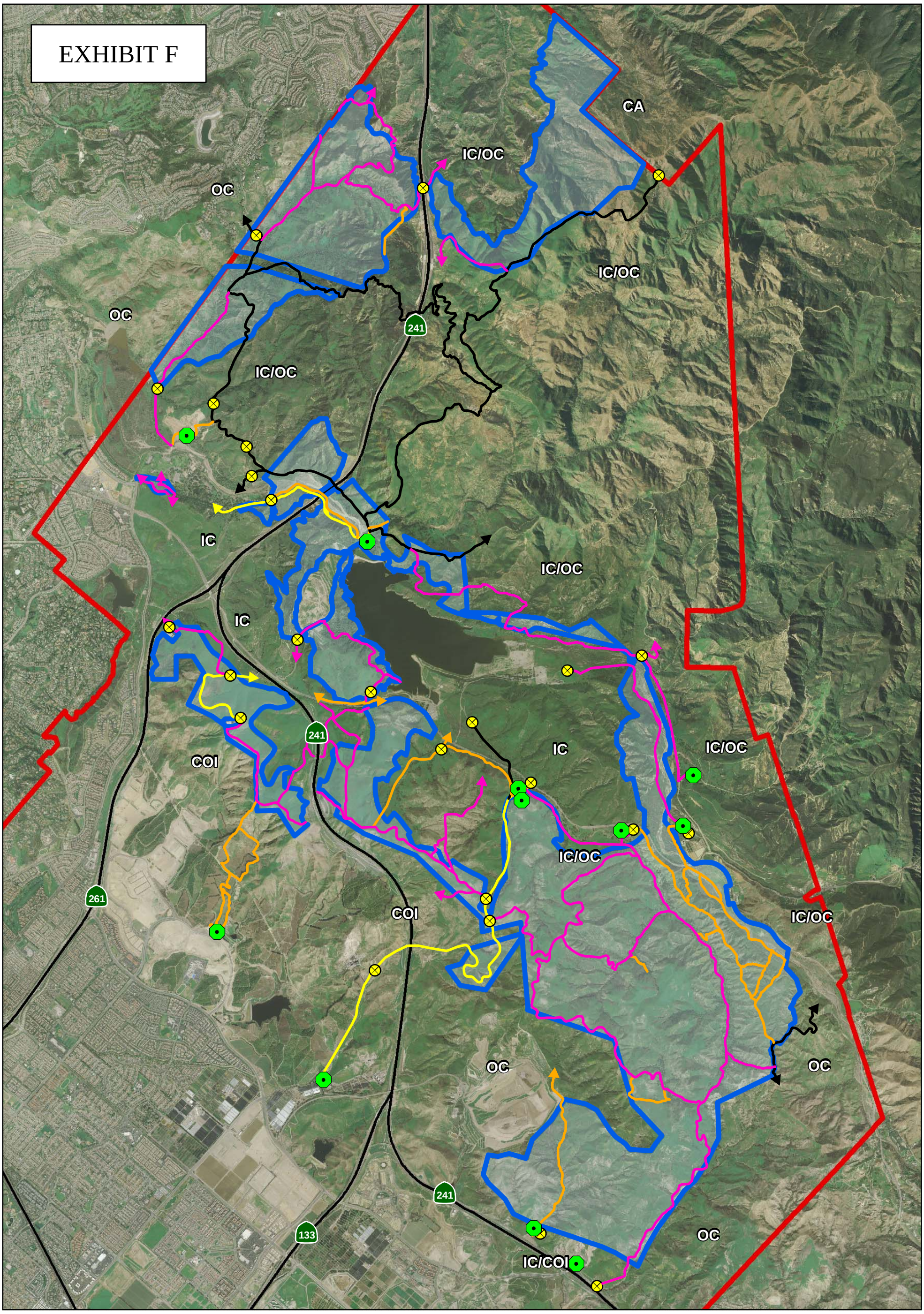
FACILITIES AND OPERATIONS

The following section outlines the various facilities and amenities necessary for the operation of these lands as an open space. The facilities will be sited and designed consistent with the NCCP Public Access and Recreational Policies (Section 5.8). The NCCP habitat Reserve design was, "*formulated with the understanding that public access, passive recreation uses and development of future recreation facilities would be compatible with and permitted within the habitat Reserve System … and policies reflect a determination that there is not an inherent conflict between the recreation uses permitted …and protection of sensitive biotic resources.*" (NCCP Plan Section 5.8)

Trails and Roads

Exhibit F, Trails Plan Map (Existing), depicts the existing trail system for the Irvine Ranch Northern Open Space. Recreational trails are primarily limited to existing trails and truck roads in order to minimize damage to open space resources. In addition, limited development of new trails will be needed to connect open space areas. Connections to adjacent open space and the Orange County Great Park are an essential part of the open space circulation concept. New trail linkages will be provided to complete trail linkages for the trail system. Every effort will be made to implement a trail system that is both sustainable and minimally impacts natural resources. Some trails may require realignment or reconstruction in order to make them less damaging to habitats and more sustainable over time. For example, some trails are on old ranch roads that are not optimally constructed from a

EXHIBIT F



LSA

LEGEND

- Irvine Ranch Northern Open Space RRMP
- Historic Irvine Ranch Boundary
- Staging Area
- Gates

Existing Trails (Total Length)

- Single Track (9.74 miles)
- Double Track (30.20 miles)
- Utility (4.85 miles)
- Paved (3.98 miles)

Land Ownership (Current/Future)

IC = Irvine Company
OC = Orange County
COI = City of Irvine
CA = State of California (Managed by CDFG)

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SOURCE: Digital Globe (2008); EDAW (2008)

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Irvine Ranch Northern Open Space RRMP

Trails Plan Map (Existing)

physical standpoint. In those cases, changing the alignment or design of the trail may be a desirable activity from a long-term resource management and public access standpoint.

The Irvine Ranch Northern Open Space contains existing truck trails as well as some single- and double-track trails that were once ranch roads. Some of the truck trails are in good locations and can facilitate recreational use; others will need to be realigned and/or redesigned to be more sustainable, or abandoned, as depicted in the Trails Implementation Master Plan Map (Exhibit G). Abandoned ranch roads and trails may require regrading and/or revegetation to restore them to natural conditions.

The specific actions involved in trail and road realignment outside of the existing area of disturbance will be addressed in future NCCP Annual Work Plans submitted by the landowner for review and determination of consistency with NCCP/HCP policies and criteria.

The trails are designated as "multiuse." Multiuse trails accommodate hikers, mountain cyclists, and equestrians.

Trail users will be restricted to well-defined areas, with off-trail encroachment into heavily vegetated and sensitive resources prohibited. Along the trails are several overlook areas offering panoramic views of the adjacent areas as well as of distant foothills and mountains.

As a primary mandate of NCCP/HCP, protection of sensitive resources will be a paramount concern. Well-managed and controlled access and trail use will afford recreational opportunities compatible with protected natural resources.

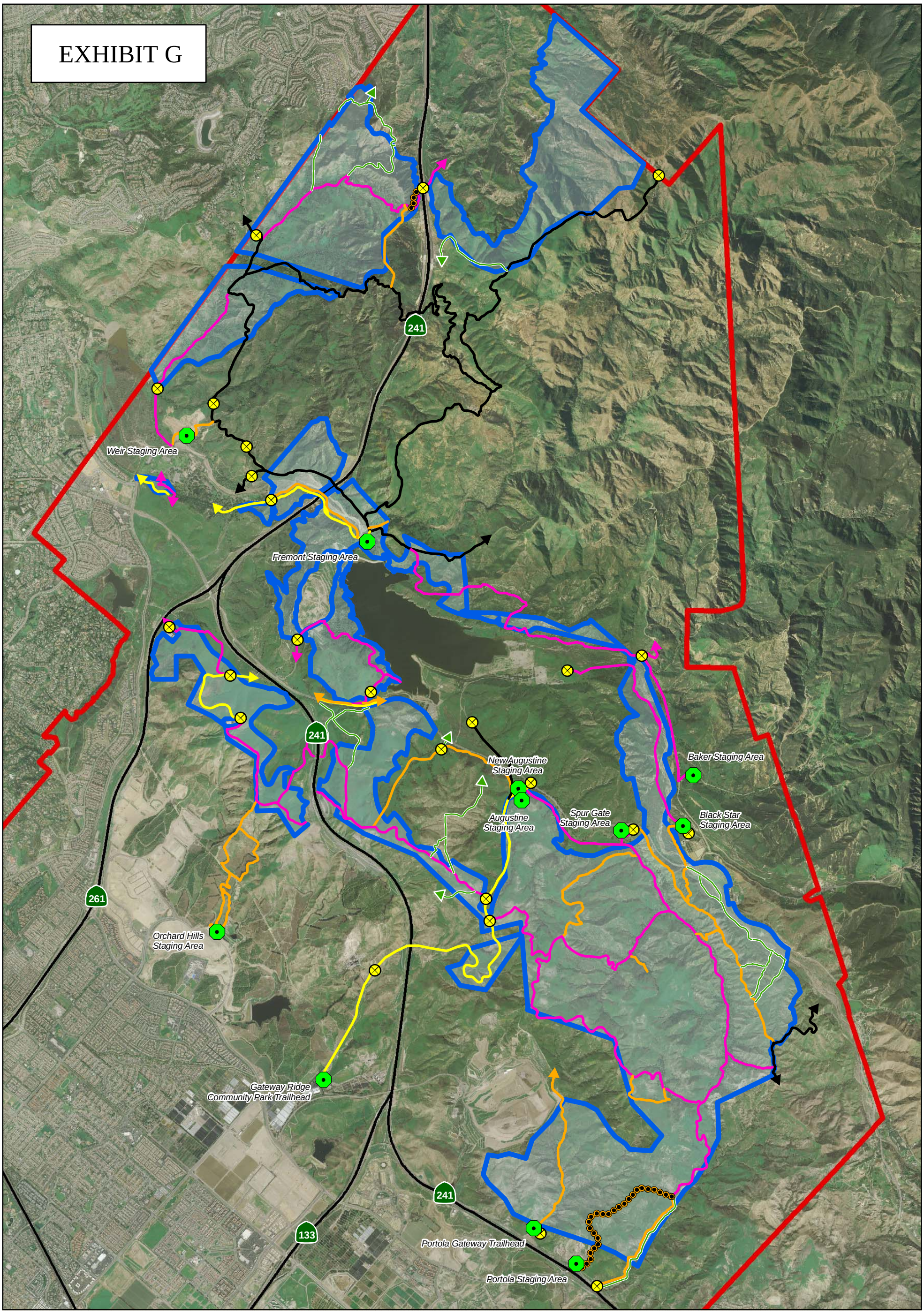
Open space activities and public use may be restricted when necessary to minimize impacts to sensitive habitat and species, to prevent user conflicts with wildlife (e.g., nesting season), and where degraded site conditions impact user safety. All open space areas shall be closed and trail use shall be prohibited on red flag (fire) warning days and for appropriate periods following rains to avoid trail damage and impacts on adjacent habitat. A "red flag warning" is issued by the United States National Weather Service to inform firefighting and land management agencies that conditions are ideal for wildland fire ignition and propagation. Under normal conditions, trail use will only occur during operational hours as determined by the landowner and/or land manager.

Any unauthorized trails will be eliminated, and impacted habitat will be restored. Trail use will be monitored through patrols and remote surveillance techniques to minimize off-trail use. The intensity of trail and facility use will be monitored by the land manager and modified as appropriate, based on observed conditions, to ensure that overuse does not occur and impact target species or sensitive habitats, consistent with NROC-established guidelines or procedures.

TRAIL AND ROAD MAINTENANCE

Trail and road maintenance is focused on improving the current network of trails and implementing management actions to minimize road and trail impacts. At present, the land manager consults the Orange County trail guidelines, as detailed in the Regional Riding and Hiking Trails Design Manual (September 13, 1991) and other authoritative trail design manuals, to evaluate and identify the appropriate BMPs, design standards, and maintenance and management strategies for implementation

EXHIBIT G



LSA

LEGEND

- Irvine Ranch Northern Open Space RRMP
- Historic Irvine Ranch Boundary
- Staging Area
- Gates

Existing Trails (Total Length)

- Single Track (9.30 miles)
- Double Track (21.31 miles)
- Utility (4.32 miles)
- Paved (4.18 miles)
- Removed / Reclaimed to Native Habitat (5.99 miles)

Proposed Trails (Total Length)

- Single Track (2.65 miles)

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FEET

SOURCE: Digital Globe (2008); EDAW (2008)

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Irvine Ranch Northern Open Space RRMP

Trails Implementation Master Plan Map

on the roads and trails within the Irvine Ranch Northern Open Space. Due to the wide variety of trail and resource conditions encountered within open space areas, these guidelines are adjusted based on specific on-site conditions.

Trail maintenance is to be planned and implemented with the objective of providing for visitor safety, resource protection, and public access. Operating within budgetary and staffing constraints, the trail maintenance program includes:

- Regular monitoring of trails and ongoing maintenance as needed for changing conditions
- Annual trail work aimed toward preventing serious damage during the cooler months after each rainfall
- Emergency repair work and/or signing to eliminate or identify a possible safety hazard

General trail and ranch road maintenance guidelines for the Irvine Ranch Northern Open Space include:

- Use environmentally sound maintenance techniques appropriate for the type of trail or ranch road.
- Priorities for trail maintenance tasks are:
    - To correct unsafe trail conditions;
    - To maintain proper and adequate erosion control devices and measures;
    - To repair environmental damage; and
    - To restore the trail to the desired conditions.
- Clear windfalls and dangerous trees from the trail bed for safety and to prevent detouring.
- Repair trail wash-outs
- Mow or deter new plant growth on the trail annually. If warranted, clear new growth in the spring and early summer when the new growth is soft. Vegetation on the sides of the trail should be pruned to allow passage, but should be preserved, as much as possible, to protect the aesthetic quality of the trail. Typically, vegetation is cleared to a height of 10 ft to accommodate recreational use. Good pruning practices must be followed, including cutting branches almost flush with the limb and cutting stumps at ground level or below. Large limbs should be pruned almost flush with the trunk. Dead and dying limbs and snags that may fall on the trail should be removed to an adjacent area off-trail. Ground cover plants and low shrubs should not be removed except on the actual trail tread.
- Restore the trail tread as necessary and restore the tread grade to the appropriate slope. Use local material to fill ruts, holes, low spots, or muddy areas.
- Repair erosion-damaged facilities to prevent further damage. Check for erosion effects after spring runoff. Check and repair water bars, drainage ditches, culverts, and drainage dips. Construct additional drainage structures if needed. Corrective work for drainage or erosion problems, other than those deemed to be an emergency situation, shall be performed when the occurrence of the winter/spring rains has diminished. Where necessary, barriers to prevent further erosion shall be erected until problems are corrected.

Trail Closure – Decommissioning

The goal of decommissioning is to restore the natural topography and habitat as much as possible so that maintenance work is no longer needed and to prevent future environmental impacts. Unauthorized trails are to be eliminated. If left uncorrected, these unauthorized trails will encourage additional use and lead to damaged vegetation, soil erosion, and drainage problems.

In areas where an existing trail is being relocated or abandoned, efforts should be taken to obliterate the old trail and restore it to as natural a condition as possible. This will avoid confusion as to which trail to use, eliminate sources of erosion, restore the trail area to a more natural appearance, and help eliminate short cutting. Depending on the terrain, the land manager may use rock, brush, fallen timber, and transplanted native vegetation. This may, in some cases, require the construction of temporary fencing to prevent use. Compacted soil in the old trail tread may need to be broken up or scarified to allow the seeds and roots of native plants to penetrate.

Surface drainage on abandoned routes must be addressed to prevent further erosion. Restoring the natural contour of the slope should be considered to reestablish the local drainage patterns and reduce the likelihood of erosion.

Revegetation of an abandoned trail is an appropriate way to restore the landscape. Disturbed soil often provides an opportunity for invasive plant species to take hold. Only native species should be planted in these areas.

A preferred way to discourage the use of a decommissioned trail is to diminish the appearance of the trail's visual corridor, including the airspace above the old trail tread. Logs and branches may be dragged across the tread and deadfall planted in the ground vertically to block the corridor at eye level. Leaves and other organic matter should be raked over the tread as the final step to complete the disguise and aid growth of new plants. If needed, the beginning and end of the trail may be blocked with a fence and signs. Since a fence could draw attention to the closure, the posting of signage explaining the closure on or near the fence is recommended. The fence can be removed when it is deemed no longer needed by the land manager.

Staging Areas

There are several staging areas (trailheads) that will service the Irvine Ranch Northern Open Space. This RRMP only covers the two staging areas (the Fremont and Augustine Staging Areas) that lie within the lands that this RRMP covers. Other staging areas or trailheads (subject to other resource management plans and programs separate from this RRMP) that will provide access to trails within the Irvine Ranch Northern Open Space include the following:

- Weir Staging Area
- Portola Staging Area
- Black Star Staging Area
- Orchard Hills Trailhead
- Spur Gate Staging Area
- Gateway Ridge Community Park Trailhead

- Portola Gateway Trailhead
- Baker Staging Area

Fremont Staging Area. This staging area (Exhibit H) is located at the mouth of Fremont Canyon, just north of Irvine Lake and east of Irvine Regional Park. The staging area itself is accessed by a paved road leading from Irvine Regional Park.

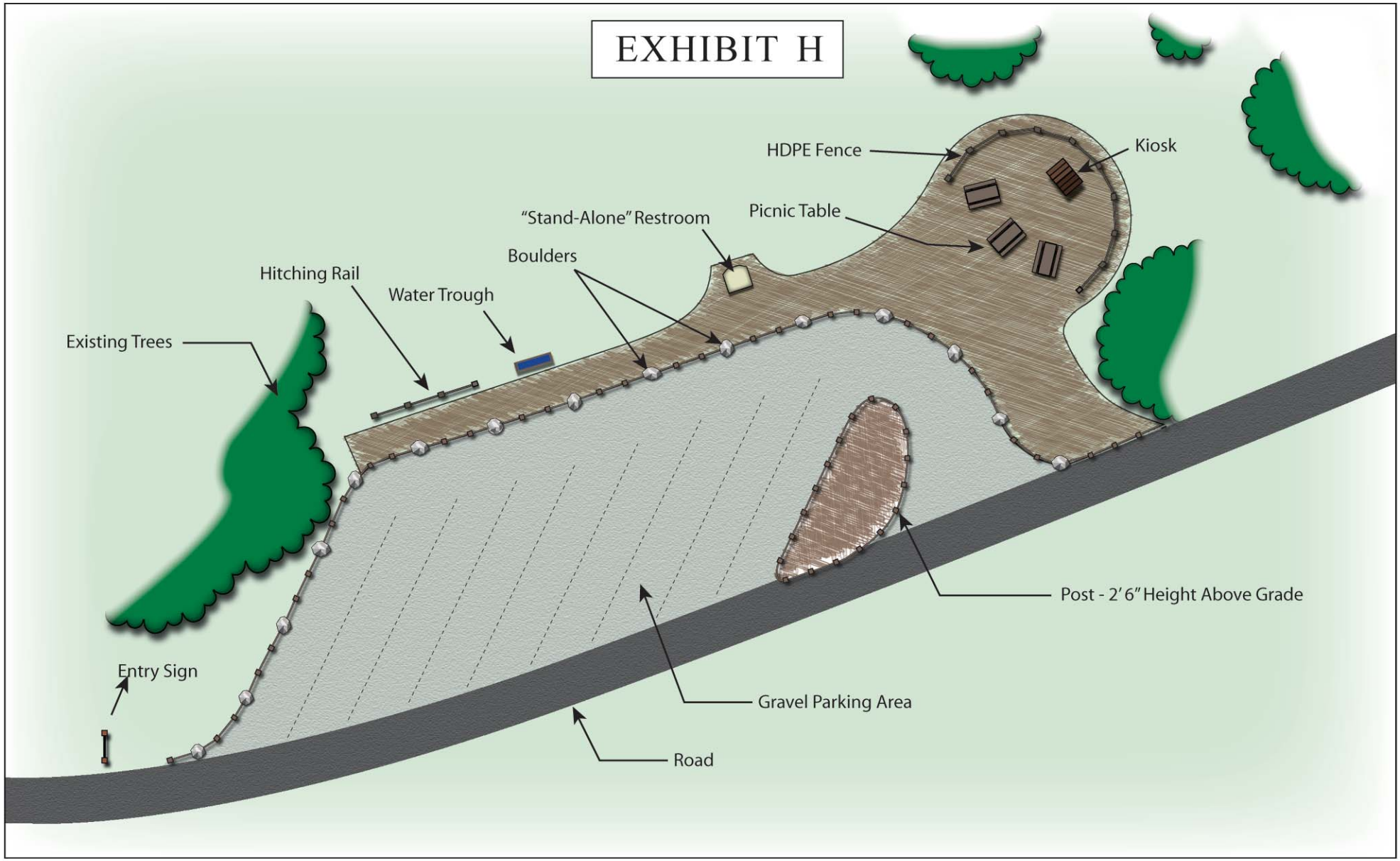
Docent-led hiking, cycling, and equestrian tours are currently offered from this staging area. Managed self-guided tours, with appropriate monitoring, may be phased into the program in the future. Tours from the Fremont Staging Area lead northeast and east out of the Northern Open Space into adjacent open space. Tours utilize two types of trails (three utility truck trails and one single-track trail). SCE has easement rights over the existence and maintenance of the utility truck trails. One of the three utility truck trails leads back to Weir Canyon. The other two lead up the ridgelines on either side of Fremont Canyon. The single track trail is a short up-and-back trail that travels up into the mouth of Fremont Canyon.

Fremont Staging Area amenities that will be maintained include:

- Trail access for equestrian, mountain bike, and pedestrian use
- Parking lot
- Stand-alone restroom
- Water trough
- Hitching rails
- Kiosk/signage
- Picnic tables
- Benches

Augustine Staging Area. Currently, the Augustine Staging Area is located along the Hicks Canyon Haul Road just outside of the Limestone Canyon portion of the Irvine Ranch Northern Open Space. The current staging area is subject to future development according to the NCCP. If this staging area is eliminated, a new Augustine Staging Area (Exhibit I) will be created to the southeast across Hicks Canyon Haul Road from the existing staging area, inside the Irvine Ranch Northern Open Space. The new Augustine Staging Area, if implemented, will provide access to the same areas as the existing staging area.

Docent-led hiking, cycling, and equestrian tours are currently offered from this trailhead. Managed self-guided tours, with appropriate monitoring, may be phased into the access program in the future. This staging area currently provides access to the Limestone Canyon portion of the Irvine Ranch Northern Open Space as well as the open space to the west of the staging area. There are three trails leading from the Augustine Staging Area. Hicks Canyon Haul Road, which is currently a paved private road, is used to access double-track trails along Loma Ridge to the south. A single-track trail



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Irvine Ranch Northern Open Space RRMP

Fremont Staging Area

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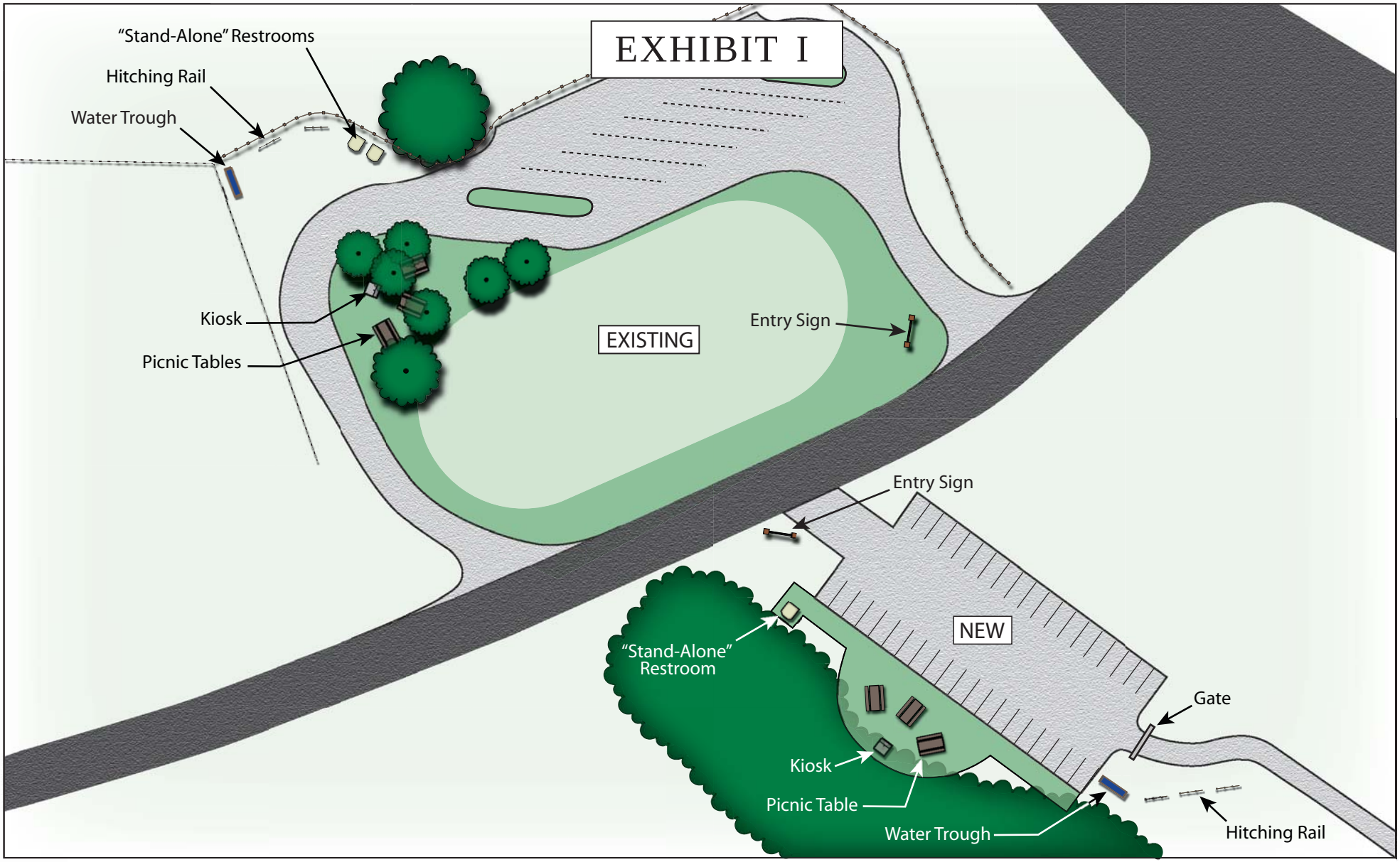

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Irvine Ranch Northern Open Space RRMP

Exhisting and New Augustine Staging Areas

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is used to access the open space to the west and eventually Loma Ridge to the south. A double-track trail leads to the southeast into Limestone Canyon and the broader trail system.

Amenities at the existing Augustine Staging Area to be maintained include the following. (Amenities at the new Augustine Staging Area, if implemented, will be similar.)

- Trail access for equestrian, mountain bike and pedestrian use
- Parking lot
- Stand-alone restroom
- Water trough
- Hitching rails
- Kiosk/signage
- Picnic tables
- Benches

Gates, Fencing, and Signage

Gates. Approximately 25 vehicle access gates currently serve the Irvine Ranch Northern Open Space, as shown on Exhibit F, Trails Plan Map (Existing). These access points control both vehicular and recreational access. They can be opened or closed as needed by staff or authorized individuals through the use of a control lock(s). Gates are typically kept closed and are opened for managed recreational activities or for authorized land management activities.

Fencing. Trail fencing will be provided where needed to control unauthorized access; confine users within the trail footprint; and promote safe use of trails within areas with steep slopes, bridges, adjacent orchards, and high-traffic and other potentially hazardous areas.

Fences can be made of sustainable wood, recycled plastic or concrete wood-look products, steel posts, and wire cable. The use of barbed wire is limited to perimeter areas where control of unauthorized access is warranted to protect adjacent native wildlife and habitat. Plantings such as native trees and shrubs, or large rocks can also serve as trail fencing or barriers and will be the preferred alternatives.

Signage. Along with trail maps, route descriptions, brochures, etc., a minimum of signs shall be installed as necessary to control and direct visitor uses. The goal of the signage program is to employ the fewest number and smallest size of signs necessary to communicate key information such as wayfinding and regulations to users. Signs should only be provided for visitor information, safety, and resource protection. They should range in size and complexity from small, simple arrow directional posts at trail junctions to regulatory signs posting open space rules as well as signs

denoting resource features and points of interest. To protect the natural scenic quality of the open space, visitor information kiosks and signs will utilize natural earth-tone colors and natural sustainable or recycled materials. The preferred location of signage shall be at trailheads and at the main entrances to designated parking areas serving the trailheads or staging areas.

The open space will include several types of signs. Typical examples are described below.

Entry Monument Signs. Entry monument signs can be located at the entry drives to staging areas and trailheads. These points of access shall include the Fremont and Augustine Staging Areas. These signs should designate the entrance to the open space in a manner compatible with the natural resources. Use of natural materials is preferred.

Kiosk/Bulletin Board Signs. If appropriate, kiosk/bulletin board signs at each trailhead and staging area should include, at a minimum:

- Information advising trail users of rules and regulations, prohibited activities, trail etiquette, potential hazards (including wilderness warning signage and fire danger signage), permitted trail uses, emergency information, and emergency phone numbers
- An explanation of accessibility levels in practical, clear wording
- A map(s) of the trail and/or trail system, including some or all of the following:
    - Each trail, including the trail name, allowed users, length to the nearest 0.25 mi, and the lowest and highest elevation points of the trail
    - The location of rest areas and/or trailheads
    - Trail highlights, such as viewpoints
    - Any hazards and seasonal conditions, if applicable
    - Creek beds and wetland areas
    - Common plants (e.g., poison oak) and animals
    - Hours of operation
    - The phone number or internet address to obtain trail maps and other trail information

Trail Signs. Trail signs can be located at the entrance to the trails and at major trail intersections. These signs should contain the following information:

- Trail name
- Trail direction
- Mileage or approximate length
- Allowed users
- Trail user yielding signs, as needed

Other Signs. Other signs may include, but are not limited to, the following:

- **Trail name signs** may be placed at entry points, halfway points, and other points where trail identification is needed.
- **Destination signs** may be placed at appropriate locations to inform trail users of the distance and destination on various routes. These signs should be accompanied by directional arrows where confusion with other routes is possible.
- **Directional signs** may be placed at intersections with roads or other trails where paths could be confused. Directional signs should be placed, as appropriate, to clarify trail destination and direction to trail users.
- **Informational signs** may be used to provide miscellaneous information about the trail, including restroom locations**,** mileage markers, water, etc.
- **Intersection signs** may be placed at intersections to warn both the trail user and oncoming traffic.
- **Warning signs** may be placed on the trail to warn trail users of hazardous conditions on the trail. Signs should identify hazard points, clearance requirements, or safety precautions, as warranted, or identify trail closures.
- **Boundary Control signs** may be posted along perimeter fences abutting public roads and private property to indicate that the land behind the sign is a protected wilderness area. Access is by permit, scheduled event, or reservation only.
- **Trail user yielding signs** should be placed at all trailheads and posted periodically, especially at trail crossings and along trails that accommodate a variety of users.

PUBLIC ACCESS

Public access shall be accommodated through trails and limited facilities intended to protect the public's health and safety as well as provide an outdoor "wilderness" recreation experience. In order to avoid the degradation of sensitive or unique resources, and as a means to implement effective adaptive management strategies to offset or minimize other potentially adverse impacts, an access program will be implemented that balances disturbance as a result of recreational use over space and/ or time through such techniques as staggering use areas, times, and types. Implemented strategically, such a program can provide fulfilling and frequent recreational experiences for the public and allow periods of rest and recovery of natural resources to ensure a healthy and resilient ecosystem. For

example, different reserve areas may be opened for self-guided access and those areas rotated over time based on the results of monitoring activities.

Through the monitoring of species and habitat impacts and recreational patterns, the intensity and frequency of public use will be adapted over time and will account for variable environmental conditions, such as drought and fire. For example, areas that have been recently burned may be closed to public access for a period necessary to ensure recovery. Developing such a program may also involve indirect methods of reducing impacts, such as limiting parking capacity, access points, and trail design. It will also certainly involve public education as well as strategically limiting the overall number and frequency of visitors in coordination with adjacent open space areas under less-restricted use. The ultimate goal of the public access program is to provide meaningful and regular public access in harmony with long-term preservation of sensitive natural resources.

It must also be recognized that visitor use of the open space involves certain risks as a consequence of the rugged terrain, the unpredictability of the natural environment, and the potential isolation from urban services. Visitor use will be managed and controlled as necessary to ensure the safety of visitors.

Permitted Uses

The Irvine Ranch Northern Open Space shall be managed to provide for passive recreational use and enjoyment by the public in ways consistent with the preservation of its natural resources and characteristics. The following uses are permitted. All other uses are prohibited.

- Passive, nature-oriented recreation activities, such as hiking, interpretive walks, mountain biking, equestrian use, picnicking, photography/filming, painting, etc.;
- Conservation, resource management, and mitigation projects, including vegetation management, invasive species control, habitat restoration, resource and public access monitoring, scientific research, and educational programs involving the study of nature, ecology, earth sciences, or other appropriate subjects; and
- Maintenance and operation of existing agricultural uses and infrastructure facilities consistent with the NCCP/HCP provisions.

Coordination with Adjacent Open Space Land Owners

Some access programs originating within the Irvine Ranch Northern Open Space may extend beyond the boundaries of the landowner's property and will require coordination with the adjacent open space landowner or land manager to ensure compliance with the applicable rules and regulations. Currently, landowners/land managers for the open space areas adjacent to the Irvine Ranch Northern Open Space include the following (See Exhibit F for land ownership):

- Irvine Company (open space managed by Irvine Ranch Conservancy)
- Orange County (open space managed by OC Parks)

- City of Irvine (open space managed by Irvine Ranch Conservancy)
- State of California (open space managed by CDFG)

To establish and maintain a coherent strategy for coordinated access policies across management units, the landowner/land manager for the Irvine Ranch Northern Open Space will coordinate directly with adjoining landowners/land managers and consult with NROC's Land Manager Council regarding access programs extending into open space areas owned by other members of NROC.

Given that the Irvine Ranch Northern Open Space parcels are part of a larger open space system, and that the Irvine Ranch Northern Open Space parcels by themselves do not form coherent management units, the landowner has identified management units for the larger open space system. Management units are depicted on Exhibit J and are intended to provide a framework for coordinating access, uses, and resource management with adjoining landowners.

Accessibility for Mobility- or Sensory-Challenged Visitors

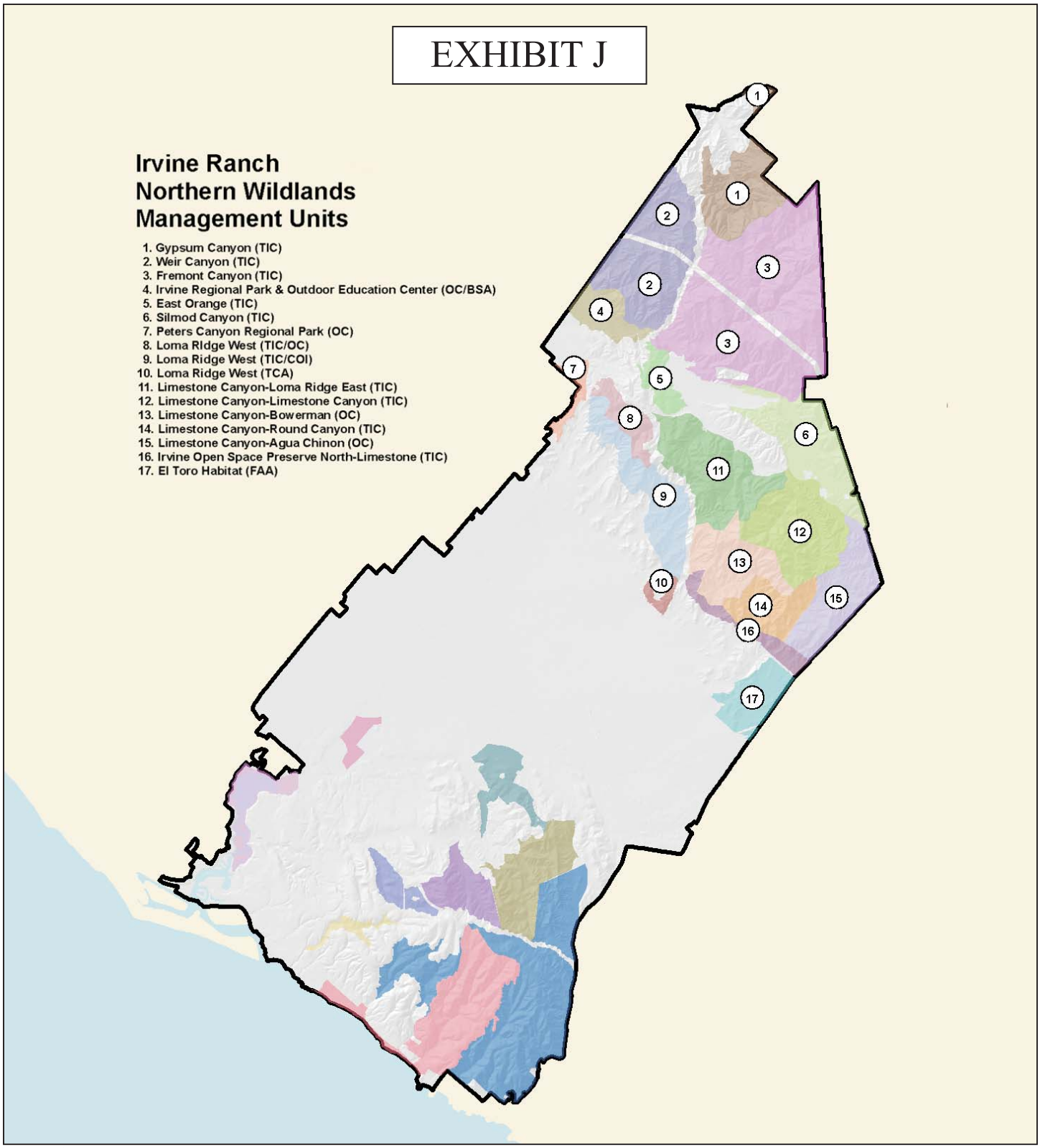
Accessibility will be determined by the natural contours of the land. Due to the nature of the existing topography, much of the open space may not be fully accessible to all who wish to experience it. The landowner or its land manager (if any) will seek to provide opportunities for accessibility of the open space, which may include allowing powered wheelchairs in some locations and on some trails.

Prohibited Uses

Except where necessary for the management of the open space resources, or as specifically approved by the landowner or its agent/land manager, the following uses shall be strictly prohibited:

- Operation of motorized vehicles beyond the limits of established public access roads and designated parking areas is not permitted except for those vehicles authorized to access the open space for purposes of management, maintenance, accessibility programming, and police and fire services by easement or special permit.
- Fires, campfires, camp stoves, and smoking.
- Release of domestic or nonnative animals.
- Overnight camping.
- All forms of fishing, hunting, trapping, falconry, or use of poisonous baits within any open space area, except for approved research and study (access into the open space for research and study will be coordinated and monitored through the landowner/land manager; access guidelines will be established and a special access permit will be issued).
- Any action on the behalf of a person or persons that creates a nuisance, poses a real or immediate threat, or results in damage to or destruction of open space resources or property.
- Removal or intentional destruction of vegetation for any reason, including arson, except for vegetation management for the specific purpose of fire management and in consistency with the NCCP Fire Management Plan policies and guidelines.

EXHIBIT J



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SOURCE: Irvine Ranch Conservancy (2008)

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Irvine Ranch Northern Open Space RRMP

Irvine Ranch Northern Wildlands
Management Units

- Harvesting or collection of native plant materials except for research or educational purposes authorized by the landowner in writing.
- The creation of nonapproved trails.
- Littering or dumping of trash and debris of any size or type, or disposal of hazardous waste materials within the open space.
- Swimming and wading.
- Artifact, plant, and animal collecting, except for approved research and study that is coordinated with NROC. Access into the open space for research and study will be coordinated and monitored through the landowner/land manager staff; access guidelines will be established and a special access permit will be issued.
- Access by domestic animals, including dogs and/or exotic animals. Dogs are not permitted in the open space at any time. Horses are permitted on all multiuse trails and in staging areas.

Grazing of livestock, including utilization of natural forage for commercial purposes, shall be prohibited unless utilized in conjunction with habitat management practices (e.g., habitat restoration, habitat enhancement, and invasive species removal) and is consistent with NROC management policies.

Phased Operation and Access Strategies

This RRMP is designed to function with various levels of public access, from "Docent-Only Access" to occasional supervised "Open Access Days" and managed "Open Hours," which could occur from sunrise to sunset, either on weekends or weekdays as part of a coordinated access program among this and other areas and with appropriate monitoring. Public access will be managed at higher or lower levels of intensity and frequency depending on a number of important factors, including season, location, timing, type, fire risk, and relationship to adjacent areas. The goal is to provide an overall program of regular public access in a manner that is consistent with current levels of public uses and that considers and ensures the long-term protection of species, habitats, and natural resources.

The phased operational plan for the open space consists of the following three elements:

- Land Management and Administration
- Land Maintenance and Safety
- Program Management

Land Management and Administration. As a signatory to the NCCP, the landowner is required to meet specific mandates for management of the open space as a Nature Reserve. This entails coordinating the activities conducted by NROC, including mitigation projects, biological monitoring, census data collection, and annual reporting. The administration of this function will be coordinated through the landowner/land manager using appropriate resources, including service by contracting specialists. Land maintenance, safety, and operational efforts in the Irvine Ranch Northern Open Space will strive to keep the facilities functional and attractive for visitors. A top priority is responsible stewardship of open space resources for both present and future generations. Land

manager staff, authorized contractors, and volunteers will provide management and maintenance services for the Irvine Ranch Northern Open Space. Operations and maintenance activities will be conducted in a manner consistent with NCCP/HCP provisions.

Land Maintenance and Safety. The landowner/land manager will conduct land maintenance to ensure visitor safety and welfare and to meet the NCCP maintenance requirements. This maintenance may consist of fencing, gates, signage for control of visitor access and liability issues, removal of litter, trail maintenance, grading for emergency access, repair and maintenance due to erosion and flooding, and regular patrols to monitor visitor use. The administration of this function will be coordinated through the landowner/land manager.

Program Management. The landowner/land manager will provide visitor access to the open space through a multimode access program. The access strategies are dependent upon availability of operational funds and habitat sensitivity. The services will be provided by the landowner/land manager or contracted out. The strategies of the access program may consist of the following, depending on the area, season, resource constraints, and other factors:

1. **Docent-Led/Staff-led Tours.** Under this management approach, which may apply to various areas under the RRMP, visitors access the open space via tours guided by a minimum of two trained docents or staff. Docent-led/staff-led tours are scheduled events advertised by the landowner/land manager and require participants to make advance reservations for a specific program.
2. **Managed, Self-Guided Access on Certain Days (alone or in Combination with Docent-led Programs).** Under this approach, designated open space areas may have open hours on specific days, and visitors may access without direct accompaniment by a docent. Docent-led and staff-led tours may still be available on those days for those who desire them. The self-guided program will be managed by a minimum of four trained docents or staff. Managed, self-guided access programs are scheduled events advertised by the landowner/land manager. Participants check in upon arrival and obtain instructions on the program's features. At the end of the event, staff and/or docents check to make sure all participants have left the program area. These managed, self-guided programs are also known as "Wilderness Days."

Program Implementation. The type and frequency of access programs will be reported in the NROC Annual Progress Report. Similarly, the planned access programs for the upcoming year will be noted in the NROC Annual Progress Report's Work Plan for review and comment by the wildlife agencies. While the access programs provided for in this RRMP may result in a slight increase in the amount of public access that existed in the Irvine Ranch Northern Open Space as of 2009, any substantial change to the frequency or type of public use (e.g. daily self-guided access) shall require an amendment to the RRMP and review by the CDFG and USFWS for consistency with the conservation and specific management policies set forth in the NCCP/HCP and its associated IA. Generally speaking, the landowner/land manager will only consider expanding the type or frequency of access programs when monitoring of the recreational programs of an open space area has demonstrated substantial adherence by recreational users to the approved trail network and use regulations. These activities will be reported within the annual report/work plan.

Types of Recreational Use

Recreational activities will be monitored to ensure appropriate visitor safety and habitat protection. All uses within the Irvine Ranch Northern Open Space will meet NCCP guidelines. Recreational uses will include the following:

Hiking. Hiking will be permitted on the approved hiking and multiuse trails. Hiking opportunities will be available by reservation through the landowner's/land manager's scheduled programs, or through the open access days, when the open space is scheduled for regular operating hours.

Mountain Biking. Mountain biking will be permitted only on approved mountain biking and multiuse trails. Mountain biking opportunities will be available by reservation through the landowner's/land manager's scheduled programs, or through open access days or hours.

Horseback Riding. Equestrian use will be permitted on approved multiuse trails. Horseback riding opportunities will be available by reservation through the landowner's/land manager's scheduled programs, or through the open access days when the open space is scheduled for regular operating hours.

Picnicking. Picnicking opportunities exist at the following staging areas/trailheads:

- Augustine Staging Area
- Weir Staging Area
- Fremont Staging Area
- Black Star Staging Area
- Baker Staging Area
- Spur Gate Staging Area
- Orchard Hills Trailhead

- Gateway Ridge Community Park Trailhead
- Portola Gateway Trailhead

Informal picnicking may be allowed in the open space. Signage, visitor guidelines, and educational efforts will emphasize the need for visitors to pack up all trash and picnic items and to refrain from feeding wildlife. Picnicking may be restricted or curtailed if trash and picnic items become a problem.

Camping. Overnight camping is not permitted within the open space or at staging areas/trailheads.

Infrastructure

Within the open space, infrastructure facilities exist and were addressed and included as part of the NCCP. Some of these facilities are necessary for public health and safety. Nearly all require maintenance and include: agricultural uses; orchards; water lines; reservoirs and associated facilities (pump stations, pressure control facilities, and access roads); sewer lines; electric, telephone, cable television, and natural gas facilities; storm drain and flood control facilities; landfill gas recovery facilities; borrow sits; monitoring wells; and maintenance facilities.

There are four potential future public infrastructure projects (e.g., the Portola Parkway Extension, the Jeffrey Road Extension, the Irvine Regional Water District (IRWD) Reservoir, and the Central Pool Augmentation [CPA] Pipeline) associated with the Irvine Ranch Northern Open Space.

The Portola Parkway Extension project would connect the portion of Portola Parkway that dead-ends at SR-241 with the portion of Portola Parkway that dead-ends at the Foothill Ranch border. Although this project would take place outside of the Irvine Ranch Northern Open Space, it may indirectly affect the Irvine Ranch Northern Open Space by impacting both wildlife movement into and out of the area and passive recreational uses within Agua Chinon.

The Jeffrey Road Extension project would annex Hicks Haul Road, thereby extending Jeffrey Road from its current terminus at Portola Parkway to Santiago Canyon Road. It could significantly affect wildlife movement and recreation within the Irvine Ranch Northern Open Space. Although Hicks Haul Road is currently a paved road, it is not accessible to public motorists. The increase in motor vehicle traffic along Hicks Haul Road, if it is opened to public motorists, may result in further habitat fragmentation and an increase in wildlife mortality due to road kill. This project consists of two segments. The first is outside of the Irvine Ranch Northern Open Space between Portola Parkway and SR-241. The second is largely within the Irvine Ranch Northern Open Space between SR-241 and Santiago Canyon Road.

The IRWD Reservoir project will largely fall outside of the Irvine Ranch Northern Open Space, but a small portion of the impacts will occur within the Irvine Ranch Northern Open Space. Impacts associated with this project will include the permanent and temporary loss of wildlife habitat. This project is currently in progress.

The CPA Pipeline project would occur within the southern portion of the Irvine Ranch Northern Open Space. Most of the project, the eastern portion of the pipeline, would consist of a tunnel within the

Irvine Ranch Northern Open Space. The western portion of the pipeline may have to be trenched into the ground. In addition, a permanent utility access road may be constructed on top of the trenched portion of the pipeline. The construction of a facility at the pipeline portal (point at which tunneling is no longer possible) and the trenching of the western portion of the pipeline would cause both permanent and temporary impacts to wildlife habitat. The proposed pipeline alignment and portal placement are subject to change.

Access to the open space will be needed routinely for the maintenance of existing facilities and/or construction of new facilities that are permitted under the NCCP. Each party accessing the land for such permitted activities shall coordinate all work and scheduling with the landowner or their designee. All work shall be consistent with the Infrastructure Policies of the NCCP (Section 5.9) and the landowner's standards.

Special Access Permits

Special access permits may be issued by the landowner or their designee for research, special activities, or other events deemed appropriate for authorized groups and individuals. Permit guidelines will be established and monitored by the landowner/land manager and shall be consistent with the terms and conditions of the NCCP.

Access Monitoring and Enforcement Procedures

Applicable laws and/or ordinances pertaining to the protection and use of the open space, whether originating at the local, regional, State, or federal level, will be in effect and enforced. Trail users shall be encouraged to participate in "self-monitoring and policing" programs to minimize instances of off-trail activities, prohibited activities, and other abuses to habitat resources within the open space.

Signage shall be used to clearly indicate appropriate behavior in the open space, and users shall be expected to comply. The landowner's or their land manager's staff, volunteers, signage, and educational programs shall all be used to communicate to users the importance of proper behavior and responsibility in the open space. All managed access programs include the regular monitoring of activities by supervising staff and trained docents. In addition, unauthorized activities on trails and facilities within the Irvine Ranch Northern Open Space will be monitored by regular patrols conducted by staff and docents and through the use of remote trail counters and cameras. The landowner shall be responsible for enforcement of all policies and procedures in coordination with all applicable law enforcement agencies and personnel. Should enforcement action be needed, staff and docents will contact the appropriate enforcement authority. Enforcement and citation authority is provided by the Orange County Sheriff and by County Park Rangers (if appropriate).

Repeated unauthorized activities/trail use can result in temporary closure of trail segments and, when necessary, entire open space areas as a means of avoiding unacceptable adverse impacts to habitat and species within the Irvine Ranch Northern Open Space. Temporary closures will also serve to educate unauthorized users on the need to obey the rules and regulations of the open space so as to protect the biological resources of the land.

Monitoring of passive recreational access will be conducted consistent with the provisions of the approved NCCP/HCP, Section 5.45, and the related Implementation Agreement. Data will be collected on brushland vegetation structure (height, canopy cover, stem density) from semi-permanent plots located adjacent to different classes of trails (single-track, double-track, utility, paved), in areas of dispersed game trails, and in dense brush with no trails. Brush structure data will be collected at year one, two, four and eight (and every four years afterwards). The data collected will be used by the land manager and NROC to analyze the effects of recreational access on brushland habitat integrity. The information from the passive recreational access monitoring will be reported in the Annual Progress Report during appropriate years, consistent with the monitoring schedule intervals.

Safety and Security Measures

The open space is a wilderness area and subject to numerous inherent dangers to visitors. The landowner will inform users of these dangers by posting standard “Wilderness Warning” and/or other visitor safety signs where appropriate. Visitors will be responsible for their own health, safety, and behavior while in the open space.

Emergency Procedures

Emergency procedures (police, fire, paramedic response) will be established and coordinated by the appropriate agencies. Evacuation plans in the case of fire or floods will be developed and reviewed on an annual basis with the appropriate agencies.

COMMUNITY OUTREACH AND EDUCATION

Outreach and Education

Visitor outreach and education programs are important management goals for the Irvine Ranch Northern Open Space. Environmental education programs may be offered to the public at staging areas and trailheads directly serving the open space or in adjacent open space facilities. Education will emphasize stewardship of the land and its resources, as well as teaching visitors how to recreate responsibly. Programs will be conducted by the landowner or land manager's staff, docents, volunteers, and occasionally specialized contracted professionals. The overall goal of outreach and education is to provide presentations and programs for all ages and user groups that encourage connection to the land.

Programs may consist of guided hikes, summer day activities, interpretive nature walks, adult classes, community presentations, exhibits, educational brochures, trail guides, after-school classes, "classroom in the field" programs, youth programs, speaker's bureaus, and regularly published newsletters and articles about the land. Special events, habitat restoration projects, and trash cleanup days will be developed and incorporated into the public programs.

Additional outreach may include presentations and newsletter articles for members of nearby homeowner's associations teaching residents how they can best live "close to nature." The Good Neighbor Program is an established community outreach program currently being implemented adjacent to wildlands throughout the County. The program provides information to local residents about the implications of living in close proximity to a wilderness park.

Collaborative Programs. Programs may be offered that combine the expertise and resources of local and nonprofit agencies, volunteer groups, and individuals. These include programs developed and implemented in coordination with:

- The Nature Conservancy
- NROC
- Irvine Unified School District
- Irvine Valley College
- The Irvine Ranch Conservancy
- Irvine Ranch Water District
- Sea and Sage Audubon
- The Irvine Museum
- Orange County Wild

- University of California, Irvine
- Homeowner's Associations
- Orange County Parks
- Equestrian Groups
- Walking and Hiking Groups
- Mountain Bike Groups

Docent and Volunteer Programs

Docent and volunteer programs provide essential support for Outreach and Education under this RRMP. Qualified and trained participants will conduct hikes and programs, monitor visitor use, help with trail maintenance, and assist with revegetation and restoration projects. Other volunteer assignments may include special projects and research studies. All docents and volunteers will be trained and managed by the landowner or their designated agent. Volunteers will complete a comprehensive training program. Categories for the volunteer program are listed below.

- **Docents.** To become interpretative docents, individuals must pass an intensive course in environmental studies focusing on interpretation of Orange County's flora and fauna, geology, and cultural history. Docent students are also given an overview of the Central Coastal NCCP/HCP and sensitive natural resources. Field trips conducted by local experts (i.e., geologists, botanists, birders) are important components of the docent course.

  The docent program's primary goal is to give the public an understanding of the importance and sensitivity of the open space's natural resources. By instilling an appreciation for the open space and its ecosystem, it is more likely that visitors will respect and protect it. Docents are the only category of volunteer that may lead guided public access interpretive trail programs.

- **Trail Guides** will have opportunities to volunteer in a number of different areas. They may provide staff with program support, assist with program sign-in, and serve as sweeps on hikes and guided tours. Trail guides could also provide visitors with information about trail safety and etiquette and monitor trail use and conditions as they tour the Irvine Ranch Northern Open Space as well as assist with setup and cleanup.
- **Land Stewards/Trail Bosses** will assist staff with trail maintenance and management, native plantings, cleanup projects, restoration and revegetation projects, and other resource management projects.
- **Collaborative Volunteer Programs.** The landowner/land manager, or their designated contractor, will work with local volunteer groups and other agencies to develop and implement appropriate collaborative programs and projects. Collaborative volunteer programs could include the following agencies:
    - Orange County Conservation Corporation
    - California Conservation Corporation
    - Equestrian Groups
    - Share Mountain Biking Group
    - Trails4All

RESTORATION, ENHANCEMENT, AND MITIGATION

There are a number of historic land uses that have occurred over much of the Irvine Ranch Northern Open Space in the past 100 years. These include cattle grazing, farming, vegetation management, and other uses. As a result, the habitat is presently in a mixed condition. Although the majority of the habitat is in good (and sometimes pristine) condition, a number of native grassland areas are degraded, and areas that until recently supported agriculture or grazing now have mostly nonnative vegetation.

A significant amount of the open space is in need of some level of restoration or enhancement. Potential habitat restoration areas include agricultural and disturbed areas. Much of the native landscape in these areas is currently occupied by annual grasses, but has potential for restoration to CSS and native grasslands. Restoration, enhancement, and mitigation will enhance key linkages and combine currently fragmented segments into larger habitat blocks.

For the purposes of this RRMP and the ongoing operations of the open space, restoration shall mean the transition of habitats containing mostly nonnative plant materials to habitats containing nearly all native materials. These can be small- or large-scale projects, completed as maintenance projects by volunteers or as special projects by contracted entities. Restoration projects can include everything from simple removal of nonnative plants to seeding or planting with native plants. Any project other than maintenance activities will be coordinated with NROC. For the purposes of this RRMP, "maintenance" projects are generally small-scale projects that increase the amount or type of existing native plant material within a local habitat area. These will generally be accomplished as volunteer projects or as part of routine land management operations. Mitigation refers to those projects required by CEQA and the Resource Agencies to mitigate impacts to other areas. These projects are completed by third parties and require coordination with the landowner or their agent. These projects may require meeting performance criteria that are the responsibility of third parties. These projects may vary in scale. The Irvine Company retains rights to perform its own habitat mitigation within the open space.

All habitat restoration, enhancement, and mitigation shall meet the requirements of the NCCP Policy, Section 5.6. Restoration and enhancement projects other than routine maintenance will be identified and reviewed as part of the Annual Work Plan submitted to NROC.

ANNUAL WORK PLAN

The NCCP/HCP IA requires that an Annual Work Plan be submitted to the NROC Board of Directors by each landowner. The landowner will prepare and submit an Annual Work Plan for the Irvine Ranch Northern Open Space that ensures management activities are coordinated with the NROC Nonprofit Corporation and are consistent with the NCCP/HCP.

ANNUAL PROGRESS REPORT

The NCCP/HCP requires (in Section 5.8.3.) that an Annual Report be submitted to the NROC Board of Directors by each landowner. The landowner will prepare and submit an Annual Progress Report for the open space that meets all of the criteria established by NROC as stated in the IA. The annual report will include:

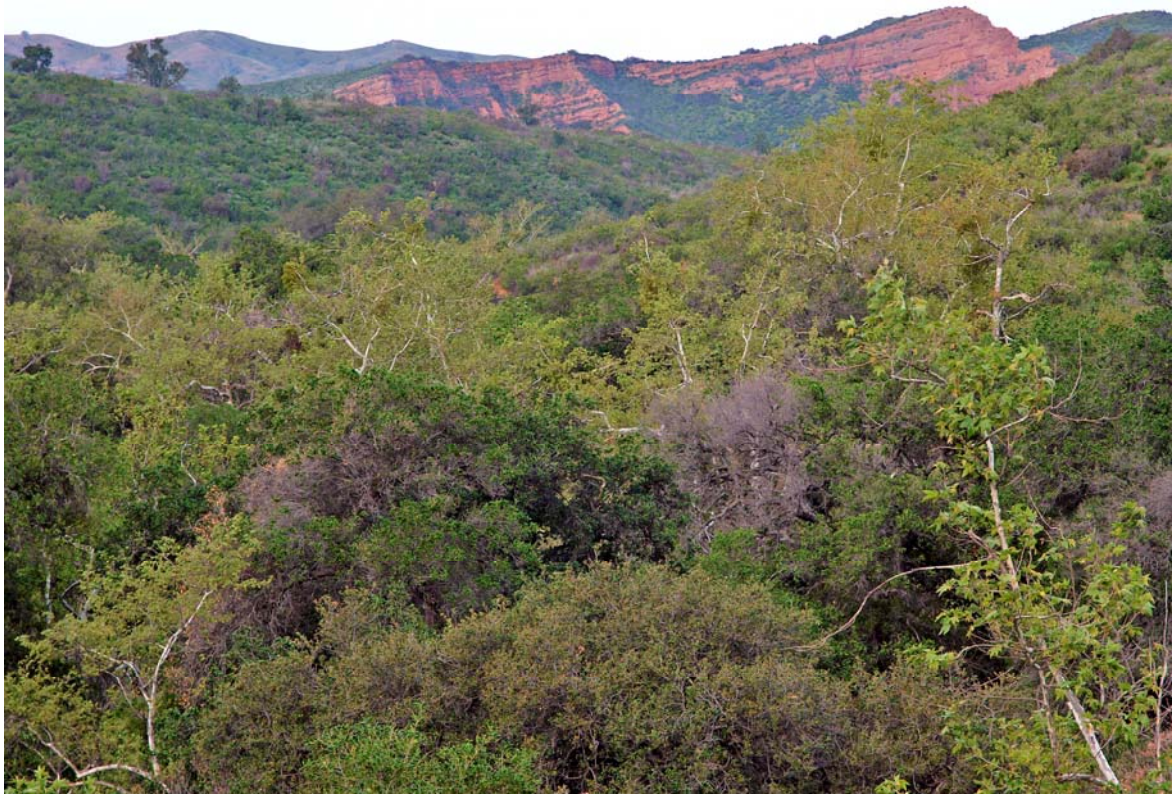
- The results of recreational use monitoring, including trail conditions, adverse habitat impacts, etc.
- Specific recommendations involving modifications to existing management practices to minimize adverse impacts on biological resources resulting from recreational use.
- Recommendations to initiate new management programs, such as educational programs or trail patrols, in response to changing circumstances and conditions.

COORDINATION WITH NROC PLANS

As part of the NCCP, programs for implementing the NCCP policies are further defined in the following management plans prepared or overseen by NROC:

- Fire Management Plan
- Habitat Restoration and Enhancement Plan
- Grazing Management Plan
- Recreation (addressed through preparation of Resource Management Plans for County parks included within the NROC)

Per Chapter 5 of the NCCP, the landowner/land manager will comply with the above management plans. The Fire Management, Habitat Restoration and Enhancement, and Grazing Management Plans are included herein by reference. This plan is intended to act as the RRMP for the Irvine Ranch Northern Open Space until such time that the future landowner adopts a new RRMP that supersedes this one.



APPENDIX A

LIST OF ACRONYMS

ac	acre(s)
BMP	best management practice
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
Corps	United States Army Corps of Engineers
County	County of Orange
CNL	California Natural Landmark
CSS	Coastal Sage Scrub
FESA	Federal Endangered Species Act
ft	feet/foot
HCP	Habitat Conservation Plan
HCS	Habitat Classification System
IA	Implementation Agreement
IRWD	Irvine Regional Water District
km	kilometer(s)
mi	mile(s)
NCCP	Natural Community Conservation Plan
NCCP/HCP	Natural Community Conservation Plan/Habitat Conservation Plan
NNL	National Natural Landmark
NROC	Nature Reserve of Orange County
RRMP	Recreation and Resource Management Plan
SCE	Southern California Edison
SilMod	Silverado and Modjeska Canyons
SR-241	State Route 241
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

APPENDIX B

ANIMAL AND PLANT SPECIES

The following vascular plant and animal species are referenced in the Irvine Ranch Northern Open Space Recreation and Resource Management Plan.

* Introduced, nonnative species

FAUNA

ANOSTRACA	**FAIRY SHRIMPS**
Branchinecta lynchi	Vernal pool fairy shrimp
Branchinecta sandiegoensis	San Diego fairy shrimp
Streptocephalus woottoni	Riverside fairy shrimp
LEPIDOPTERA	**BUTTERFLIES**
Nymphalidae	**Brush-Footed Butterflies**
Euphydryas editha quino	Quino checkerspot butterfly
OSTEICHTHEYS	**BONY FISHES**
Catostomidae	**Suckers**
Catostomus santaanae	Santa Ana sucker
Cyprinidae	**Minnows**
Rhinichthys osculus ssp.	Santa Ana speckled dace
AMPHIBIA	**AMPHIBIANS**
Salamandridae	**Newts**
Taricha torosa torosa	Coast range newt
Plethodontidae	**Lungless Salamanders**
Aneides lugubris	Arboreal salamander
Batrachoseps nigriventris	Black-bellied slender salamander
Pipidae	**Tongueless Frogs**
* *Xenopus laevis*	African clawed frog
Pelobatidae	**Spadefoot Toads**
Spea hammondii	Western spadefoot

Bufonidae	**True Toads**
Anaxyrus boreas	Western toad
Anaxyrus californicus	Arroyo toad
Hylidae	**Treefrogs and Relatives**
Pseudacris hypochondrizco	Baja California treefrog
Ranidae	**True Frogs**
* *Lithobates catesbeiana*	American bullfrog
REPTILIA	**REPTILES**
Emydidae	**Box and Water Turtles**
Actinemys marmorata pallida	Southwestern pond turtle
Phrynosomatidae	**Phrynosomatid Lizards**
Sceloporus orcutti	Granite spiny lizard
Sceloporus occidentalis	Western fence lizard
Uta stansburiana	Common side-blotched lizard
Phrynosoma coronatum	Coast horned lizard
Scincidae	**Skinks**
Eumeces skiltonianus	Western skink
Eumeces skiltonianus	Western skink
Teiidae	**Whiptails and Relatives**
Aspidoscelis hyperythra	Orange-throated whiptail
Aspidoscelis tigris stejnegeri	Coastal western whiptail
Anguidae	**Alligator Lizards and Relatives**
Elgaria multicarinata	Southern alligator lizard
Anniellidae	**California Legless Lizards**
Anniella pulchra pulchra	Silvery legless lizard
Boidae	**Boas**
Charina trivirgata	Rosy boa
Colubridae	**Colubrid Snakes**
Diadophis punctatus modestus	San Bernardino ringneck snake
Masticophis flagellum	Coachwhip
Masticophis lateralis	California whipsnake
Salvadora hexalepis virgultea	Coast patch-nosed snake
Pituophis catenifer	Gopher snake
Lampropeltis getulus	Common kingsnake
Lampropelis zonata pulchra	San Diego mountain kingsnake
Thamnophis hammondii	Two-striped garter snake
Viperidae	**Vipers**
Crotalus ruber ruber	Northern red-diamond rattlesnake
Crotalus oreganus	Western rattlesnake

AVES	BIRDS
Odontophoridae	**New World Quail**
Callipepla californica	California quail
Ardeidae	**Herons, Bitterns, and Allies**
Ardea herodias	Great blue heron
Accipitridae	**Hawks, Kites, Eagles, and Allies**
Pandion haliaetus	Osprey
Elanus leucurus	White-tailed kite
Circus cyaneus	Northern harrier
Accipiter cooperii	Cooper's hawk
Accipiter striatus	Sharp-shinned hawk
Buteo lineatus	Red-shouldered hawk
Buteo regalis	Ferruginous hawk
Buteo jamaicensis	Red-tailed hawk
Aquila chrysaetos	Golden eagle
Falconidae	**Caracaras and Falcons**
Falco columbarius	Merlin
Falco peregrinus anatum	American peregrine falcon
Falco sparverius	American kestrel
Charadriidae	**Plovers and Lapwings**
Charadrius vociferus	Killdeer
Columbidae	**Pigeons and Doves**
* *Columba livia*	Rock (Feral) pigeon
Zenaida macroura	Mourning dove
Cuculidae	**Cuckoos, Roadrunners, and Anis**
Geococcyx californianus	Greater roadrunner
Tytonidae	**Barn Owls**
Tyto alba	Barn owl
Strigidae	**Typical Owls**
Megascops kennicottii	Western screech-owl
Asio otis	Long-eared owl
Bubo virginianus	Great horned owl
Athene cunicularia	Burrowing owl
Trochilidae	**Hummingbirds**
Archilochus alexandri	Black-chinned hummingbird
Calypte anna	Anna's hummingbird
Calypte costae	Costa's hummingbird
Selasphorus sasin	Allen's hummingbird
Picidae	**Woodpeckers and Allies**
Picoides nuttallii	Nuttall's woodpecker

Tyrannidae	**Tyrant Flycatchers**
Contopus sordidulus	Western wood-pewee
Empidonax traillii extimus	Southwestern willow flycatcher
Sayornis saya	Say's phoebe
Myiarchus cinerascens	Ash-throated flycatcher
Tyrannus verticalis	Western kingbird
Laniidae	**Shrikes**
Lanius ludovicianus	Loggerhead shrike
Vireonidae	**Vireos**
Vireo bellii pusillus	Least Bell's vireo
Corvidae	**Crows and Jays**
Aphelocoma californica	Western scrub-jay
Corvus brachyrhynchos	American crow
Corvus corax	Common raven
Alaudidae	**Larks**
Eremophila alpestris actia	California horned lark
Paridae	**Chickadees and Titmice**
Baeolophus inornatus	Oak titmouse
Troglodytidae	**Wrens**
Campylorhynchus brunneicapillus	Cactus wren
Thryomanes bewickii	Bewick's wren
Troglodytes aedon	House wren
Regulidae	**Kinglets**
Regulus calendula	Ruby-crowned kinglet
Sylviidae	**Old World Warblers and Gnatcatchers**
Polioptila californica californica	Coastal California gnatcatcher
Turdidae	**Thrushes**
Catharus guttatus	Hermit thrush
Timaliidae	**Babblers**
Chamaea fasciata	Wrentit
Mimidae	**Mockingbirds and Thrashers**
Toxostoma redivivum	California thrasher
Sturnidae	**Starlings**
* *Sturnus vulgaris*	European starling
Motacillidae	**Wagtails and Pipits**
Anthus rubescens	American pipit
Parulidae	**Wood Warblers**
Vermivora celata	Orange-crowned warbler
Dendroica petechia brewsteri	Yellow warbler
Dendroica coronata	Yellow-rumped warbler

Geothlypis trichas	Common yellowthroat
Icteria virens	Yellow-breasted chat
Emberizidae	**Emberizids**
Pipilo maculatus	Spotted towhee
Pipilo crissalis	California towhee
Aimophila ruficeps canescens	Southern California rufous-crowned sparrow
Spizella atrogularis	Black-chinned sparrow
Chondestes grammacus	Lark sparrow
Amphispiza belli belli	Bell's sage sparrow
Passerculus sandwichensis	Savannah sparrow
Ammodramus savannarum	Grasshopper sparrow
Passerella iliaca	Fox sparrow
Melospiza melodia	Song sparrow
Melospiza lincolnii	Lincoln's sparrow
Zonotrichia leucophrys	White-crowned sparrow
Cardinalidae	**Cardinals, Saltators, and Allies**
Pheucticus melanocephalus	Black-headed grosbeak
Passerina caerulea	Blue grosbeak
Icteridae	**Blackbirds**
Agelaius phoeniceus	Red-winged blackbird
Sturnella neglecta	Western meadowlark
Euphagus cyanocephalus	Brewer's blackbird
Molothrus ater	Brown-headed cowbird
Icterus bullockii	Bullock's oriole
Fringillidae	**Fringilline and Cardueline Finches and Allies**
Carpodacus mexicanus	House finch
Carduelis lawrencei	Lawrence's goldfinch
Carduelis psaltria	Lesser goldfinch
MAMMALS	**MAMMALIA**
Didelphidae	**Opossums**
* *Didelphis virginiana*	Virginia opossum
Phyllostomidae	**Leaf-nosed Bats**
Choeronycteria mexicana	Mexican long-tongued bat
Verspertilionidae	**Evening Bats**
Myotis ciliolabrum	Western small-footed myotis
Myotis yumanensis	Yuma myotis
Pipistrellus hesperus	Western pipistrelle
Eptesicus fuscus	Big brown bat
Lasiurus blossevillii	Western red bat

Lasiurus cinereus	Hoary bat
Lasiurus xanthinus	Western yellow bat
Corynorhinus townsendii	Townsend's big-eared bat
Antrozous pallidus	Pallid bat
Molossidae	**Free-tailed Bats**
Tadarida brasiliensis	Brazilian free-tailed bat
Nyctinomops femorosaccus	Pocketed free-tailed bat
Nyctinomops macrotis	Big free-tailed bat
Eumops perotis californicus	California mastiff bat
Leporidae	**Rabbits and Hares**
Sylvilagus audubonii	Desert cottontail
Lepus californicus bennettii	San Diego black-tailed jackrabbit
Sciuridae	**Squirrels, Chipmunks, and Marmots**
Spermophilus beecheyi	California ground squirrel
Geomyidae	**Pocket Gophers**
Thomomys bottae	Botta's pocket gopher
Heteromyidae	**Pocket Mice and Kangaroo Rats**
Chaetodipus fallax fallax	Northwestern San Diego pocket mouse
Muridae	**Mice, Rats, and Voles**
Reithrodontomys megalotis	Western harvest mouse
Peromyscus eremicus	Cactus mouse
Peromyscus californicus	California mouse
Peromyscus maniculatus	Deer mouse
Neotoma lepida intermedia	San Diego desert woodrat
Neotoma macrotis	Big-eared woodrat
* *Mus musculus*	House mouse
Microtus californicus	California vole
Canidae	**Foxes, Wolves, and Allies**
Canis latrans	Coyote
Urocyon cinereoargenteus	Gray fox
Procyonidae	**Raccoons and Allies**
Bassariscus astutus	Ringtail
Procyon lotor	Raccoon
Mustilidae	**Weasels and Allies**
Taxidea taxus	American badger
Mephitidae	**Skunks**
Mephitis mephitis	Striped skunk
Felidae	**Cats**
Puma concolor	Mountain lion
Lynx rufus	Bobcat
Cervidae	**Deer, Elk, and Allies**
Odocoileus hemionus	Mule deer

FLORA

GYMNOSPERMAE		**CONE-BEARING PLANTS**
Cupressaceae		**Cypress Family**
	Callitropsis forbesii	Tecate cypress
ANGIOSPERMAE: DICOTYLEDONAE		**DICOT FLOWERING PLANTS**
Anacardiaceae		**Sumac Family**
	Malosma laurina	Laurel sumac
	Rhus integrifolia	Lemonade berry
	Rhus ovata	Sugar bush
	Toxicodendron diversilobum	Poison oak
Asclepiadacea		**Milkweed Family**
	Asclepias californica	California milkweed
Asteraceae		**Sunflower Family**
	Ambrosia psilostachya	Western ragweed
	Artemisia californica	Coastal sagebrush
	Artemisia douglasiana	California mugwort
	Bacchoris emoryi	Emory's baccharis
	Baccharis malibuensis	Malibu baccharis
	Baccharis pilularis	Coyote bush
	Baccharis salicifolia	Mulefat
	Brickellia californica	California brickellbush
*	*Centaurea melitensis*	Tocalote
	Centromadia parryi ssp. *australis*	Southern tarplant
	Centromadia pungens ssp. *laevis*	Smooth tarplant
	Deinandra fasciculata	Fascicled tarweed
	Encelia californica	California encelia
	Ericameria palmeri	Grassland goldenbush
	Gnaphalium bicolor	Bicolored cudweed
	Isocoma menziesii var. *vernonioides*	Coastal goldenbush
	Lactuca serriola	Prickly lettuce
	Lepidospartum squamatum	Scale-broom
	Pentachaeta aurea ssp. allenii	Allen's pentachaeta
	Pseudognaphalium leucocephalum	White rabbit tobacco
	Senecio aphanactis	Rayless ragwort
	Sonchus asper	Prickly sow-thistle
	Symphyotrichum defoliatum	San Bernardino aster
	Xanthium strumarium	Cocklebur

Boraginaceae	**Borage Family**
Amsinckia menziesii var. *intermedia*	Common fiddleneck
Cryptantha intermedia	Common cryptantha
Plagiobothrys collinus var. *californicus*	California popcorn flower
Brassicaceae	**Mustard Family**
* *Brassica nigra*	Black mustard
Lepidium virginicum var. *robinsonii*	Robinson's peppergrass
Cactaceae	**Cactus Family**
Opuntia littoralis	Coastal prickly pear
Caprifoliaceae	**Honeysuckle Family**
Sambucus mexicana	Mexican elderberry
Chenopodiaceae	**Goosefoot Family**
Atriplex coulteri	Coulter's saltbush
Chenopodium album	Lamb's quarters
Crassulaceae	**Stonecrop Family**
Dudleya cymosa ssp. *ovatifolia*	Santa Monica Mountains dudleya
Dudleya multicaulis	Many-stemmed dudleya
Dudleya pulverulenta	Chalky live-forever
Ericaceae	**Heath Family**
Arctostaphylos sp.	Manzanita
Euphorbiaceae	**Spurge Family**
* *Ricinis communis*	Castor bean
Fabaceae	**Legume Family**
Astragalus brauntonii	Braunton's milk-vetch
Lotus scoparius var. *scoparius*	Coastal deerweed
Lupinus bicolor	Miniature lupine
* *Melilotus* sp.	Sweet clover
Fagaceae	**Beech Family**
Quercus agrifolia var. *agrifolia*	Coast live oak
Quercus berberidifolia	California scrub oak
Quercus dumosa	Nuttall's scrub oak
Grossulariaceae	**Gooseberry Family**
Ribes speciosum	Fuchsia-flowered gooseberry
Hydrophyllaceae	**Waterleaf Family**
Eriodictyon crassifolium	Thickleaf yerba santa
Nama stenocarpum	Mud nama
Phacelia minor	Wild Canterbury-bell
Juglandaceae	**Walnut Family**
Juglans californica var. *californica*	Southern California black walnut

Lamiaceae	**Mint Family**
Lepechinia cardiophylla	Heart-leaved pitcher sage
Monardella hypleuca ssp. *lanata*	Felt-leaved monardella
Monardella macrantha ssp. *hallii*	Hall's monardella
Salvia apiana	White sage
Salvia columbariae	Chia
Salvia leucophylla	Purple sage
Salvia mellifera	Black sage
Lauraceae	**Laurel Family**
* *Persea americana*	Avocado
Malvaceae	**Mallow Family**
Malacothamnus fasciculatus	Lax-flowered bushmallow
Sidalcea neomexicana	Salt Spring checkerbloom
Nyctaginaceae	**Four O'Clock Family**
Abronia villosa var. *aurita*	Chaparral sand-verbena
Onagraceae	**Evening Primrose Family**
Camissonia lewisii	Lewis' evening primrose
Plantaginaceae	**Plantain Family**
Plantago erecta	California plantain
* *Plantago major*	Common plantain
Platanaceae	**Sycamore Family**
Platanus racemosa	Western sycamore
Polemoniaceae	**Phlox Family**
Eriastrum densifolium ssp. *sanctorum*	Santa Ana River woolly-star
Polygonaceae	**Buckwheat Family**
Chorizanthe parryi var. *fernandina*	San Fernando Valley spineflower
Chorizanthe polygonoides var. *longispina*	Long-spined spineflower
Chorizanthe xanti var. *leucotheca*	White-bracted spineflower
Dodecahema leptoceras	Slender-horned spineflower
Eriogonum elongatum	Long-stemmed buckwheat
Eriogonum fasciculatum	California buckwheat
Rhamnaceae	**Buckthorn Family**
Ceanothus sp.	Ceanothus
Ceanothus megacarpus	Bigpod lilac
Rhamnus californica ssp. *californica*	California coffee berry
Rhamnus crocea	Spiny redberry
Rhamnus ilicifolia	Holly-leaved redberry
Rosaceae	**Rose Family**
Adenostoma fasciculatum	Chamise
Cercocarpus betuloides	California mountain mahogany
Cercocarpus minutiflorus	San Diego mountain mahogany
Heteromeles arbutifolia	Toyon

Rubiaceae	**Madder Family**
Galium angustifolium ssp. *angustifolium*	Chaparral bedstraw
Rutaceae	**Rue Family**
Cneoridium dumosum	Bushrue
Salicaceae	**Willow Family**
Salix exigua	Narrow-leaved willow
Salix gooddingii	Black willow
Salix laevigata	Red willow
Salix lasiolepis	Arroyo willow
Scrophulariaceae	**Figwort Family**
Castilleja exserta	Purple owl's clover
Mimulus aurantiacus	Bush monkey flower
Penstemon californicus	California beardtongue
Solanaceae	**Nightshade Family**
* *Nicotiana glauca*	Tree tobacco
Solanum douglasii	Douglas' nightshade
Urticaceae	**Nettle Family**
Urtica dioica ssp. *holosericea*	Hoary nettle
Verbenaceae	**Vervain Family**
Verbena lasiostachys	Western verbena

ANGIOSPERMAE: MONOCOTYLEDONAE	**MONOCOT FLOWERING PLANTS**
Alliaceae	**Onion Family**
Allium munzii	Munz' onion
Cyperaceae	**Sedge Family**
Carex sp.	Sedge
Iridaceae	**Iris Family**
Sisyrinchium bellum	California blue-eyed grass
Liliaceae	**Lily Family**
Brodiaea filifolia	Thread-leaved brodiaea
Bloomeria crocea	Common golden stars
Calochortus sp.	Mariposa lily
Calochortus plummerae	Plummer's mariposa lily
Calochortus weedii var. *intermedius*	Intermediate mariposa lily
Dichelostemma capitatum ssp. *capitatum*	Blue dicks
Nolina cismontana	Peninsular nolina
Yucca whipplei	Our Lord's candle

Poaceae		**Grass Family**
	Agrostis pallens	San Diego bentgrass
*	*Arundo donax*	Giant reed
*	*Avena* sp.	Wild oat
	Bromus carinatus	California brome grass
*	*Bromus* sp.	Brome
*	*Cortaderia selloana*	Pampas grass
*	*Cynodon dactylon*	Bermuda grass
	Distichlis spicata	Coastal salt grass
	Hordeum sp.	Barley
	Hordeum intercedens	Vernal barley
	Koeleria macrantha	Junegrass
	Leymus condensatus	Giant wild-rye
	Leymus triticoides	Beardless wild-rye
	Nassella lepida	Foothill needlegrass
	Nassella pulchra	Purple needlegrass
*	*Polypogon monspeliensis*	Rabbitfoot grass
	Vulpia microstachys var. *pauciflora*	Pacific fescue
	Vulpia sp.	Fescue
Typhaceae		**Cat-Tail Family**
	Typha sp.	Cat-tail

Taxonomy and nomenclature are based on the following.

Butterflies: North American Butterfly Association, 2001.

Fishes: Moyle, P.B., 2002.

Amphibians and reptiles: Crother, B.I. et al., 2000 (for species taxonomy and nomenclature); Stebbins, R.C., 2003 (for sequence and higher order taxonomy).

Birds: American Ornithologists' Union, 1998.

Mammals: Grenfell, W.E., Parisi, M.D. and McGriff, D., 2003.

Plant taxonomy and scientific nomenclature conform to Hickman, 1993. Common names for each taxa conform to Roberts, 1998.

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